

**Utilizing Distributed Ledger Technology to Integrate  
Anglophone and Indigenous Pedagogies in the 21<sup>st</sup>  
Century – The Case for Hawaii**

by

GREGORY HOWARD JACKSON

Thesis submitted for the Doctor of Philosophy in the School of Education

The University of Buckingham

March 2020

**Title: Utilizing Distributed Ledger Technology to Integrate Anglophone and Indigenous Pedagogies in the 21st Century – The Case for Hawaii**

**Author: Gregory Howard Jackson**

**ABSTRACT**

The emergence of the Fourth Industrial Revolution (Industry 4.0) is rapidly transforming many global industries influenced by the growth and use of artificial intelligence (AI), distributed ledger technology (DLT), ubiquitous cloud and edge computing as well as other emerging digital platform-based systems.

Mobile technologies and their use and adoption in education have generated research concerning new approaches for technology-enhanced learning (TEL), including mobile learning (m-learning). The evolution of TEL and recent research on m-learning and ubiquitous learning (u-learning) offer the potential for a new phase of educational delivery marked by a continuity of the learning experience across different learning settings using the mobile device as the mediator. Chan and colleagues use the term “seamless learning” to describe these new affordances.

Indigenous peoples have historically experienced both the positive and negative effects of being educated within the Anglophone tradition. American Indian, Alaska Native, and Native Hawaiian students have had the highest high-school dropout rates of any racial or ethnic groups in the United States and are the least represented on college campuses at both the undergraduate and graduate levels.

This thesis has selected the Native Hawaiian indigenous culture for in-depth analysis. It examines the epistemological and ontological underpinnings of the Native Hawaiian worldview and the educational history of indigenous Hawaiians in the State of Hawaii, both ancient and modern. In addition, it examines the potential for the synthesis of the Anglophone and Native Hawaiian pedagogical traditions in order to improve educational outcomes for these and other indigenous students attending United States public schools.

Since the early 1960s, the education of Native Hawaiians in the State of Hawaii has undergone a gradual systemic transformation that has led to improved outcomes. To that end, the Hawaiian language, cultural values, and the use of traditional pedagogies have blossomed, primarily due to the establishment of indigenous-led Hawaiian culture-based education (CBE) initiatives and scholarship.

Moreover, the creation of a growing number of Hawaiian Language Immersion and Public Charter Schools has elevated these CBE pedagogies to a new level of importance within the public education system of Hawaii. While significant challenges to increased progress remain, the innovative use of a cultural strengths-based approach has succeeded in addressing several of the historical barriers hindering Native Hawaiian student motivation and engagement in education. In addition, empirical research conducted in Hawaii has verified a CBE model framework capable of improving indigenous student outcomes within the Anglophone traditions of the United States educational system.

This thesis examines the potential for the integration of traditional Anglophone and indigenous pedagogies implemented through mobile seamless learning modalities. It analyses the significant synergies available through the utilization of DLT and Hyperledger applications for the facilitation of seamless learning interactions between providers and seekers of education when structured within a new integrative model. It also examines the unexplored gaps in the research associated with mobile-assisted seamless learning (MSL) and recommends the potential application of the model design to close those gaps, increase the seamlessness of MSL and propel learning opportunities. The model is then situated within both the Anglophone and Native Hawaiian pedagogical traditions in order to illustrate the MSL affordances available for both educators and mobile indigenous learners. Finally, several use cases of the integrative model are provided to demonstrate its flexibility and extendibility in different m-learning and other indigenous and traditional learning environments.

While not a comprehensive or complete solution, this integrative model nonetheless has implications for future research as well as potentially broad applications for indigenous communities to collaborate and share their knowledge at a lower cost, and for educators and students worldwide to benefit mutually as the Fourth Industrial Revolution advances.

## **ACKNOWLEDGMENTS**

I wish to express my sincere gratitude to Dr. Ronald E. Bartholomew. He consented to step-in and be my thesis supervisor over the last year at a critical time in the development of this dissertation. His guidance has been invaluable. He has been a friend and mentor and has given of himself, his time, and most importantly, provided his outstanding acumen and knowledge of scholarly writing to assist my efforts. Many thanks to him for his patience in reading and correcting style and grammatical shortcomings.

I am grateful to Dr. Michael Conolly, who acted as my initial thesis supervisor and helped with the organization, structure, and earlier writing and editing of my thesis. He also was an excellent mentor and friend. I am also most appreciative of the assistance provided by my Examiners, Dr. James Tooley and Dr. Bryant Jensen, in reviewing my original thesis manuscript and their professional recommendations for editing and improvement.

Finally, I wish to express my gratitude to my family, close friends, and others too numerous to mention, who provided constant encouragement. Without their emotional support, I would not have been able to sustain my motivation and devote the time and energy to this thesis that was required.

## **ABBREVIATIONS**

5G – 5<sup>th</sup> general wireless infrastructure

ABCFM – American Board of Commissioners for Foreign Missions

ACT – American College Testing

AI – artificial intelligence

AI or Indian – American Indian

AI/AN/NH –American Indian, Alaska Native and Native Hawaiian

AIHEC – American Indian Higher Education Consortium

AIM – American Indian Movement

AKRSI –Alaska Rural Systems Initiative

AN – Alaska Native

ANKN – Alaska Native Knowledge Network

BIA – Bureau of Indian Affairs

CBE – culture-based education

CHAT – Cultural Historical Activity Theory

CLD – culturally and linguistically diverse

CLM – Constructivist Learning Model

CRE –culturally-relevant education

CREDE – The Center for Research on Education, Diversity and Excellence

DLT – distributed ledger technology— also frequently referred to as the blockchain

DOE – Department of Education

ECC – Education and Community Change Project

ECE – early childhood education

ESL – English as a Second Language

Gen Z or Generation Z – individuals born from 1996-2012

GPS – global positioning system

HCIE – Hawaiian Cultural Influences in Education

HCR 108 – House Current Resolution #108

HF – Hyperledger Fabric or Hyperledger Framework—a suite of digital applications

HIDOE – Hawaii State Department of Education

HIER – The Hawaiian Indigenous Education Rubric

HPCS – Hawaiian Public Charter School (s)

HPS – The Hawaiian Studies Program

IC – instructional conversations

IC – integrated chip

ICT – information and communications technology

Industry 4.0 – The Fourth Industrial Revolution

IoT –the Internet of Things

K-12 – kindergarten through the 12<sup>th</sup> grade

KEEP – Kamehameha Early Education Program

LMS – learning management system (s)

MEIM – Multigroup Ethnic Identity Measure

MIT – Massachusetts Institute of Technology

m-learning – mobile learning

MOOC – massive open online course

MSCP – Michigan Community Scholars Program

MSL – mobile-assisted seamless learning

NASA – National Aeronautics and Space Administration

NCLB – No Child Left Behind

NH – Native Hawaiian

NHEA – Native Hawaiian Educational Assessments Project

NHEC – Native Hawaiian Education Council

NLL – Nā Lau Lama Hawaiian Charter School Alliance

NLN – Nā Lei Na‘auao – The Native Hawaiian Charter School Alliance

NSF – The National Science Foundation

OER – open educational resources

OHA – Office of Hawaiian Affairs

OHE – Office of Hawaiian Education

P-20 – pre-school through undergraduate college graduation

PPRC – Pacific Policy Research Center

SAT – Standard Aptitude Test

SNBH – Navajo language term - ‘saah naaghai bikeh hozhoon - signifying the interconnectedness that exists between the cognitive, physical, societal and spiritual dimensions of human experience

STE –The Sociocultural Theory of Education

STEM – science, technology, engineering and math

TCUs – Tribal Colleges and Universities in the United States

TEL – technology-enhanced learning

UH – Hilo – University of Hawaii, Hilo Campus

u-learning – ubiquitous learning

VR –virtual reality

WYMIWYG – what you measure is what you get

## TABLE OF CONTENTS

<b>ABSTRACT .....</b>	<b>ii</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>iii</b>
<b>ABBREVIATIONS .....</b>	<b>iv</b>
<b>LIST OF FIGURES .....</b>	<b>ix</b>
<b>LIST OF TABLES.....</b>	<b>xi</b>
<b>DECLARATION OF ORIGINALITY.....</b>	<b>xiii</b>
 <b>PART I: Thesis Description, Methodology and Review of the Literature</b>	
<b>CHAPTER 1: Thesis Description .....</b>	<b>2</b>
<b>CHAPTER 2: Constructing a Methodology – Identifying the Problem: A Personal Journey.....</b>	<b>10</b>
<b>CHAPTER 3: Review of the Literature.....</b>	<b>27</b>
 <b>PART II: Issues in Indigenous Education – The Case for Hawaii</b>	
<b>CHAPTER 4: A Comparative Overview of Modes and Models of Indigenous Education.....</b>	<b>145</b>
<b>CHAPTER 5: Native Hawaiian Cultural, Epistemological and Ontological Traditions.....</b>	<b>183</b>
<b>CHAPTER 6: The History and Heritage of Native Hawaiian Education....</b>	<b>222</b>
<b>CHAPTER 7: The Successes and Challenges of Hawaiian CBE in the Modern Era .....</b>	<b>249</b>
 <b>PART III: Wider Implications, Challenges and Recommendations</b>	
<b>CHAPTER 8: Individual and Collective Consciousness – A Theoretical Bridge.....</b>	<b>289</b>

<b>CHAPTER 9: Synergizing DLT Infrastructure with CBE Pedagogies: A New Paradigm of Seamless Education for Indigenous Learners</b> .....	<b>311</b>
<b>CHAPTER 10: Conclusions and Recommendations.....</b>	<b>375</b>
<b>BIBLIOGRAPHY .....</b>	<b>394</b>
<b>APPENDIX A: The Hawaiian Indigenous Education Rubric (HIER) .....</b>	<b>459</b>
<b>APPENDIX B: CREDE Standards.....</b>	<b>464</b>
<b>APPENDIX C: Original Thesis Proposal Diagram .....</b>	<b>469</b>



## LIST OF FIGURES

Figure 5.1: Hawaiian Worldview – Macro Level - Collective .....	186
Figure 5.2: Mana & Lokahi.....	196
Figure 5.3: E Ho’okanaka Training Program.....	209
Figure 7.1: Conceptual Framework Depicting the Dynamic and Interrelated Aspects of Well-Being.....	265
Figure 7.2: Developing a Framework: the Hawaiian Indigenous Education Rubric (HIER) .....	275
Figure 7.3: Hawaiian Cultural Influences in Education Study Model.....	281
Figure 7.4: Participating Teachers by School Type .....	282
Figure 8.1: Linear Polarity.....	298
Figure 8.2: Merging Continuum .....	298
Figure 8.3: Cyclical Continuum .....	299
Figure 9.1: Blockchain within the Context of the Internet.....	318
Figure 9.2: Educational Stakeholders with Interest in the Blockchain.....	329
Figure 9.3: Centralized (a), Decentralized (b), & Distributed Networks (c).....	332
Figure 9.4: Reversed Distributed and Decentralized Networks.....	332
Figure 9.5: Evolution of Computing Architecture.....	336
Figure 9.6: Cloud and Edge Computing – Complementary Technologies Powering IIoT.....	337
Figure 9.7: Cloud, Fog, and Edge.....	338
Figure 9.8: Hierarchical View of the Ten MSL Dimensions .....	350
Figure 9.9: Education Specific Seamless Learning Through an Extendable Infrastructure at the Edge .....	355
Figure 9.10: Hawaiian Indigenous Education Model CBE/CRE Extendable Infrastructure .....	360
Figure 9.11: Case #1 .....	363
Figure 9.12: Case #2 .....	364

Figure 9.13: Case #3 .....	365
Figure 9.14: Case #4 .....	366
Figure 9.15: Case #5 .....	367
Figure 9.16: Case \$6 .....	368

## LIST OF TABLES

Table 3.1: Gaps in American Indian, Alaska Native and Native Hawaiian Student Educational Performance in United States Schools .....	29
Table 3.2: Percentages of the Alaska Native and Native Hawaiian Populations to Total Population of the States of Alaska and Hawaii .....	88
Table 4.1: Generic Comparison of Worldviews.....	147
Table 4.2: The United States of America (AI and AN Demographics) .....	149
Table 4.3: AI/AN Education Achievement Levels.....	150
Table 4.4: American Indian Education Act Amendments 1969 to Present.....	156
Table 4.5: Native Hawaiian (NH) and Pacific Islander Demographics in the United States .....	160
Table 4.6: Australia (Aboriginal and Torres Strait Demographics) .....	163
Table 4.7: New Zealand (Māori Demographic Characteristics).....	170
Table 4.8: Ka Hikitia-Accelerating Success 2013-2017 Reports & Outcomes Summary .....	173
Table 4.9: Canada (First Nations, Métis and Inuit Demographics).....	175
Table 5.1: Comparing Correctional Education Framework to Native Hawaiian Education Framework.....	210
Table 6.1: Modern History and Status of Native Hawaiian Education in the State of Hawaii – 1959-Present.....	239
Table 6.2: Race-Ethnicity of Students in Public Schools in Hawai'i (2016).....	241
Table 7.1: Native Hawaiian Educational Assessment (NHEA) – 1983.....	254
Table 7.2: Relative Strengths Progress Native Hawaiian Cognitive Well-Being (2006-14) .....	266
Table 7.3: Key Components of Culture-Based Education.....	274
Table 7.4: Modern Theories (1960-Present) Used to Explain Minority Gaps and Indigenous Student School Achievement Gaps.....	278
Table 7.5: Culturally Relevant Strategies Reported by Teachers in Hawaii as Effective in Improving Student Outcomes .....	283
Table 8.1: A Historical Outline of Collective Human Consciousness .....	305

Table 9.1: Key Terms and Definitions – Forms of Technology Enhanced Learning (TEL).....	314
Table 9.2: Key Advantages of Distributed Ledger Technology .....	321
Table 9.3: Five Processing Stages – Student Activity to DLT Certification .....	322
Table 9.4: Learning Preferences of Generation Z – What Will it Take to Engage Them in Learning.....	342
Table 9.5: Mobile Seamless Learning (MSL) Framework – Wireless, Mobile, and Ubiquitous Technologies in Education (WMUTE) Design .....	349
Table 9.6: Examples of MSL Incorporating the DLT Facilitated Model Design .....	363

## DECLARATION OF ORIGINALITY

I hereby declare that my thesis/dissertation entitled *Utilizing Distributed Ledger Technology to Integrate Anglophone and Indigenous Pedagogies in the 21st Century – The Case for Hawaii* is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text, and is not substantially the same as any that I have submitted, or, is concurrently submitted for a degree or diploma or other qualification at the University of Buckingham or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my thesis has already been submitted, or is concurrently being submitted for any such degree, diploma, or other qualification at the University of Buckingham or any other University or similar institution except as declared in the Preface and specified in the text.

Signature:

Date: December 1, 2019

**PART I: Thesis Description, Methodology  
and Review of the Literature**

## CHAPTER 1

### Thesis Description

In 1959, Peter Drucker, a well-known global management and leadership expert, coined the term “knowledge workers.” He defined this as the ability to acquire and apply theoretical knowledge. An example would be a 20th-century college graduate hired with the expectation that he would then apply theoretical knowledge gained from a college education to practical applications, as opposed to an earlier era when individuals were hired with expectations limited to the demands of physical strength or manual skill.<sup>1</sup> In the 21<sup>st</sup> century however, due to the explosion of information through a digital medium, the former “age of the knowledge worker” seems to be rapidly waning. In addition, accelerated globalization has led to an ever-shrinking interdependent and highly interactive world.

This wave of changes has animated the necessity for different forms of thinking and approaches to learning. Daniel Pink has termed this the “Conceptual Age,” meaning, an age where higher conceptual thinking and working matched with a higher degree of empathy for others and aptitude to understand the subtleties of human interaction will be paramount.<sup>2</sup> What does this complex macro-trend portend for Western society as a whole? How will this impact traditional systems of education? How does one acquire and learn the skills and aptitudes required to thrive in such a new age dominated by these forces? This thesis is

---

<sup>1</sup> Peter Drucker, 'The Next Decade in Management', *Duns Review and Modern Industry*, 74 (1959).

<sup>2</sup> Daniel H. Pink, *A Whole New Mind: Why Right-Brainers Will Rule the Future* (New York: Powerhead Books, 2006).

an attempt to address and possibly even resolve some of these issues and questions.

Historically, a worldview that might generally be described as linear, hierarchical, scientific, competitive, reductive and analytical has dominated Western thought and its preferential approaches to education and learning.<sup>3</sup> An example of this phenomenon was discovered by Henrich, Heine and Norenzayan's study, wherein they noted the predominant tendency of behavioral scientists to over-generalize in their research about human psychology and behavior based on samples drawn entirely from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies.<sup>4</sup>

In contrast, many indigenous societies, that pre-date modernity, could be characterized as having a system of thinking or worldview that is more holistic, non-linear, spiritual, cooperative and egalitarian in epistemological approach.<sup>5</sup>

---

<sup>3</sup> G. L. Gutek, *A History of the Western Educational Experience* (Waveland Press, 1972).

David J. McGough, *Exploring the Foundations of Philosophy of Natural Education*, (1992) <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED353110> .

William H. McNeill, 'History and the Scientific Worldview', *History and Theory*, 37 (1998), p. 1.

H. J. Pietersen, *The Four Types of Knowing: Metaphysical, Scientific, Narrative, and Pragmatic: A Meta-Epistemology of Mind* (Lewiston, N.Y.: Edwin Mellen Press, 2011).

<sup>4</sup> Joseph Henrich, Steven J. Heine and Ara Norenzayan, 'The Weirdest People in the World?', *Behavioral and Brain Sciences*, 33 (2010), 61-83, in Cambridge Core [accessed 2020/04/09].

<sup>5</sup> *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice, Volume II*, ed. by Ah Nee-Benham, Maenette K.P. (New York and London: Routledge-Taylor and Francis Group, 2008).

Ray Barnhardt, *Indigenous Education Around the World - Workshop Papers*, Albuquerque, New Mexico edn, World Indigenous People's Conference: Education June 15-22, 1996, (1999) [https://archive.org/details/ERIC\\_ED467395/page/n1](https://archive.org/details/ERIC_ED467395/page/n1) .



Unfortunately, these societies have suffered from colonization, marginalization, assimilation, and, in some cases, frequent periods attending state-imposed boarding schools separate from their home and culture.

One of the Latin roots of the English word education is *educere*, which means to lead out or evoke from within.<sup>6</sup> This definition suggests that in the process of education, there are three essential components to learning: (1) the subject (the learner), (2) the object (the learned) and (3) the process of learning. The focus of the predominant Western worldview (analytical, linear) and the Anglophone approach to education is to help students learn something previously unknown to them. This acquisition of knowledge is measured today by student educational achievement under a largely centralized, teacher-driven pedagogical framework.<sup>7</sup> The indigenous worldview of education and its

---

Jioanna Carjuzaa and William G. Ruff, 'When Western Epistemology and an Indigenous Worldview Meet: Culturally Responsive Assessment in Practice', *Journal of the Scholarship of Teaching and Learning*, 10 (2010), pp. 68-79.

Vine Deloria Jr. and Daniel Wildcat, *Power and Place: Indian Education in America* (Golden, CO: Fulcrum Publishing, 2001).

Manulani Aluli Meyer, 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', *Social Justice*, *Thomas Gale*, 30 (2003), pp. 54-62.

Gale L. Russell and Egan J. Chernoff, *Incidents of Intrusion: Disruptions of Mathematics Teaching and Learning by the Traditional Western Worldview*, (North American Chapter of the International Group for the Psychology of Mathematics Education, 2013), p. 35  
<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED584481> .

<sup>6</sup> R. Bass and J. W. Good, 'Educare and Educere: Is a Balance Possible in the Educational System?', *Educational Forum*, 68 (2004), pp. 161-168  
<https://doi.org/10.1080/00131720408984623> .

<sup>7</sup> Jerald M. Liss, 'Creative Destruction and Globalization: The Rise of Massive Standardized Education Platforms', *Globalizations*, 10 (2013), pp. 557-570  
<https://www.tandfonline.com/doi/full/10.1080/14747731.2013.806741> .

Carla Moore, Michael D. Toth and Robert J. Marzano, *The Essentials for Standards-Driven Classrooms: A Practical Instructional Model for Every Student to Achieve Rigor* (West Palm Beach, FL: Learning Sciences International, 2017).

purposes operates from the opposite perspective, in that the learner engages in the process of learning internally, as opposed to responding to an external impetus. Indigenous educational methods are thus more decentralized, observational, student-driven and operate under a general assumption that everything learned is interconnected.<sup>8</sup> Where is the middle ground? Where can we find a more balanced epistemology—the integral juxtaposition or mechanism where learning takes place, where neither polarity dominates, and thus both are whole and complete? This dilemma, caused by the present duality in educational processes is hampering learning, especially for indigenous student populations. This thesis will attempt to show that the middle ground, is in fact, a superior epistemological approach for indigenous communities.

American Indian, Alaskan Native and Native Hawaiian (AI/AN/NH) students, among all ethnic groups in the United States, have historically had the lowest academic performance based on centralized educational achievement standards.<sup>9</sup> With the cessation of former assimilationist policies, beginning in

---

<sup>8</sup> George J. Sefa Dei, 'Rethinking the Role of Indigenous Knowledges in the Academy', *International Journal of Inclusive Education*, 4 (2000), pp. 111-132  
<https://doi.org/10.1080/136031100284849> .

George J. Sefa Dei, 'Spiritual Knowing and Transformative Learning', in *Expanding the Boundaries of Transformative Learning; Essays on Theory and Praxis*, ed. by Edmund V. O'Sullivan, Amish Morrell and Mary Ann O'Connor (New York: Palgrave, 2002), pp. 121-132.

<sup>9</sup> Catherine Freeman and others, *Status and Trends in the Education of American Indians and Alaska Natives*. ed. by National Center for Education Statistics, 108 vols (Washington, DC: Education Statistics Services Institute, 2005)  
<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED485861> .

Laura Merner and John Tyler, *Native American Participation among Bachelors in Physical Sciences and Engineering: Results from 2003-13 Data of the National Center for Education Statistics*, ed. by American Institute of Physics and Statistics Research Center, Focus On, (College Park, MD: AIP Statistical Research Center, 2017)  
<http://files.eric.ed.gov/fulltext/ED578986.pdf> .

the late 1960s through the end of the 1980s, considerable research focused on how to improve Native student academic achievement in America's public schools. The result has been a corpus of scholarship that has led, when applied, to a less than optimal pedagogical and learning environment, and to the realization of only minimal student progress.

At present, there is a shortage of scholarship that can demonstrate a synthesis or integral balance between the traditional Anglophone and indigenous educational approaches. Therefore, one purpose of this paper centers on the potential integration of these oppositional points of view where learning can be maximized for the benefit of the indigenous student.

As an educational framework for negotiating such a synthesis, this dissertation advocates for the adoption of the seven standards of effective pedagogy and learning established by The Center for Research on Education, Diversity and Excellence (CREDE). Through their extensive longitudinal analysis of the literature in education and diversity beginning in the 1980s, CREDE scholars established a set of five universal pedagogical standards which they defined as (1) Joint Productive Activity – *teacher and students producing together*; (2) Language Development--*developing language and literacy across the curriculum*; (3) Contextualization--*making meaning: connecting school to students' lives*; (4) Challenging Activities--*teaching complex thinking*; and (5) Instructional Conversation—*teaching through conversation*.

---

National Indian Education Association and National Education Association, *Native Education 101: Basic Facts about American Indian, Alaska Native, and Native Hawaiian Education*, (Washington, D.C.: National Indian Education Association, 2008).

The University of Hawaii at Manoa, College of Education, maintains the only operating CREDE program today. The Hawaiian educators have added two more standards to the original five, namely: (6) Modeling--promoting observational learning, and (7) Student Directed Activity--encouraging students' decision-making. It is significant to note that these two additional standards roughly parallel the standards found by the early CREDE scholars to be distinctly evident in Native American pedagogical approaches.

For the above mentioned and other reasons to be examined in subsequent chapters, the Hawaiian cultural worldview and Native Hawaiian students' performance in the State of Hawaii's educational systems--secondary school through college undergraduate level-- were selected by this thesis for an in-depth examination.

Today's education systems and pedagogical methods were tailored to meet the demands of mass production required in the twentieth century. Educational institutions in the United Kingdom and the United States are now struggling to adapt: to create a more individualized, agile, sustainable and lifelong learning system that matches the needs of the future. Striking a balance in the classroom has become increasingly critical in 21st-century learning environments. Educators are now confronted with growing ethnic diversity, racial disunity, distractions and challenges presented by mobile supercomputing, ubiquitous media and youth whose educational preferences have been scripted by a digital-age participatory culture. As a consequence of these present-day challenges, an attempt will be made by this paper to look forward and examine some of the synergies that might be possible in education

because of the era in which we now live—where all students, including indigenous learners, will need to function. Economist Klaus Schwab has called this era the emergence of the “Fourth Industrial Revolution”<sup>10</sup>—a time where disruptive emerging technologies such as Artificial Intelligence (AI)<sup>11</sup> and Distributed Ledger Technology<sup>12</sup> (DLT also- frequently referred to as the blockchain) will speed up technological breakthroughs and have a tremendous impact on the processes and dissemination of knowledge and learning—a time when the business models of every industry will be transformed.

DLTs combined with Hyperledger applications, in particular, offer the flexibility to customize content and instructional distribution modalities in real-time (e.g., from educator to single or a wide range of student groups both in and outside of the classroom). Thus, their integrated use as a technology-enhanced learning (TEL) infrastructure bodes well for potentially improving the educational outcomes of students today that have been deeply scripted by the digital age. The COVID-19 global pandemic has also highlighted the need for educational institutions to consider more advanced TEL systems capable of facilitating secure, high-quality interactions between instructor to pupil and from peer-to-peer an increasingly decentralized and mobile world. Some experts are predicting that decentralized blockchain-based systems and their derivatives

---

<sup>10</sup> Klaus Schwab, *The Fourth Industrial Revolution*, 1st edn (New York: Crown Business, 2017).

<sup>11</sup> Jim E. Greer, Kenneth R. Koedinger and Rosemary Luckin, *Artificial Intelligence in Education: Building Technology Rich Learning Contexts that Work* (Amsterdam, Netherlands: IOS Press, 2007).

<sup>12</sup> Alexander Grech and Anthony F. Camilleri, *Blockchain in Education*, ed. by Andreia Inamorato dos Santos, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017) [https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255\\_blockchain\\_in\\_education%281%29.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255_blockchain_in_education%281%29.pdf) .

will disperse computer power and better secure and transform the architecture of the Internet.<sup>13</sup>

In light of the needs and trends mentioned above, this thesis examines the potential for the integration of traditional Anglophone and indigenous pedagogies implemented through MSL modalities. It also conceptualizes the significant synergies available through the utilization of DLT Hyperledger applications for the facilitation of seamless learning interactions between providers and seekers of education when structured within a new integrative model.

The research presented in this dissertation is based on the following two hypothetical questions:

- (1) Is it possible to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students? and
- 2) Is it possible to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?<sup>14</sup>

---

<sup>13</sup> Gilder, George, *Life After Google: The Fall of Big Data and the Rise of the Blockchain Economy* (Washington D.C.: Regeneray Publishing, 2018)

<sup>14</sup> Tak-Wai Chan and others, 'One-to-One Technology-Enhanced Learning: An Opportunity for Global Research Collaboration', *Research and Practice in Technology Enhanced Learning Journal*, 1 (2006), pp. 3-29.

## CHAPTER 2

### Constructing a Methodology Identifying the Problem: A Personal Journey

When Europeans first arrived in the Americas, they found many indigenous populations from significant empires to smaller societies,<sup>15</sup> each possessing their own unique cultures, traditions and language. John Locke posited that from his philosophical perspective, these people were living in a pre-governmental state which he referred to as the “state of nature.”<sup>16</sup>

Over the past few years, my work and travel have put me in contact with several of these indigenous populations. On multiple occasions, I have been an eyewitness to what seemed to me to be the effects of the “colonial” practice of imposing Anglophone educational pedagogies on these indigenous groups. As a result, I was left to ponder the following questions: What has come of it? Has it been balanced and beneficial to these indigenous peoples? If so, why? If not, why not and what can be done to rectify this situation moving forward?

I interrupted my undergraduate studies to serve a short-term proselyting mission for the Church of Jesus Christ of Latter-day Saints to Taiwan where I

---

<sup>15</sup> Girolamo Benzoni, Jana Byars and Robert C. Schwaller, *The History of the New World: Benzoni's Historia Del Mondo Nuovo* (University Park, Pennsylvania: Penn State University Press, 2017).

Jayme A. Sokolow, *The Great Encounter: Native Peoples and European Settlers in the Americas, 1492-1800* (Florence: Routledge, 2015).

<sup>16</sup> John Locke, 'Two Treatiss of Government', in *Texts in the History of Political Thought*, ed. by Peter Laslett (Cambridge University Press, 1991), pp. 14-49. Locke makes numerous references to America, not least the dramatic, “Thus in the beginning all the World was America....” II, 49 the relevant citation is II, 14.

encountered the Amis and Atayal, non-Han Chinese peoples,<sup>17</sup> whose cultures and traditions bore striking and surprising similarities with those I had met among the indigenous people of Hawaii and other Pacific Island cultures. What is more, while reading the nineteenth-century journals of my great grandparents, I discovered a Pacific Rim connection with my ancestors: some Scots had immigrated to New Zealand, and there were British and Americans who had worked as missionaries in Hawaii. These links to my heritage served to increase my interest in the indigenous populations in New Zealand (the Māori) and the Native Hawaiians. The natural result of this and other encounters is what eventually led to this study.

As I continued to travel throughout the Pacific Rim during the 1980s, my repeated interactions with these indigenous populations heightened my awareness of the adverse effects colonial education had on them. I also uncovered a good deal of evidence of shared ancestry among the indigenous communities of Samoa, Tahiti, Tonga, New Zealand and Hawaii. This also provided me occasion to both study and listen to the stories of Native Hawaiians, Māori, and other indigenous Pacific Islanders. It became readily apparent that they all had one thing in common—they had all experienced the negative impacts of multi-generational, historical, and emotional trauma incident to Western colonization. They reported that this condition was, at least in part, exacerbated by the colonial practice of providing education according to the Anglophone tradition. This caused me to wonder if there might be a more

---

<sup>17</sup> *China and its Others: Knowledge Transfer through Translation, 1829-2010*, ed. by James St. André and Hsiao-yen Peng (Amsterdam – New York, NY: Brill | Rodopi, 2012).



effective way to educate these people, utilizing the most effective pedagogical methods from both the Anglophone and their indigenous educational systems.

After that, I began to engage in my independent study and research on this issue. It became apparent from my initial perusal of the corpus of academic literature on the subject that the non-indigenous, Anglophone, mainstream, government-sponsored public educational systems had various adverse effects on the educational outcomes of these peoples.<sup>18</sup> Furthermore, frequent discussions with indigenous educators and students themselves provided first-hand evidence this was accurate.<sup>19</sup>

During the first decade of the 21<sup>st</sup> century (2002-2007), my scholarly interest in these issues increased when my employer assigned me to work with a technology-assisted educational outreach program among the Navajo Nation. Joe Shirley, President of that Nation at that time, and a former educator was focused on two objectives: improving the educational achievement of the rising generation of Navajo youth and maintaining his nation's cultural integrity. He

---

<sup>18</sup> Deirdre Almeida, *Countering Prejudice Against American Indians and Alaska Natives through Antibias Curriculum and Instruction*, ed. by Office of Educational Research and Improvement, (Charleston, West Virginia: ERIC Clearinghouse on Rural Education and Small Schools, 1996) <http://files.eric.ed.gov/fulltext/ED400146.pdf> .

Rene Dussault and Erasmus Georges, *Report of the Royal Commission on Aboriginal Peoples, Vol. 1: Looking Forward, Looking Back*, ed. by Canada Royal Commission on Aboriginal Peoples and Canada Privy Council Office, (Ottawa: Canada Communication Group - Publishing, 1996).

<sup>19</sup> Ray Barnhardt, 'Cross-Cultural Issues in Alaskan Education', in *Educational Renewal in Rural Alaska, Vol II*, ed. by R. Barnhardt, A. O. Kawagley and F. Hill, II vols (1982).

Maria Estela Brisk and others, *Educators' Preparation for Cultural and Linguistic Diversity: A Call to Action*, (Washington, DC: American Association of Colleges for Teacher Education, 2002).

Christopher Oliver, *The Internal Colonialism Model: What the Model has done to the Education of Native Americans*, (1996).

coined as a motto “technology based on tradition,” to promote his educational and cultural objectives. Once again, while working directly with the Navajo Nation during this time, I saw first-hand evidence of similar challenges I had seen among the indigenous populations of the Pacific Rim. Shortly after that, I initiated a broader scholarly investigation of not only the Navajo educational history but also the epistemologies, ontologies and modern educational milieus of Alaska Native, American Indian, Native Hawaiian and other indigenous populations in the United States and Canada.<sup>20</sup>

The educational challenges I witnessed among the indigenous Navajo people were mainly systemic and so daunting that they are difficult to describe. A brief description of the Nation’s situation perhaps would help to place things into an appropriate context concerning what I experienced. The Navajo Nation is a sovereign, yet U.S. federally dependent third-world country located within the first-world political and economic system of the United States. Covering a land area of 27,413 square miles with a total tribal population 356,890 (2016

---

<sup>20</sup> *Indigenous Educational Models for Contemporary Practice: In our Mother’s Voice, Volume II*, ed. by Ah Nee-Benham.

Gregory Cajete, *Look to the Mountain: An Ecology of Indigenous Education* (Durango, CO: Kivaki Press, 1994).

Pamela Colorado, ‘Wayfinding and the New Sun: Indigenous Science in the Modern World’, *Noetic Science Review*, (1992), pp. 1-7.

Patricia Anne Davia, “*Choose Life: A Ceremonial Process Model*”, (Seattle, WA: Center for Creative Change, Antioch University, 2005).

William Demmert and John Towner, *A Review of the Research Literature on the Influences of Culturally Based Education on the Academic Performance of Native American Students* (Portland, OR: Northwest Regional Educational Laboratory, 2003)  
<http://www.nwrel.org/indianed/cbe.pdf> [accessed January 15, 2010].

estimate), the Navajo, as an indigenous tribal group, represents the second-largest American Indian population in America.<sup>21</sup>

The 2010 US Government Census statistics revealed that the unemployment rate of the Navajo Nation was over 45%. In addition, 48% of families were subsisting below the federal poverty level, and only 6% had attained some college education.<sup>22</sup> The schools are state-sponsored. However, an important transformational change occurred in 2016 when the U.S. Government allowed the Navajo Board of Education to take greater control of the education of the Bureau of Education (BIA) elementary school students under a single system of standards, assessments, and accountability.<sup>23</sup>

### **An Analysis of Indigenous Educational Outcomes**

While pursuing this research, I discovered that Alaska Natives and American Indians, representing only about 1.2% of the school-age population in America, are the most consistently underachieving student demographic in terms of

---

<sup>21</sup> Navajo Nation and United States Census Statistical Records (2016).

<sup>22</sup> United States 2010 Census and Navajo Government published statistics.

<sup>23</sup> Refer to press release retrieved from [https://newsmaven.io/indiancountrytoday/archive/obama-administration-gives-historic-control-of-education-system-to-navajo-nation-pWaDpD\\_CNEeeD5GSGpyuwu/](https://newsmaven.io/indiancountrytoday/archive/obama-administration-gives-historic-control-of-education-system-to-navajo-nation-pWaDpD_CNEeeD5GSGpyuwu/).

secondary school graduation, retention, and academic achievement level.<sup>24</sup> The Native Hawaiians are not far behind, though they fare somewhat better.<sup>25</sup>

At this point in my journey, I was determined to investigate, through scholarly inquiry, the primary factors influencing the poor educational outcomes of these indigenous populations. I began my investigation by assembling a collection of scholarly research on Anglophone and indigenous pedagogies in an attempt to ascertain what factors might lead to the lower than average educational outcomes attained by indigenous students. My study of this corpus of research revealed several factors that have historically influenced these outcomes: multi-generational psychological and emotional trauma incident to colonization, poverty, negative family influences, challenges associated with English as a second language, and a general shortage of trained teachers and instructional content tailored to the culture of indigenous student populations.<sup>26</sup> The data and

---

<sup>24</sup> S. Aud, M. Fox and A. Kewalkamani, *Status and Trends in the Education of Racial and Ethnic Groups (NCES 2010-015)*, (Washington, D.C., U.S. Government Printing Office: U.S. Department of Education, National Center for Educational Statistics, 2010).

Cristobal de Brey and others, *Status and Trends in the Education of Racial and Ethnic Groups 2018*, ed. by National Center for Education Statistics and Institute of Education Sciences, NCES 2019038 vols (Washington, DC: U.S. Department of Education, 2019)  
<https://nces.ed.gov/pubs2019/2019038.pdf> .

New Mexico Higher Education Department, *Native American and Hispanic Students: Recruitment, Enrollment, Retention and Graduation Trends; Institutional Performance Measures and Targets; Institutional Action Plans*, (New Mexico Higher Education Department, 2005)  
<http://files.eric.ed.gov/fulltext/ED500286.pdf> .

<sup>25</sup> Kamehameha Schools, *Native Hawaiian Educational Assessment Update 2009: A Supplement to Ka Huaka'i 2005*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation Division, 2009) [http://www.ksbe.edu/assets/spi/pdfs/kh/KH\\_Supplement09.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/KH_Supplement09.pdf) .

<sup>26</sup> H. Adams, *Prison of Grass: Canada from the Native Point of View* (Toronto, Ontario: General Publishing, 1988).

Francis Adyanga Akena, 'Critical Analysis of the Production of Western Knowledge and its Implications for Indigenous Knowledge and Decolonization', *Journal of Black Studies*, 43 (2012), pp. 599-619.

reports gathered were both quantitative and qualitative.<sup>27</sup> My study was essentially qualitative in nature, involving extensive analysis of these sources,

---

Kathryn Hu-Pei Au and Cathie Jordan, 'Hawaiian Americans: Teaching Reading to Hawaiian Children: Finding a Culturally Appropriate Solution', in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography – Book 1*, ed. by Henry T. Trueba (Rowley, MA: Newbury House Publishers, 1981), pp. 139-152.

M. Battiste, 'Enabling the Autumn Seed: Toward a Decolonized Approach to Aboriginal Knowledge, Language, and Education', *Canadian Journal of Native Education*, 22 (1999), pp. 16-27.

Charla Bear, 'American Indian Boarding Schools Haunt Many', in *History of Indian Schools Traced through Reports - Excerpts Quoted from the 1886 Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior* (2008) <http://www.npr.org/templates/story/story.php?storyId=16516865> [accessed February 13, 2013].

Vine Deloria Jr., *A Brief History of the Federal Responsibility for the American Indian* Washington, D.C. (U.S. Department of Health, Education and Welfare, Office of Education, 1979).

D. Deyhle, 'Learning Failure: Tests as Gatekeepers and the Culturally Different Child', in *Success Or Failure*, ed. by H. Trueba (Rowley, MA: Newbury House, 1987), pp. 85-108.

Teresa L. McCarty, 'American Indian, Alaska Native, and Native Hawaiian Education in the Era of Standardization and NCLB—An Introduction', *Journal of American Indian Education*, 47 (2008), pp. 1-9.

National Advisory Council on Indian Education, *Indian Education: A Federal Entitlement*. 19th Annual Report to the U.S. Congress for Fiscal Year 1992 (1993).

Abner Oakes, Traci Maday and Center for Comprehensive School Reform and Improvement, *Engaging Native American Learners with Rigor "and" Cultural Relevance*. Issue Brief, (Center for Comprehensive School Reform and Improvement, 2009).

Joseph Watras, 'Progressive Education and Native American Schools, 1929-1950', *Educational Foundations*, 18 (2004), pp. 81-105.

<sup>27</sup> Kalani Beyer, 'Comparing Native Hawaiian Education with Native American and African American Education during the Nineteenth Century', *American Educational History Journal*, 41 (2014), pp. 59-75.

Carjuzaa and Ruff, 'When Western Epistemology and an Indigenous Worldview Meet: Culturally Responsive Assessment in Practice', pp. 68-79.

A. Castagno and B. Brayboy, 'Culturally Responsive Schooling for Indigenous Youth: A Review of the Literature', *Review of Educational Research*, 78 (2008), pp. 941-993.

Vine Deloria Jr., 'Conclusion', in *Indians and Anthropologists: Vine Deloria Jr. and the Critique of Anthropology*, ed. by T. Bilosi and L. Zimmerman (Tucson, AZ: University of Arizona Press, 1997).

Jill Fleury DeVoe, Kristen Darling-Churchill and National Center for Education Statistics, *Status and Trends in the Education of American Indians and Alaska Natives: 2008*. NCES 2008-084,

which included an overview of the history of the American secondary school system and a comparison of the Western Anglophone and indigenous and American philosophies of education.

### **Developing a Methodology**

A research question that emerged from this initial scholarly inquiry was this: How to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students? If this were indeed workable, the intent would then be to define a useful set of integrated interventions capable of improving both the teaching and academic progress of underachieving indigenous secondary and undergraduate students within the context of the educational system of the United States.

After defining this research question, I then undertook an organized effort to uncover points of relative similarities and dissimilarities between Western and indigenous ways of gaining knowledge and what forms of knowledge were valued respectively as a cultural lens for analysis. Subsequently, I uncovered through a review of the literature, some of the significant differences and inherent tensions between teaching and learning as approached by both philosophies of education.

After that, I engaged in an in-depth examination of the pertinent research on culture-based education and culturally-relevant pedagogies in the United States

---

(Washington, DC: National Center for Education Statistics; Institute of Education Science; U.S. Department of Education, 2008).

and other English-speaking countries located on the Pacific Rim having significant indigenous populations. I discovered from a review of this corpus of literature that scholars and public educators in the States of Alaska and Hawaii had produced a high volume of studies over the last two decades devoted to the use of indigenous culture-based education (CBE) curriculum and pedagogies for improving indigenous student school progress.

Further analysis uncovered the fact that the research collaborators in Hawaii were most advanced regarding a potential synthesis of Anglophone and indigenous pedagogies because of their consistent longitudinal evidenced-based research approach. For this reason and other salient statistical and demographic factors, I determined that the integration of Anglophone and indigenous pedagogies among Native Hawaiians would serve as the most appropriate baseline and context for my research examination.

Because I have been professionally involved in distance education and the use of technology-enhanced learning (TEL) methods for over twenty years, I naturally became intrigued about the potential role that new emerging technologies such as artificial intelligence (AI) and in particular distributed ledger technology (DLT or blockchain) might play further to close the gaps in indigenous students' academic performance.

After examining the recent literature in the fields of seamless learning, mobile learning and the critical emerging technologies such AI, virtual reality (VR), DLTs and edge-computing, I found a considerable gap in the literature. I discovered that there were no studies had combining effective CBE pedagogies with these critical emerging systems to enhance indigenous student progress.

While the evolution of AI and DLTs are still just beginning, their rapid adoption portends an accelerated transformation of the business models of all industries, including education. It seemed to me that AI and DLT systems could be especially beneficial as a new way to disseminate educational opportunities to indigenous peoples around the world if properly deployed and used interactively in concert with excellent teaching.

A second research question emerged from this discovery, namely: How to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?

**The inherent difficulties in doing socio-educational research where causal formulations are limited – Inventing an appropriate methodological focus**

Some educators are fond of talking about the statistical assessment of what constitutes valid learning in a precise way; however, it seems to me that knowledge acquisition, as such, is fundamentally an experiential phenomenon. It is also a social and environmental phenomenon in the classroom. Vygotsky's research defined education in terms of social interaction.<sup>28</sup> Social aspects, however, are not easily explained using a purely scientific paradigm. The use of concepts like intention, or the motivation for action and reasons for behavior, required some serious investigation on my part to bring some semblance of comparison between Western and indigenous approaches to learning and knowledge acquisition. For example, while Descartes made a clear distinction

---

<sup>28</sup>. Lev S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes* (Cambridge, Massachusetts: Harvard university press, 1980).



between the material and spiritual substance, i.e., between the physical and mental,<sup>29</sup> a similar separation between the material and spiritual is rarely made by the Native Hawaiian people in their respective worldviews or epistemologies.<sup>30</sup> Because there appeared to be two divergent ways of seeing the world, I determined that an inescapable exploratory track of my scholarly effort would have to include the investigation of these comparisons.

For example, generally speaking, a basic tenet of the cognitive view of the indigenous peoples of Hawaii is that the physical body and the thinking mind are inseparable.<sup>31</sup> As I continued to research this phenomenon, my studies of the last decade led me to the discovery that scholars on both sides of the ledger (both Western and indigenous) have been giving greater credence and value to the fact that we live in a world of growing interconnectedness.<sup>32</sup>

---

<sup>29</sup> Rene' Descartes and John Cottingham, *René Descartes: Meditations on First Philosophy: With Selections from the Objections and Replies* (New York: Cambridge University Press, 2012).

<sup>30</sup> *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice, Volume II*, ed. by Ah Nee-Benham.

Meyer, 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', pp. 54-62.

<sup>31</sup> Manulani Aluli Meyer, 'Our Own Liberation: Reflections on Hawaiian Epistemology', *The Contemporary Pacific*, 13 (2001), p. 124.

<sup>32</sup> Russell Bishop and others, 'Te Kotahitanga: Addressing Educational Disparities Facing Maori Students in New Zealand', *Teaching and Teacher Education: An International Journal of Research and Studies*, 25 (2009), pp. 734-742.

Maggie George and Daniel McLaughlin, 'Re-Framing Mainstream Assessment: Colleges use Native Philosophies of Growth and Reflection', *Tribal College Journal of American Indian Higher Education*, 19 (2008), pp. 18-22.

A. Heibert and D. Hiebert, 'Antiseptic Education: The Myth of Irregularity', *Faculty Dialogue*, 17 (1993), pp. 1-28.

Manulani Aluli Meyer, 'Native Hawaiian Epistemology: Exploring Hawaiian Views of Knowledge', *Cultural Survival Quarterly*, 22 (1998), pp. 38-40.

At this point, it is perhaps essential to interject that a primary hypothesis of my original thesis proposal to the University was that it was preferable to find a combined framework for mitigation of the natural tensions between the traditional Anglophone (e.g., individualistic/competitive) and Indigenous (e.g., collectivist) worldviews. By this, I mean that instead of approaching a perceived oppositional polarity between these educational systems and worldviews, the assumption I adopted, was that *both* the Anglophone and indigenous peoples' worldviews and approaches to education were correct, useful and a valid means of learning from their respective points of view. This assumption was articulated in my original thesis proposal that was submitted and accepted by the University of Buckingham. (Refer to Appendix C for a copy of this thesis proposal). However, taking this assumptive point of view did not rule out the prospect of a null hypothesis as a final thesis conclusion.

Subsequently, as a direct result of my examination of the literature and analysis of the scholarship produced over the last twenty years in Hawaii, I chose to advocate for the adoption of the seven standards of effective pedagogy and learning established by CREDE through their extensive analysis of the research and development literature in education and diversity. Because these standards express principles of effective pedagogy *for all students*, they also theoretically had the potential for the integration of both traditional Anglophone and Native Hawaiian indigenous pedagogical and effective CBE/CRE methods.

---

David Kekaulike Sing, Alapa Hunter and Manulani Aluli Meyer, 'Native Hawaiian Education: Talking Story with Three Hawaiian Educators', *Journal of American Indian Education*, 39 (1999), pp. 4-13.

### **The Rationale for the Selection of a Qualitative Research Approach**

My thesis proposal being more conceptual, thematic, historical, multi-disciplinary in nature, a focused quantitative study or research design was not suitable. Therefore, the research methodology adopted throughout is more conceptual and qualitative in approach, scope and sequence.

### **Standard Nomenclature, English Language Sources and Geographic/Demographic Limitations**

The issue of the use of a consistent nomenclature in the development of the writing of this thesis was a limiting factor. For example, the legal, statistical and historical terms most widely seen in the literature studied and accepted for the over 530 indigenous populations in the Continental United States (geographic, tribal reservations) are American Indian (AI) and Alaska Native (AN). The term Native Hawaiians (NH) is the acceptable term used in the State of Hawaii for this indigenous sub-demographic living there and elsewhere in the United States. In comparison, the Government of Canada predominantly uses the term Aboriginals or First Nations, Métis and Inuit peoples in their statistics and legal designations as are the terms Indigenous/Aboriginals and Māori in Australia and New Zealand respectively. When referring to these groups in general, I have chosen to use the term “indigenous” to represent them all for uniformity in nomenclature.

### **Using different types of data to illuminate the inquiry**

It is important to note that the types of data needed to illuminate factors tied to my research questions involved mixed-research approaches. The primary search methodology adopted was extensive qualitative research of documents, studies, and where possible, experimental studies or quasi-experimental

studies in the prevailing literature, specifically the field of education. Moreover, except for rare cases, where non-English scholars have added seminal contributions, I limited my analysis to English language sources only.

### **Criteria used to judge the quality of the findings**

The measures to evaluate the quality of research sources investigated were primarily traditional. Did the source show rigor, validity, and reliability? Other criteria were used to determine the overall merit of the source, e.g., did it include a diversity of perspectives, clarity of voice, etc. to determine the overall trustworthiness and credibility of the source.

Because in any qualitative research inquiry, the researcher per se is the investigative instrument, every attempt was made to ensure fairness and objectivity while assuming a position akin to what Hammersley and Atkinson conceptualized as “reflexive activity.” In discussing social research methods, Hammersley and Atkinson state: “the existential fact is... there is no way to escape the social world to study it.”<sup>33</sup> They further correctly posit that “data in themselves cannot be valid or invalid; what is at issue are the inferences drawn from them.”<sup>34</sup> Far from being seen as liabilities, I made every attempt in my analysis to reflect on different research procedures as opportunities for understanding and to monitor the effects of my personal bias. This same

---

<sup>33</sup> M. Hammersley and P. Atkinson, *Ethnography: Principles in Practice* (London: Tavistock, 1983) p. 15.

<sup>34</sup> *Ibid.*, p. 191.

approach was also useful for developing and testing of theoretical insights that then emerged.

### **The Selection of the Native Hawaiian Indigenous Culture and Modern Educational Experience as the Primary Research Concentration**

The selected in-depth investigative focus of this thesis was the education of Native Hawaiians at the secondary and undergraduate college levels within the American Anglophone educational system and tradition.

The choice of the Native Hawaiian indigenous cultural context as the focus of my thesis purpose and research was selected for several reasons. First was the statistically significant demographic consideration—Native Hawaiian students comprise 26.7% of the students within the State of Hawaii’s public school system.<sup>35</sup> The second was the homogenous Native Hawaiian cultural heritage and language tradition. The issues of demographic size, homogeneity of language and geography seemed to be vital from a cultural perspective. In comparison, among the designated American Indian (AI) and Alaska Native (AN) and indigenous populations in the United States, the majority of these peoples live on reservations in rural areas with no more than a few hundred members or are widely dispersed amongst U.S. urban communities.<sup>36</sup> The native languages of these other U.S. indigenous communities are also extremely diverse, and in many cases, dying out. Furthermore, as will be articulated more in detail in later chapters, the history of Native Hawaiians under the Kingdom of Hawaii and the colonial period was entirely separate and

---

<sup>35</sup> U.S. Department of Education Statistics (2010-2012).

<sup>36</sup> Ibid.

distinct from that experienced by most of the tribal peoples in continental North America.

In contrast, the last forty years in the Hawaiian Islands has witnessed a dramatic resurgence of Native Hawaiian language use as well as explosive population growth.<sup>37</sup>

Lastly, was the systemic transformation of education that has taken place in the modern era for Native Hawaiians. Since the early 1980s, there has occurred a proliferation of Hawaiian language immersion and public elementary/secondary charter schools and numerous other State of Hawaii and Native Hawaiian-led innovative community initiatives aimed at the perpetuation of Native Hawaiian culture and educational advancement. This historical reality offered a rich context and volume of scholarly literature for in-depth investigation and analysis.

Native Hawaiian preferences in their educational practices allowed for the inclusion of such concepts as native spirituality and consciousness as integral components of analysis in my research. Being “subjective” in this way is considered acceptable when viewed from the perspective of this Native Hawaiian scholarly work and cultural perspective.<sup>38</sup>

---

<sup>37</sup> C. L. Haliniak, *A Native Hawaiian Focus on the Hawai'i Public School System, SY2015 (Ho'Ona' Auau (Education) Fact Sheet, Vol. 2017, no. 1)*, (Honolulu, HI: Office of Hawaiian Affairs, Research Division, Special Projects, 2017) <https://19of32x2yl33s8o4xza0gf14-wpengine.netdna-ssl.com/wp-content/uploads/A-Native-Hawaiian-Focus-on-the-Hawaii-Public-School-System.pdf> .

<sup>38</sup> 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', pp. 54-62.

There also exists a general belief among the elders and scholars of indigenous people that cultural practices, ceremonies, and protocols, by their very nature, perpetuate and restore good practice in education.<sup>39</sup> In this context, it proved necessary to provide some narrative discussion on the comparative Western and Native Hawaiian indigenous teaching literature and learning paradigms, and definitions of good practice as a methodological guide. The relative constructs that I used to discuss both the respective worldviews and forms of education were organized under the following four areas: (1) *Ontology* – the theory of the nature of existence or reality; (2) Epistemology - the study of the nature of thinking and knowing; (3) Methodology – the theory of how knowledge is perceived and gained, and (4) Axiology - the ethics, values, or relative worth or morals that guide the search for knowledge and learning.

### **Conclusion**

I proceeded under the guidelines, focus and methodology described above to complete a Ph.D. dissertation investigating answers to the following two research questions:

- (1) How to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students? and
- (2) How to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?

---

<sup>39</sup> Shawn Wilson, *Research is Ceremony: Indigenous Research Methods* (Winnipeg, Manitoba, Canada: Fernwood Publishing, 2008).

## **CHAPTER 3**

### **Review of the Literature**

#### **Introduction**

##### **Objective and Purpose Statement**

This literature review focuses on a comparative analysis of the pedagogies that have empirically been shown to improve the academic achievement of students within both the Anglophone and indigenous educational traditions. The primary investigative focus pertains to Native Hawaiian students attending U.S. schools at the secondary and undergraduate levels.

The purpose of this analysis is to investigate the following two research questions:

- (1) How to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students?
- (2) How to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?

##### **Historical Overview and Statement of Need**

A brief historical overview will provide a context for this study.

“Culturally and Linguistically Diverse” (CLD) is the most commonly used term in the literature and U.S based statistical reports to refer to a student whose culture or language is different from the historically dominant White, English-



speaking student. In the decade between 1990 and 2000 in the U.S., the enrollment of Kindergarten through 12<sup>th</sup> grade (K-12) students whose native tongue was not English grew by 104.97%, a growth rate equal to five times that of the total enrollment in public schools.<sup>40</sup>

The multi-faceted issue of how to educate CLD students attending United States schools is the subject of intense ongoing debate. Advancing educational outcomes via improved pedagogies for this target population represents a challenge that many have wrestled with over an extended period, and the results are still seen by many as unsatisfactory.<sup>41</sup> Of primary concern to many educators working actively with indigenous students is that contemporary praxis and national education policies continue to favor assimilation versus mutual accommodation.<sup>42</sup> This paper will not attempt to address this complex policy issue. *What is of central concern to this thesis are the possible improvements in pedagogies that might potentially close the gaps in the academic outcomes for these indigenous students.*

Subsets of these populations who live within the confines of the United States are referred to as American Indian, Alaska Native and Native Hawaiian (AI/AN/NH) in government reports and the literature of the academy. These students have historically had the highest high school dropout rates of any

---

<sup>40</sup> U.S. Department of Education and National Center for Education Statistics, *The Condition of Education 2002, NCES 2002-25*, (Washington, DC: U.S. Government Printing Office, 2002).

<sup>41</sup> B. M. Brayboy, 'Postsecondary Education for American Indian and Alaska Natives: Higher Education for Nation Building and Self-Determination', *ASHE Higher Education Report*, 37 (2012), pp. 1-140.

<sup>42</sup> Brisk and others.

racial or ethnic groups in America<sup>43</sup> and are least represented on college campuses at both the undergraduate and graduate levels.<sup>44</sup> Additional data demonstrating the need for intervention for the AI/AN/NH indigenous populations are highlighted in the table below:

<b>Table 3.1 - Gaps in American Indian, Alaska Native and Native Hawaiian Student Educational Performance in United States Schools</b>
<ul style="list-style-type: none"><li>❖ Approximately 644,000 American Indian (AI) and Alaska Native (AN) and 185,000 Native Hawaiian (NH) indigenous students in the U.S. K-12 system. (2008 statistics)</li><li>❖ In 2017, 72.4% of AI/AN graduated from High School, the lowest of any ethnic or racial group in the United States, and they had the highest dropout rates of 42%, with just over 53.5% receiving their diplomas on time.</li><li>❖ Only 10% of American Indian/Alaska Natives have obtained a Bachelor's degree and 17% an Associate's degree. This compares to 21.9% for Native Hawaiians and a U.S. national average of 54% for White students (2015-16 statistics).</li><li>❖ AI/AN students were 1.53 times more likely to receive special education services for specific learning disabilities and 2.89 times more likely to receive such assistance for developmental delays than the average of all other racial groups. (2008 statistics)</li></ul>
Sources: Adapted from Jill Fleury DeVoe, Kristen Darling-Churchill and National Center for Education Statistics, <i>Status and Trends in the Education of American Indians and Alaska Natives: 2008</i> . NCES 2008-084, (Washington, DC: National Center for Education Statistics; Institute of Education Science; U.S. Department of Education, 2008  M. C. Stetser and R. Stillwell, <i>Public High School Four-Year on-Time Graduation Rates and Event Dropout Rates: School Years 2010-11 and 2011-12. First Look (NCES 2014-391)</i> , (Washington, DC: National Center for Education Statistics; Institute of Education Sciences; U.S. Department of Education, 2014)  National Indian Education Association and National Education Association, <i>Native Education 101: Basic Facts about American Indian, Alaska Native, and Native Hawaiian Education</i>

<sup>43</sup> Susan Aud and others, *The Condition of Education 2013*. NCES 2013-037, (National Center for Education Statistics, 2013).

National Indian Education Association and National Education Association, *Native Education 101: Basic Facts about American Indian, Alaska Native, and Native Hawaiian Education*.

M. A. Reddy, *Statistical Record of Native Americans*, (Washington, D.C.: Gale Research, 1993).

<sup>44</sup> L. Brown and S. E. Kurpius, 'Psychosocial Factors Influencing Academic Persistence of American Indian College Students', *Journal of College Student Development*, 38 (1997), pp. 3-12.

D. R. Falk and L. P. Aitkin, 'Promoting Retention among American Indian College Students', *Journal of American Indian Education*, 23 (1984), pp. 24-31.

### **A Historical Summary of United States Education Policy**

In 1832, Chief Justice John Marshall of the U.S. Supreme Court gave it as his opinion that: “It is difficult to comprehend...that the discovery of either by the other should give the discoverer the rights in the country discovered which annulled the previous rights of its ancient possessors.”<sup>45</sup> Part of the rights of indigenous peoples annulled during the colonial era in the United States (circa 1750-1950) was their sovereignty over their education and learning.

Consequently, as will be examined below, indigenous populations have been subjected to an Anglophone educational system that has not always considered practices that would produce the best outcomes for them.

As an additional backdrop for later analysis, the following is a brief summary of three historical stages representing the general relationship between those whose activities have been historically and polemically viewed as “colonizers,” as well as the Government of the United States and its indigenous peoples:

1. Post-Contact Cooperation or Rough Co-equality (circa 1500 to 1750) –

This was a period where peaceful relations under treaties existed between indigenous peoples and the immigrants in the Americas.

2. Colonization and Assimilation (circa 1750 to 1950) – After power tilted

toward the non-indigenous governments and peoples, those colonizers formalized ways to expropriate indigenous occupied lands, among other regulatory actions, aimed at civilizing and educating America’s indigenous peoples in European ways.

---

<sup>45</sup> *Worcester V. Georgia*, 31 U.S. 515, (US Supreme Court, 1832)  
<https://www.oyez.org/cases/1789-1850/31us515> [accessed May 8, 2014].

3. Ethnic Revitalization and Renewal (circa 1950 to the present) – During this period, government officials and indigenous peoples worked together to abolish policies that had negatively impacted the preservation of AI/AN/NH languages and cultures, restoring a more mutually respectful balance.

Significantly, from the beginning of the 19<sup>th</sup> century, until the 1960s, the U.S. educational policy of assimilation was imposed on both new immigrants and indigenous peoples.<sup>46</sup>

Whether intentional or not, one of the ways assimilation organically occurred was through the efforts of Christian missionaries, who established local schools in the Anglophone tradition. As early as the beginning of the seventeenth century, Christian missionaries established schools in the Continental United States and the Hawaiian Islands for the purpose of converting the indigenous population to Christianity through education and assimilation.<sup>47</sup> When these early efforts failed, the missionaries concluded that indigenous adults could not be educated.<sup>48</sup> As Christian missionaries grappled with their apparent inability to educate indigenous adults, they concluded that the very nature of indigenous culture and spirituality was the cause of this failure.<sup>49</sup>

---

<sup>46</sup> I. M. Young, 'Polity and Group Difference: A Critique of the Ideal of Universal Citizenship', *Ethics*, 99 (1989), pp. 250-299.

<sup>47</sup> J. A. Banks, 'Diversity, Group Identity, and Citizenship Education in a Global Age', *Educational Researcher*, 37 (2008), pp. 129-139.

<sup>48</sup> S. J. Waterman, 'A Complex Path to Haudenosaunee Degree Completion', *Journal of American Indian Education*, 46 (2007), pp. 20-40.

<sup>49</sup> Bear, 'American Indian Boarding Schools Haunt Many'.

A similar concern regarding the culture and spirituality of American Indians led to the boarding school policies for that indigenous population in the United States beginning in the 1880s, requiring the separation of these children from their parents for educational purposes. Deyhle and Swisher maintain that separation was justified as a rationale for not implementing practices that would benefit indigenous populations as a whole.<sup>50</sup> As a result of these negative perceptions of indigenous cultures, state and national educational policymakers have historically imposed the Anglophone methods of education on these marginalized populations. From the 1880s onward, as Sanchez and Stuckey suggest, the cultures and languages of indigenous peoples were seen by state and national education leaders as an impediment to the implementation of the broader needs and standards of U.S. public education.<sup>51</sup> Several scholars share the point of view that the imposed removal of indigenous populations from their languages and cultures combined with the pressure to adapt to mainstream norms have adversely affected both the identity development and the academic progress of indigenous children.<sup>52</sup>

---

Julie Kaomea, *Education for Elimination in Nineteenth-Century Hawai'i: Settler Colonialism and the Native Hawaiian Chiefs' Children's Boarding School*. 54 vols (GB: Cambridge University Press, 2014), p. 123.

<sup>50</sup> D. Deyhle and K. Swisher, 'Research in American Indian and Alaska Native Education: From Assimilation to Self Determination', *Review of Research in Education*, 22 (1997), pp. 113-194.

<sup>51</sup> John Sanchez and Mary E. Stuckey, 'From Boarding School to Multicultural Classroom: The Intercultural Politics of Education, Assimilation, and American Indians', *Teacher Education Quarterly*, 26 (1999), pp. 83-95.

<sup>52</sup> M. T. Garrett and E. F. Pichette, 'Red as an Apple: Native American Acculturation and Counseling with Or without Reservation', *Journal of Counseling and Development*, 78 (2000), pp. 3-13.

P. G. Horse, 'Reflections on American Indian Identity', in *New Perspectives on Racial Identity Development: A Theoretical and Practical Anthology*, ed. by C. L. Wijeyesinghe and B. W. Jackson III (New York, NY: New York University Press, 2001), pp. 91-107.

From 1890 through 1950, laws imposing the assimilation and acculturation of these marginalized populations were legally adopted as the official educational policies of the United States Federal Departments of Education and Interior.<sup>53</sup> Moreover, in the Kingdom of Hawaii (1819-1893) and during the U.S. controlled Republic /Territory of Hawaii era (1893-1959), similar policies were made normative.<sup>54</sup>

School desegregations in the United States during the 1960s and 1970s inaugurated new methods of teaching CLD students. These new methods, which were implemented in the Continental United States first and later in Hawaii, included ethnic revitalization, bringing about a significant shift in sociopolitical theory as well as educational policy initiatives.<sup>55</sup> The rationale underpinning this policy shift centered on the sovereign legal right of marginalized minorities, ethnic groups, and tribal communities to maintain their distinct linguistic and cultural identities as long as they did not conflict with national ideals. Originating during this same period was a series of new pedagogies termed “Culturally Relevant Education” (CRE), which had the purpose of facilitating indigenous populations’ recovery from their former

---

C. Pewewardy and B. Frey, 'American Indian Students' Perceptions of Racial Climate, Multicultural Support Services, and Ethnic Fraud at a Predominantly White University', *Journal of American Indian Education*, 43 (2004), pp. 32-60.

<sup>53</sup> Sanchez and Stuckey, pp. 83-95.

<sup>54</sup> Phil Barnes, *A Concise History of the Hawaiian Islands* (Honolulu, HI: Petroglyph Press, Ltd., 2009), p. 96.

<sup>55</sup> *A Brief History of the Federal Responsibility for the American Indian Washington, D.C.*

Haliniak, C. L., *A Native Hawaiian Focus on the Hawai'i Public School System*.

Shawn Malia Kana'iaupuni, N. Malone and K. Ishibashi, *Ka Huaka'i: 2005 Native Hawaiian Educational Assessment*, (Honolulu, HI: Kamehameha Schools, Pauahi Publications, 2005).

marginalized state.<sup>56</sup> Thus, these new CRE pedagogies helped individuals among these indigenous populations perceive that policymakers were embracing social justice and were using the classroom as a platform for these changes.<sup>57</sup>

These theoretical and educational policy changes, which were preceded by the ethnic revitalization movement, led to the U.S. government's relinquishing sovereignty to indigenous populations.<sup>58</sup> This revitalization, in turn, enabled many indigenous groups, e.g., AI/AN/NH, to begin a process of reestablishing traditional culture and educational practices.<sup>59</sup> As early as 1961, a U.S. Department of Interior *Task Force on Indian Affairs* recommended a wide range of new reforms, including the encouragement of AI participation in the formulation of school programs.<sup>60</sup>

The purpose of this brief historical summary was to provide a framework for the more detailed examination of the primary arguments that will follow, concerning pedagogies for indigenous students in the United States. Limitations concerning

---

<sup>56</sup> Banks, pp. 129-139.

<sup>57</sup> Brittany Aronson and Judson Laughter, 'The Theory and Practice of Culturally Relevant Education: A Synthesis of Research Across Content Areas', *Review of Educational Research*, 86 (2016), pp. 163-206.

<sup>58</sup> D. Champagne, 'Beyond Assimilation as a Strategy for National Integration: The Persistence of American Indian Political Identities', *Transnational Law & Contemporary Problems*, (1993), p. 109.

<sup>59</sup> Horse, pp. 91-107.

<sup>60</sup> Senate Special Subcommittee on Indian Education, *Indian Education: A National Tragedy - A National Challenge*, (Washington, DC: U.S. Senate Committee on Labor and Public Welfare, 1969), pp. 91-501 <https://eric.ed.gov/?id=ED034625> .

the scope of this literature review will be outlined below before moving to that examination.

### **Limitations of this Literature Review**

- A. **Qualitative Review** – This will be a qualitative analysis of the most effective pedagogical methods applicable to indigenous students based on the scholarship of both indigenous and non-indigenous (Western) scholars.
- B. **Period Limitation** – This review will be limited to the literature from circa 1950 to the present. The rationale for the selection of this period is that this date corresponds to the approximate philosophical starting point of the ethnic revitalization movement and the changes in educational policy and legislation supporting indigenous ethnic inclusion in the United States.
- C. **English Language and Geographical Limitation** – This literature review will be limited to English Language sources pertaining to American Indian, Alaskan Native and Native Hawaiian populations in the United States Educational system. For evaluation and comparative purposes, references will be made to scholarship from other English-speaking countries on the Pacific Rim, such as Australia, New Zealand and Canada, when these sources add comparative support to the investigation of this thesis.
- D. **Terminology, Sequence, and Organization of the Literature Review** – While there are many terms used to refer to indigenous populations (e.g., Aboriginal, Native American, American Indian, Alaska Native, Native Hawaiian), this study will use the term



“indigenous.” To be more precise, when referencing particular research quotes or sources, the contextual term referenced by the author(s) will be used to remain consistent with the emphasis offered by that source.

Each published work will be discussed in the context of its contribution to answering the primary research questions in the categories outlined.

Identification of the more seminal contributions to the understanding of the pedagogies shown to be effective in education for indigenous learners, in particular, Native Hawaiians, will be examined in greater detail. Gaps in the current scholarship will be elucidated, indicating the need for further research.

This literature review and thesis document utilize the MHRA (Modern Humanities Research Association) style for its footnotes and bibliography.

## **SUMMARY OF MAJOR ARGUMENTS**

Each argument will be examined thematically in seven sections with headings marked by the letters A through G. First, a summary of the argument emerging from the literature will be stated. This will be followed by an analysis, either advocating or rejecting the thesis of each argument. Finally, the significant issues, gaps in the scholarship and implications for additional research, if any, will be provided.

### **ARGUMENT A – THE IMPORTANCE OF CULTURE-BASED EDUCATION AND CULTURALLY RELEVANT EDUCATION PEDAGOGIES**

*The inclusion of Culture-Based Education (CBE) would greatly improve and sustain the academic achievement levels of indigenous student populations.*

*Significantly, scholars within and outside of the indigenous community agreed*

*on this particular point. Also, the use of effective CRE pedagogies were considered a much-needed classroom adaptation for the improvement of CLD student outcomes.*

### **Analysis of the Corpus of Literature**

Before proceeding to outline the various positions held by scholars in this field as they relate to Argument A, definitions of the terms Culture-Based Education (CBE) and Culturally Relevant Education (CRE) are necessary. Indigenous Hawaiian researcher, Kana'iaupuni, has offered an excellent working definition of CBE and its components:

Perhaps most simply put, culture refers to shared ways of being, knowing, and doing. *Culture-based education is the grounding of instruction and student learning in these ways, including the values, norms, knowledge, beliefs, practices, experiences, and language that are the foundation of an (indigenous) culture.* Because U.S. society typically views schools through a Western lens—where Western culture is the norm, what many do not recognize is that all educational systems and institutions are culture-based. Hence, the term is conventionally used to refer to 'other' cultures, and in this case, indigenous cultures.<sup>61</sup> [Italics added]

In addition, Kana'iaupuni suggests that CBE consists of five essential elements that can vary significantly, depending on the local context:

- **LANGUAGE:** recognizing and using native or heritage language.
- **FAMILY & COMMUNITY:** Actively involving family and community in the development of curricula, everyday learning, and leadership.
- **CONTEXT:** Structuring the school and the classroom in culturally-appropriate ways.

---

<sup>61</sup> Shawn Malia Kana'iaupuni, *A Brief Overview of Culture-Based Education and Annotated Bibliography (Culture-Based Education Brief Series)* (Honolulu, HI: Kamehameha Schools, Research & Evaluation, 2007).

- **CONTENT:** Making learning meaningful and relevant through culturally grounded content and assessment.
- **DATA & ACCOUNTABILITY:** Gathering and maintaining data using various methods to ensure student progress in culturally responsive ways.<sup>62</sup>

CRE-related language emerged in the literature in the 1980s when scholars began using terms like *culturally appropriate*,<sup>63</sup> *culturally congruent*,<sup>64</sup> *culturally responsive*,<sup>65</sup> and *culturally compatible education*.<sup>66</sup> Two different types of CRE were initially proposed in these early studies. One group of studies focused on the concept of *culturally responsive teaching* as embodied in the early work of Gay,<sup>67</sup> and the second group of studies focused on *culturally relevant pedagogy*, as found in the scholarly works of Ladson-Billings.<sup>68</sup> However, this

---

<sup>62</sup> Ibid.

<sup>63</sup> Au and Jordan, pp. 139-152.

<sup>64</sup> G. Mohatt and F. Erickson, 'Cultural Differences in Teaching Styles in an Odawa School: A Sociolinguistic Approach', in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography*, ed. by Henry T. Trueba, G. P. Guthrie and Kathryn H. Au (Rowley, MA: Newberry House, 1981), pp. 105-119.

<sup>65</sup> C. Cazden and E. Leggett, 'Culturally Responsive Education: Recommendations for Achieving Lau Remedies II', in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography*, ed. by Henry T. Trueba, G. P. Guthrie and Kathryn H. Au (Rowley, MA: Newbury House, 1981), pp. 69-86.

<sup>66</sup> Cathie Jordan, 'Translating Culture: From Ethnographic Information to Educational Program', *Anthropology & Education Quarterly*, 16 (1985), pp. 105-123.

<sup>67</sup> Geneva Gay, *Culturally Responsive Teaching: Theory, Research and Practice* (New York: Teachers College Press, 2000).

Geneva Gay, 'Preparing for Culturally Responsive Teaching', *Journal of Teacher Education*, 53 (2002), pp. 106-116.

<sup>68</sup> Gloria Ladson-Billings, 'But That's Just Good Teaching! the Case for Culturally Relevant Pedagogy', *Theory into Practice*, 43 (1995), pp. 159-165.

Gloria Ladson-Billings, 'Toward a Theory of Culturally Relevant Pedagogy', *American Educational Research Journal*, 32 (1995), pp. 465-491.

thesis will use the term “*Cultural Relevant Education*,” instead of these other categorizations, primarily because it is more commonly used in the corpus of literature.<sup>69</sup>

Gay provides a useful definition of CRE as “using the cultural knowledge, prior experiences, and performance styles of diverse students to make learning more appropriate and effective for them.”<sup>70</sup> According to Gay, CRE pedagogies can enable teachers to teach to and through the strengths of these students. She describes culturally responsive teaching as having the following essential characteristics:

- It acknowledges the legitimacy of the cultural heritages of different ethnic groups, both as legacies that affect students’ dispositions, attitudes and approaches to learning as worthy content to be taught in the formal curriculum.
- It builds bridges of meaningfulness between home and school experiences as well as between academic abstractions and lived socio-cultural realities.
- It uses a wide variety of instructional strategies that are connected to different students’ learning preferences.
- It teaches students to know and praise their own and each other’s cultural heritages.

---

<sup>69</sup> Aronson and Laughter, 'The Theory and Practice of Culturally Relevant Education: A Synthesis of Research Across Content Areas', pp. 163-206.

<sup>70</sup> *Culturally Responsive Teaching: Theory, Research and Practice*, p. 29.

- It incorporates multicultural information, resources, and materials in all of the subjects and skills routinely taught in school.<sup>71</sup>

Ladson-Billings defines CRE as a pedagogy “that empowers students intellectually, socially, emotionally, and politically using cultural referents to impart knowledge, skills, and attitudes.”<sup>72</sup> Ladson-Billings explains that culturally relevant pedagogy is a “pedagogy of opposition not unlike critical pedagogy, but specifically committed to a collective, not merely individual, empowerment.”<sup>73</sup> In addition, Ladson-Billings suggests a framework for culturally relevant pedagogy with three primary components:

- (1) Culturally relevant pedagogues think in terms of long-term academic achievement and not merely end-of-year tests.<sup>74</sup>
- (2) Culturally relevant pedagogy directs its focus on cultural competence, which she refers as “helping students to recognize and honor their own cultural beliefs and practices while acquiring access to the wider culture, where they are likely to have a chance of improving their socioeconomic status and making informed decisions about the lives they wish to lead.”<sup>75</sup>

---

<sup>71</sup> Ibid.

<sup>72</sup> Gloria Ladson-Billings, *The Dreamkeepers: Successful Teachers of African American Children* (San Francisco, CA: Jossey-Bass, 1994), p. 16-17.

<sup>73</sup> 'But That's just Good Teaching! the Case for Culturally Relevant Pedagogy', p. 160.

<sup>74</sup> Gloria Ladson-Billings, “Yes, but how do we do it?” Practicing Culturally Relevant Pedagogy', in *White Teachers Diverse Classrooms: Creating Inclusive Schools, Building on Students' Diversity, and Providing True Educational Equity*, ed. by Julie G. Landsmen and Chance W. Lewis (Sterling, VA: Stylus, 2006), p. 34.

<sup>75</sup> Ibid.

- (3) Instructors who use culturally relevant pedagogy seek to develop sociopolitical consciousness in the student, which includes a teacher's obligation to find ways for "students to recognize, understand, and critique current social inequalities."<sup>76</sup>

Aronson and Laughter posited that while many teachers and educational researchers have claimed to adopt various tenets of CRE, recent scholarship suggests that the U.S. educational system's movement toward standardized curricula and testing has tended to marginalize CRE in educational reform discourses.<sup>77</sup> Sleeter agreed with this purported marginalization and suggested that there are gaps in the scholarship that need to be overcome in order to combat the impact that standardized curricula have had on the broader use of CRE in the following three areas:

- (1) There is a clear need for evidence-based research that documents connections between culturally-responsive pedagogy and student outcomes.
- (2) There is a need to educate parents, teachers, and education leaders about what culturally-responsive pedagogy means and looks like in the classroom; and
- (3) There is a need to reframe the public debate about teaching, especially teaching in diverse and historically underserved communities.<sup>78</sup>

---

<sup>76</sup> 'Toward a Theory of Culturally Relevant Pedagogy', p. 476.

<sup>77</sup> Aronson and Laughter, p. 163.

<sup>78</sup> C. Sleeter, 'Confronting the Marginalization of Culturally Responsive Pedagogy', *Urban Education*, 47 (2012), p. 576.

Another gap frequently mentioned in the literature was that effective CBE or CRE pedagogies should include indigenous epistemologies as essential ingredients. In addition to epistemology, researchers from indigenous communities advocated for the inclusion of the culture's spiritual heritage as a means of forming a more balanced and holistic educational approach.

Similar epistemological connections have historically represented the general formation of practical knowledge for many indigenous cultures. Indigenous "knowledge systems" fundamentally maintain the connection between the spiritual, moral, scientific, and natural worlds. As a result, their epistemologies and ontologies frequently deal with metaphysics. Deloria suggested that indigenous cultures have "knowledge systems" in which all knowledge and experience was drawn together to establish the proper moral and ethical road of direction for human beings."<sup>79</sup> Deloria and Wildcat further described Native American metaphysics as:

...the realization that the world, and all its possible experiences, constituted a social reality, a fabric of life in which everything had the possibility of intimate knowing relationships, because, ultimately, everything was related.<sup>80</sup>

Meyer, a Native Hawaiian scholar, asserts that each culture's unique epistemology, or as she said, "thinking about how we think," brings about a vital meta-consciousness—which in turn forms a robust hermeneutic basis for causal awareness and the interpolation of life for each individual.<sup>81</sup> In this way,

---

<sup>79</sup> Vine Deloria Jr., 'If You Think about it, You Will See that it is True', *ReVision*, 18 (1996), p. 37.

<sup>80</sup> Deloria and Wildcat, p. 2.

<sup>81</sup> Manulani Aluli Meyer, 'Native Hawaiian Epistemology: Sites of Empowerment and Resistance', *Equity & Excellence in Education*, 31 (1998), pp. 22-28.

Meyer defines epistemology somewhat differently from its classical definition. She views epistemology as something that is fundamentally subjective and unique to the individual. Moreover, she asserts that a confrontational “two-dimensional only epistemology” (e.g., Anglophone vs. Hawaiian indigenous), might hinder change and restrict flexibility in our current educational practices.<sup>82</sup> Meyer’s argument coincides with the interconnected relationships that form the basis of the epistemology and heuristic practice in the indigenous Hawaiian cultural context.

Meyer’s contention is relevant to the primary research question posed by this thesis. Perhaps the use of fewer confrontational definitions between Anglophone and indigenous epistemologies could potentially yield more genuine mutual understanding and pedagogical malleability and integration.

Meyer offered another critical point concerning the historical conflicts between Western and indigenous worldviews. She suggested that typically, Native Hawaiian epistemologies do not incorporate the “mind-heart dilemma” that is fundamental to Western scientific thought. She asserted that this finds its origins in the theories of René Descartes.

Descartes's signature doctrine was the separation of the mind and body, and this permeated other theories he advanced.<sup>83</sup> Descartes argued that the differences between body (a material thing) and mind (an immaterial thing)

---

<sup>82</sup> Ibid.

<sup>83</sup> William D. Hart, 'Dualism', in *A Companion to the Philosophy of Mind*, ed. by Samuel Guttenplan (Oxford: Blackwell: Wiley, 1996), pp. 265-267.



make the two ontologically distinct. Commonly known as Cartesian dualism, this doctrine subsequently influenced theories of knowledge acquisition, observation, and scientific experimentation and thinking. These theories underpinned the core understanding of modern Western epistemology, cognition, and reasoning.<sup>84</sup> Meyer posited that Native Hawaiian epistemologies are based on the interconnectedness of physical, mental and spiritual. Thus, according to Meyer, being “subjective”—meaning to interconnect these three dimensions of knowing—is entirely acceptable from the perspective of Native Hawaiian epistemology.<sup>85</sup>

Hanohano, another indigenous Hawaiian scholar, agreed with both Deloria and Meyer. He argued that a spiritual dimension in teaching (not to be confused with religion) should be incorporated as part of a truly culturally appropriate epistemology. He also posited that the inclusion of concepts of spirituality could be a means of restoring balance, wholeness, and purpose to education for indigenous learners.<sup>86</sup>

---

<sup>84</sup> D. Garber, 'Descartes, René (1596–1650)', in *Routledge Encyclopedia of Philosophy* (Taylor and Francis, 1998).

Manulani Aluli Meyer, *Ho'Oulu - our Time of Becoming - Hawaiian Epistemology and Early Writings* (Honolulu, Hawai'i: 'Ai Pohaku Press - Native Books, 2003).

<sup>85</sup> Manulani Aluli Meyer, 'Acultural Assumptions of Empiricism: A Native Hawaiian Critique', *Canadian Journal of Native Education*, 25 (2001), pp. 188-98.

<sup>86</sup> Peter Hanohano, 'The Spiritual Imperative of Native Epistemology: Restoring Harmony and Balance to Education', *Canadian Journal of Native Education*, 23 (1999), pp. 206-19.

In addition to these three dimensions, both Western scholar Gregoric<sup>87</sup> and Native American researcher Wilson argued that ceremonial protocols are also essential elements of effective pedagogy for indigenous students.<sup>88</sup>

Sanders posited that cross-cultural conflicts between indigenous epistemologies and Anglophone pedagogies have long been an essential contributor to the lower academic progress of indigenous students in U.S. schools.<sup>89</sup> In order to mitigate indigenous student failure, Applebee and Eisner offered a potential solution: they recommended a curriculum that provides a 'conversational space' for students to engage the subject matter. They purported that this space is vital because it is where personal knowledge and comprehension are socially and culturally situated. Their central argument was that pedagogies are more effective when the roles of the teacher and student can be transformed to support the construction of meaning *in the learner's cultural context*, rather than the mere transmission of knowledge.<sup>90</sup>

---

<sup>87</sup> Marta Gregoric, 'Cultural Capital and Innovative Pedagogy: A Case Study among Indigenous Communities in Mexico and Honduras', *Innovations in Education and Teaching International*, 46 (2009), pp. 357-366.

<sup>88</sup> *Research is Ceremony: Indigenous Research Methods*.

<sup>89</sup> D. Sanders, 'Culture Conflicts: An Important Factor in the Academic Failures of American Indian Students', *Journal of Multicultural Counseling and Development*, 15 (1987), pp. 81-90.

<sup>90</sup> Arthur N. Applebee, *Beyond the Lesson: Reconstructing Curriculum as a Domain for Culturally Significant Conversations*. Report Series 1.7, (Albany, New York: National Research Center on Literature Teaching and Learning; University at Albany; State University of New York, 1993).

National Society for the Study of Education Yearbook Committee, *Learning and Teaching the Ways of Knowing*, ed. by Elliot Eisner, National Society for the Study of Yearbooks, Eighty-fourth Yearbook of the National Society for the Study of Education - Part II vols (Chicago, IL: University of Chicago Press, 1985).

This literature suggests that mutual respect for the philosophical and pedagogical foundations of both the indigenous and the Anglophone educational traditions is essential in order to achieve and sustain the academic progress of indigenous students attending U.S. public schools. Dee and Penner's recent empirical work on the causal effects of an ethnic studies curriculum piloted in several San Francisco high schools strongly suggests that culturally relevant teaching--when implemented in a supportive, high-fidelity context---is capable of significantly improving the academic performance of CLD at-risk students.<sup>91</sup>

One of the most significant contributions to the body of literature regarding the value of integrating both educational traditions was a study conducted by scholars at the University of Alaska. Between 1990 and 2006, Barnhardt, Kawagley and their colleagues conducted extensive research to identify and document the indigenous epistemologies of Alaska Native (AN) peoples. Their research project, entitled the *Alaska Rural Systemic Initiative (AKRSI)*, involved over 50 public educational entities, including numerous AN indigenous community groups. Their investigative efforts incorporated an interdisciplinary, longitudinal, cross-cultural project framework.

The AKRSI project's inquiry is relevant to this thesis because its findings affirmed that using CBE/CRE pedagogies improved AN student outcomes.<sup>92</sup>

---

<sup>91</sup> T. Dee and E. Penner, 'The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum', *American Educational Research Journal*, 54 (2017), 127-166.

<sup>92</sup> Ray Barnhardt, 'Educational Renewal in Rural Alaska: The Alaska Rural Systemic Initiative', *Rural Educator*, 21 (2000), pp. 9-14.

AKRSI scholars tracked AN students' academic progress utilizing longitudinal empirical research methods. Importantly, the project's participants demonstrated measurable improvements in attendance, retention and performance in core school subjects.<sup>93</sup>

Another project aim of AKRSI was to combine Anglophone and indigenous pedagogies in a complementary and non-conflicting manner. The University of Alaska, Fairbanks research team, in consultation with other community members, anticipated that such a combination would build a foundation for the future enhancement of their CBE curriculum. Also significant was the fact that this early Alaskan project effort established a set of CBE standards and methods from which others were able to build. How Hawaiian educators subsequently built upon and extrapolated the Alaskan data will be referenced below.

The CBE pedagogies and AN community collaboration continue to expand today through the University-led *Alaska Native Knowledge Network* (ANKN).<sup>94</sup>

ANKN describes its mission as:

---

<sup>93</sup> Ray Barnhardt, Angayuqaq Oscar Kawagley and Frank Hill, 'Cultural Standards and Test Scores', *Sharing our Pathways: A Newsletter of the Alaska Rural Systemic Initiative*, (2000).

Ray Barnhardt and Angayuqaq Oscar Kawagley, 'Culture, Chaos and Complexity: Catalysts for Change in Indigenous Education', *Cultural Survival Quarterly*, 27 (2003), pp. 59-64  
<https://www.culturalsurvival.org/publications/cultural-survival-quarterly/culture-chaos-complexity-catalysts-change-indigenous> .

Ray Barnhardt and Angayuqaq Oscar Kawagley, 'Indigenous Knowledge Systems and Alaska Native Ways of Knowing', *Anthropology and Education Quarterly*, 36 (2005), pp. 8-23.

Shawn Wilson, *Gwitch'in Native Elders: Not just Knowledge but a Way of Looking at the World* (Fairbanks, AK: Alaska Native Knowledge Network, 1996).

<sup>94</sup> For further detailed information and a greater appreciation and understanding of the ongoing accomplishments of the ANKN refer to the following link: <http://www.ankn.uaf.edu>.

...partner designed to serve as a resource for compiling and exchanging information related to Alaska Native knowledge systems and ways of knowing. ANKN has been established to assist Native people, government agencies, educators, and the general public in gaining access to the knowledge base that Alaska Natives have acquired through cumulative experience over millennia.<sup>95</sup>

Over the last twenty years, ANKN has produced a broad range of CBE scholarship, publications and courses. Moreover, ANKN maintains affiliations with indigenous communities and research entities around the world.<sup>96</sup>

Deer asserted that indigenous “knowledge systems” must first be accepted by Western educators as having a legitimate pedagogical contribution to make before CBE programs are implemented.<sup>97</sup> Kirkness and Barnhardt’s empirical studies among Alaska Natives supported this same principle assertion; i.e., that mutual respect, reciprocity, and joint responsibility must be present to bring about effective partnerships and sustainable improvements for indigenous learners, their families, and communities.<sup>98</sup>

Native American educator Deloria openly advocated that United States public schools adopt pedagogies suited for indigenous populations. As early as 1969, Deloria argued that positive change in education could come about by utilizing holistic indigenous culture-based pedagogies—not as an adjunct—but as a

---

<sup>95</sup> Quoted from the ANKN website page: <http://www.ankn.uaf.edu/about.html>.

<sup>96</sup> ANKN website page: <http://www.ankn.uaf.edu/about.html>.

<sup>97</sup> Frank Deer, 'Research Perspectives in Indigenous Education: The Legitimacy of Indigenous Knowledge', *WINHEC Journal*, (2006).

<sup>98</sup> Verna J. Kirkness and Ray Barnhardt, 'First Nations and Higher Education: The Four R's – Respect, Relevance, Reciprocity, Responsibility', *Journal of American Indian Education*, 30 (1991), pp. 1-15.

viable foundation for the academic progress of all students.<sup>99</sup> In particular, scholars frequently referred to Deloria and Wildcat's 2001 work entitled, *Power and Place: Indian Education in America*, as being pivotal to the reversal of U.S. government AI/AN educational policies that were shown to favor assimilation. Pueblo Indian scientist Cajete's works, also referenced widely, were viewed as foundational to the early creation and use of CBE/CRE curriculum and pedagogies benefiting indigenous students.<sup>100</sup> Cajete has spent his entire educational career striving to harmonize indigenous ways of learning and knowing with Western science and scholarship so that each tradition could be enriched by the other. Where Western scholarship tends to isolate things in order to understand them rationally, native thinking perceives objects and events holistically and spiritually in terms of their relationships with their surroundings. For Cajete, the *two ways of knowing are complementary*, and they together offer a depth of understanding that neither can provide on its own.<sup>101</sup>

A common theme expressed by educators and scholars working in the Native Hawaiian and Alaskan communities was that effective CBE pedagogies should be "place-based"— meaning that they should be closely aligned with the cultural

---

<sup>99</sup> Vine Deloria Jr., *Custer Died for Your Sins: An Indian Manifesto* (University of Oklahoma Press, 1969).

Deloria, 'Conclusion', in *Indians and Anthropologists: Vine Deloria Jr. and the Critique of Anthropology*, ed. by Bilosi and Zimmerman.

<sup>100</sup> Deloria and Wildcat.

<sup>101</sup> *Look to the Mountain: An Ecology of Indigenous Education*.

Gregory A. Cajete and Santa Clara Pueblo, 'Contemporary Indigenous Education: A Nature-Centered American Indian Philosophy for a 21st Century World', *Futures*, 42 (2010), pp. 1126-1132.

context of the local indigenous community. For example, Sang and Worchel proposed the use of a place-centered pedagogical process for increasing the learning of Native Hawaiian students.<sup>102</sup> This concept is consistent with Hawaiian epistemology, which is rooted in the idea that not only is one's identity inseparable from their place of birth, but it is also connected to their 'ohana (extended family), community, and even the specific way they work.<sup>103</sup> Place-based educational approaches and community support had a positive impact on the progress of at-risk Hawaiian high school students in another study completed by Yamauchi and Purcell.<sup>104</sup>

Jensen, Grajeda and Haertel corroborate the importance of utilizing a cultural community context both in and out of school, and show how cultural dimensions of teaching enrich academic opportunities for minority students. Moreover, their *Classroom Assessment of Sociocultural Interactions (CASI)*, an observation system designed to measure cultural dimensions of classroom interactions, offers a compelling model framework for the improvement of CRE and place-based teaching practices. Similar to Tharp,<sup>105</sup> they argue that the generic

---

<sup>102</sup> Shawn Malia Kana'iaupuni and Keiki K. C. Kawai'ae'a, 'E Lauhoe Mai Na Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework', *Hūlili: Multidisciplinary Research on Hawaiian Well-being - Online Submission*, 5 (2008)  
<https://files.eric.ed.gov/fulltext/ED523184.pdf> [accessed September 26, 2018].

Kau'i Sang and Jessica Worchel, 'A Place-Based Process for Reimagining Learning in the Hawaiian Context', *Voices in Urban Education*, (2017), pp. 26-32.

<sup>103</sup> Sang and Worchel, p. 28

<sup>104</sup> Lois A. Yamauchi and Andrea K. Purcell, 'Community Involvement in a Place-Based Program for Hawaiian High School Students', *Journal of Education for Students Placed at Risk*, 14 (2009), pp. 170-188.

<sup>105</sup> Roland G. Tharp, 'Psychocultural variables and constants: Effects on teaching and learning in schools,' *American Psychologist*, 44(2), 349–359.

cultural dimensions of classroom interactions should be considered interrelated rather than separate.<sup>106</sup>

Alaskan scholars, Kawagley and Barnhardt, also acknowledged the importance of using place-based educational approaches. They argued that unless the local community context is carefully considered, there can be no real effective combination of Anglophone and indigenous pedagogies.<sup>107</sup> Their research further indicated that the use of indigenous guidelines and other ethnographic considerations was a critical factor in the achievement of a more balanced framework for student progress and school reform in Alaska.<sup>108</sup>

Kawagley and Barnhardt further recommended that indigenous students engage with learning communities outside the classroom, where flexible peer-to-peer and instructor-mentored learning activities can occur. They suggested that using the outdoors is a culturally-appropriate pedagogy for indigenous learners because it is more consistent with their community and place-based group learning preferences. In addition, it provides a context in which “every place is a potential classroom, and every activity a learning activity.”<sup>109</sup> Could

---

<sup>106</sup> Bryant Jensen, Sara Grajeda and Edward Haertel, 'Measuring Cultural Dimensions of Classroom Interactions', *Educational Assessment*, 23:4 (2018), 250-276.

<sup>107</sup> Ray Barnhardt and A. Oscar Kawagley, 'Education Indigenous to Place: Western Science Meets Native Reality', in *Ecological Education in Action*, ed. by Gregory Smith and Dilafruz Williams (New York, NY: State University of New York Press, 1999), pp. 117-140.

<sup>108</sup> James W. Kushman and Ray Barnhardt, 'Reforming Education from the Inside-Out: A Study of Community Engagement and Educational Reform in Rural Alaska', *Journal of Research in Rural Education*, 17 (2001), pp. 12-26.

National Society for the Study of Education Yearbook Committee.

<sup>109</sup> Angayuqaq Oscar Kawagley and Ray Barnhardt, *A Long Journey: Alaska Onward to Excellence in Yupit/Tuluksak Schools. Case Study*, (1999).



this approach become the optimal example of good pedagogical practice relative to place-based education? While generally agreeing with the place-based contextual learning approach, one might call into question its practical implementation as suggested by the Alaskan educators. How would one build in the rigor and quality standards that exist in a regular classroom?

Scholarship completed by Lipka, Tippeconnic and others examined how the adaptation of pedagogies closely aligned with local community knowledge and values could be an important aid to indigenous student progress.<sup>110</sup> These and other studies demonstrated that, at a young age, the use of the native language and cultural-based knowledge have a strong correlation to the measurable improvements of indigenous student' academic progress success, motivation, identity and attitude.<sup>111</sup>

Cross-cultural training and professional development for teachers was another necessary element frequently mentioned in the literature. For example, Ledward et al. documented the positive influence that the cross-cultural

---

<sup>110</sup> Deyhle and Swisher, 'Research in American Indian and Alaska Native Education: From Assimilation to Self Determination', pp. 113-194.

Susan Faircloth and John Tippeconnic, 'Issues in the Education of American Indian and Alaska Native Students with Disabilities', *ERIC Digests*, (2000).

J. Lipka, N. Sharp and B. Brenner, 'The Relevance of Culturally Based Curriculum and Instruction: The Case of Nancy Sharp', *Journal of American Indian Research*, 44 (2006), pp. 31-54.

Jerry Lipka, 'Language, Power, and Pedagogy: Whose School is it?', *Peabody Journal of Education*, 69 (1994), pp. 71-93 <http://www.jstor.org/stable/1492746> .

John Tippeconnic, 'The Use of Academic Achievement Tests and Measurements with American Indian and Alaska Native Students', *Eric Digest*, (2003).

<sup>111</sup> W. Demmert and others, 'Preparing Native Children for Academic Success: A Blueprint for Research', *Journal of American Indian Education*, 45 (2006), pp. 92-106.

orientation of teachers had on Native Hawaiian indigenous student progress, learning confidence and self-efficacy.<sup>112</sup> In other studies completed in Alaska and Canada, the CRE pedagogies included the active use of the native languages, elder teachings, and adult mentoring as significant components of the cross-cultural professional development. In these instances, the CRE training reportedly helped equip teachers with the capacity to create a more positive learning environment in the classroom. Also, measurable improvements in student retention, academic progress and less truancy resulted.<sup>113</sup>

In a groundbreaking study completed in 2003, Demmert and Towner reviewed a large corpus of scholarship associated with the influence of CBE on the academic achievement of AI/AN/NH students. They reported numerous problems encountered by scholars in attempting to do controlled research within the CBE context. They highlighted problems of time, ethics in group formation, effective measurement and other issues as being particularly formidable barriers to be overcome.<sup>114</sup> One exception to this was the

---

<sup>112</sup> B. Ledward, B. Takayama and K. Elia, *Hawaiian Cultural Influences in Education (HCIE): Culture-Based Education among Hawaii Teachers (Culture-Based Brief Education Series)*. (Honolulu: Kamehameha Schools, Research, & Evaluation, 2009).

<sup>113</sup> Ray Barnhardt, 'Preparing Teachers for Rural Alaska', *Sharing our Pathways*, 4 (1999), pp. 1-3.

Battiste, 'Enabling the Autumn Seed: Toward a Decolonized Approach to Aboriginal Knowledge, Language, and Education', pp. 16-27.

M. Battiste, L. Bell and L. M. Findlay, 'Decolonizing Education in Canadian Universities: An Interdisciplinary, International, Indigenous Research Project', *Canadian Journal of Native Education*, 26 (2002), pp. 82-95 <http://proquest.umi.com/pqdlink?did=325001141&Fmt=7&clientId=12306&RQT=309&VName=PQD>; .

<sup>114</sup> Demmert and Towner.

scholarship initiated in the 1970s by the *Kamehameha Early Education Program (KEEP)*, which is still considered to be viable in terms of controlled, quantitative research and analysis.<sup>115</sup> KEEP was an early-age reading comprehension program tailored to the Native Hawaiian culture and language. Gallimore and Tharp evaluated the findings of KEEP and found that the participants' reading ability improved as did their comprehension.<sup>116</sup> Caffee et al. also analyzed the KEEP model and recommended that it be adapted for potential use with other minorities.<sup>117</sup>

Tharp, Jordan, and their colleagues at the University of California's *Center for Research on Education, Diversity, and Excellence (CREDE)* sought to refine the KEEP findings by using multi-disciplinary, evidence-based research. One of their aims was to translate the pedagogies used by KEEP to other indigenous educational environments. Jordan piloted a research initiative in Arizona and New Mexico schools and found that KEEP's pedagogies had similar positive effects with Navajo indigenous students.<sup>118</sup>

---

<sup>115</sup> Ronald Gallimore, and Kamehameha Schools H.H.K.E.E.P., *A Proposal to Build an Education Research and Development Program: The Kamehameha Early Education Project Proposal. Technical Report #3*, (1974) <http://files.eric.ed.gov/fulltext/ED158832.pdf> .

<sup>116</sup> Ronald Gallimore, Roland G. Tharp and Kamehameha Schools H.H.K.E.E.P., *An Overview of Research Strategies and Findings (1971-1975) of the Kamehameha Early Education Program. Technical Report #66*, (1976) <http://files.eric.ed.gov/fulltext/ED158865.pdf> .

<sup>117</sup> Robert C. Calfee, And Others and Harvard Univ, Cambridge, MA Graduate School, of Education, *Designing Reading Instruction for Cultural Minorities: The Case of the Kamehameha Early Education Program*, (1981).

<sup>118</sup> Cathie Jordan, 'Cultural Compatibility and the Education of Hawaiian Children: Implications for Mainland Educators', *Educational Research Quarterly*, 8 (1984), pp 59-71.

Cathie Jordan, 'Creating Cultures of Schooling: Historical and Conceptual Background of the KEEP/Rough Rock Collaboration', *Bilingual Research Journal*, 19 (1995), pp 83-100.

CREDE in California was one of 12 national research and development centers funded by the *U.S. Department of Education* through its *Office of Educational Research and Improvement* and *National Institute on the Education of At-Risk Students*. CREDE was created to assist at-risk students in achieving academic success. It focused on the growing population of CLD students attending U.S. schools. The aim of its ongoing research has been “to identify and develop effective educational practices for educators with CLD students placed at risk because of factors attributable to race, poverty, and geographic location.”<sup>119</sup>

CREDE discontinued its centers in California but continues to undertake research at the University of Hawaii-Manoa in Honolulu. Reportedly, the CREDE Hawaii research group is working to improve education for Hawaii's youth, providing educators there with a range of CBE and CRE pedagogies proven to be valid for Native Hawaiian and other CLD students.<sup>120</sup>

In his paper entitled, *Four Hundred Years of Evidence, Culture, Pedagogy and Native America*, Tharp suggested that a pedagogy derived from indigenous socialization is superior to that found in the Anglophone tradition.<sup>121</sup> Tharp pointed out “that traditional and contemporary Native American socialization emphasizes learning by observation”....and that this is “closely tied to the well-

---

R. G. Tharp, 'The Effective Instruction of Comprehension: Results and Description of the Kamahameha Early Education Program', *Reading Research Quarterly*, 71 (1982), pp 503-527.

<sup>119</sup> Refer to the following website for more information on CREDE. <http://www.cal.org/what-we-do/projects/crede>.

<sup>120</sup> Refer to the following website for more information on CREDE Hawaii project: <https://manoa.hawaii.edu/coe/crede/>.

<sup>121</sup> Roland G. Tharp, 'Four Hundred Years of Evidence: Culture, Pedagogy and Native America', *Journal of American Indian Education*, 45 (2006), pp 6-26.

documented visual learning patterns of American Indian children, and its holistic cognitive style.”<sup>122</sup> Cazden and John described this learning style as “learning by looking more than learning through language,” and also as “competence before performance.” Importantly, they asserted that this pedagogy provides an opportunity for indigenous students to practice without the risk of public embarrassment.<sup>123</sup>

Tharp and his colleagues at CREDE worked for many years to establish five universal standards for productive CBE/CRE pedagogies. They maintained that these standards could be used cross-culturally in interventions with all types of CLD students. Their research uncovered another set of two universal standards, which they indicated were “*embedded only in Native American pedagogical research.*” These two indigenous pedagogies are (1) Modeling through demonstration: Learning through observation, and (2) Student-directed activity—encouraging student decision-making.<sup>124</sup>

Tharp maintained that the power of these indigenous ways of learning was based on the fact that they help pattern and develop a more holistic perceptive ability and visual proclivity:

The visual rather than verbal proclivity maps easily into the holistic vs. analytic patterns because visual perception presents itself holistically; language (both oral and written) presents itself sequentially, in a linear pattern of emerging parts. In any event,

---

<sup>122</sup> Ibid., pp. 6-26.

<sup>123</sup> C. B. Cazden and V. P. John, 'Learning in American Indian Children', in *Anthropological Perspectives on Education*, ed. by M. L. Wax, S. Diamond and F. O. Gerning (New York: Basic Books, 1971), p. 256.

<sup>124</sup> 'Four Hundred Years of Evidence', p. 13.

the holistic pattern of cognition is associated with observational-learning.<sup>125</sup>

From 1983 to the present, indigenous and non-indigenous scholars collaborating with the Hawaii Department of Education, the Kamehameha Schools, the University of Hawaii and other community entities have produced a corpus of scholarship affirming the positive influence of CBE and other environmental factors on Native Hawaiian students' academic progress. Entitled the *Native Hawaiian Educational Assessment Project* (NHEA), these studies have been longitudinal in scope, data-driven, and inclusive of the influences on Native Hawaiian student performance both in and out of school. Forces such as health, poverty, and family environment were incorporated and analyzed in depth. The NHEA studies, completed over three decades, involved student age groups from pre-school age through the undergraduate college graduation (known as P-20).<sup>126</sup>

The central argument of the NHEA multi-disciplinary work was, “that the use of best practice strategies in culture-based education can be shown to have a positive impact upon improved indigenous student achievement in school.”<sup>127</sup> Over the past 30 years, numerous improvements in Native Hawaiian student outcomes were accomplished by the NHEA consortium using well-designed

---

<sup>125</sup> Ibid., p. 14.

<sup>126</sup> Bishop Estate Kamehameha Schools/Bernice Pauahi, *Native Hawaiian Educational Assessment Project. Final Report*, (1983)  
[http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA\\_1983.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA_1983.pdf) .

<sup>127</sup> *A Brief Overview of Culture-Based Education and Annotated Bibliography*.

CBE pedagogies conducted under experimentally sound, data-driven research conditions.<sup>128</sup>

In 2002, the *Native Hawaiian Educational Council* (NHEC), in partnership with the University of Hawaii-Hilo, adopted a comprehensive set of specific guidelines for CBE/CRE learning environments called *Nā Honua Mauli Ola*.<sup>129</sup> It is significant to note that the *Nā Honua Mauli Ola* guidelines were informed by and built upon the foundational work of the *Alaska Standards for Culturally Responsive Schools* and the AKRSI and ANKN initiatives.

The work done by the UH- Hilo and the NHEC has important relevance to the primary question posed by this thesis. UH-Hilo implemented a set of teacher training initiatives using the *Nā Honua Mauli Ola* framework: part of its role as the primary proponent of Native Hawaiian culture and language teacher education in the State of Hawaii. Wilson and Kawai'ae'a purported that the UH-Hilo-led teacher training programs, developed in tandem with Hawaiian charter and language immersion schools, brought meaningful CBE benefits for Native

---

<sup>128</sup> Chris L. S. Coryn, Daniela C. Schröter and Robert H. McCowen, 'A Mixed Methods Study of some of the Factors Associated with Successful School Strategies for Native Hawaiian Students in the State of Hawai'i', *Journal of Mixed Methods Research*, 8 (2014), pp. 377-395.

B. Ledward, B. Takayama and W. Kahumoku III, *Hawaiian Cultural Influences in Education (HCIE): 'Ohana and Community Integration in Culture-Based Education (Culture-Based Education Brief Series)*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation, 2008) [https://www.ksbe.edu/assets/research/collection/08\\_0128\\_ledward.pdf](https://www.ksbe.edu/assets/research/collection/08_0128_ledward.pdf).

Ledward, Takayama and Elia.

<sup>129</sup> Native Hawaiian Education Council and others, *Na Honua Mauli Ola: Hawai'i Guidelines for Culturally Healthy and Responsive Learning Environments*, ed. by John Cotton Wright, Statewide Review Meetings Sponsored by the Native Hawaiian Education Island Councils, trans. by Keoni Kelekolio, Keiki Kawai'ae'a and William H. Wilson (Honolulu and Hilo, Hawai'i: Native Hawaiian Education Council, 2002).

Hawaiian students mainly because they were “derived *by* going through Hawaiian language mediums” and pedagogical methods.<sup>130</sup>

Adams et al. concurred with another of the UH-Hilo scholars' findings regarding the critical importance of starting language and cultural immersion programs at an early age. They suggested that only early-age literacy and native language immersion programs have the potential to reverse the historical achievement gaps experienced by indigenous students in United States' schools.<sup>131</sup> Lipke, Sharp and Brenner also supported the importance of using early-age CBE and language immersion pedagogies for improving indigenous student performance. Moreover, they recommended that the successful CBE pedagogies used in Alaska and Hawaii could be applied by other U.S. schools seeking to benefit indigenous students.<sup>132</sup>

In addition, several scholars argued that one of the problems of CBE/CRE programs is maintaining long-term sustainability. In Demmert and Towner's review, the most frequently mentioned reason for the inability to sustain CBE and CRE educational programs was a lack of long-term funding.<sup>133</sup> According to Demmert and Towner, financial resource limitations have not only hampered sustainability but also tended to exacerbate the barriers against meaningful

---

<sup>130</sup> William H. Wilson and Keiki K. C. Kawai'ae'a, 'I Kumu; I Lala: "Let there be Sources; Let there be Branches": Teacher Education in the College of Hawaiian Language', *Journal of American Indian Education*, 46 (2007), pp. 37-53.  
<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c8b6a49b7662a8539b36142fe2e2156b969c676adfff93a03b&fmt=H> .

<sup>131</sup> B. Adams, S. Adam and M. Opbroek, 'Reversing the Academic Trend for Rural Students: The Case of Michelle Opbroek', *Journal of American Indian Education*, 44 (2005), pp. 55-79.

<sup>132</sup> Lipka, Sharp and Brenner, pp. 31-54.

<sup>133</sup> Demmert and Towner.



longitudinal data formation that is vital to the assessment of the impact of CBE educational interventions.<sup>134</sup> However, more recent research in Alaska and Hawaii suggested that these funding barriers might be overcome if indigenous epistemologies were *dominant* and not *secondary* concerns, and if they are not tied to short-term external grant programs.<sup>135</sup>

Retaining teachers who are good role models, mentors and have knowledge about and commitment to the indigenous culture can also be significant in the sustainability of CBE/CRE programs. Mantle et al. and Smith-Mohammed both analyzed these influences as being substantial factors aiding CLD student motivation and subsequent progress in school.<sup>136</sup>

Community surveys completed by Ledward and Takayama showed that the use of CBE pedagogies by teachers had a positive impact on the academic progress of not only Native Hawaiian students but those from other ethnic groups. Significantly, their research also implied that there need not be any

---

<sup>134</sup> Ibid.

<sup>135</sup> Dorothy Aguilera and others, 'Culturally Responsive Education for American Indian, Alaska Native, and Native Hawaiian Students', *Journal of American Indian Education*, 46 (2007), 4-147 <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c8b6a49b7662a8539b36142fe2e2156b96be360b5f34e6bd24&fmt=C> .

'Indigenous Knowledge Systems and Alaska Native Ways of Knowing', pp. 8-23.

William H. Wilson, Kauano'e Kamana and Namaka Rawlins, 'Nawahi Hawaiian Laboratory School', *Journal of American Indian Education*, 45 (2006), pp. 42-44 <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c862613111d5526759d0bbc40a241dd3963bcb76a2c15e4bdc&fmt=H> .

<sup>136</sup> Corinne Mantle-Bromley, Carol A. Wilson and Ann M. Foster, 'Context Matters: Improving Schooling for Native Hawaiian Children', *Equity & Excellence in Education*, 36 (2003), pp. 259-269 <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=c84804dfd2d2953e988f1b44482541676b195ac76180c525513f583680d97dfc&fmt=C> .

K. Smith-Mohamed, 'Role Models, Mentors, and Native Students: Some Implications for Educators', *Canadian Journal of Native Education*, 22 (1998), pp. 238-250.

trade-off between conventional U.S. standards-based curriculum methods and culture-based teaching approaches.<sup>137</sup>

Cajete set a foundation for the consideration of the integration of Anglophone and indigenous pedagogies. While incomplete in scope and specificity, Cajete advocated for the early development of a contemporary CBE founded on traditional native tribal principles and orientations. He suggested integrating them with the most relevant concepts, content, rigor, and modern technologies of Western education.<sup>138</sup> Cajete's core hypothesis was centered on his belief that indigenous pedagogies are more closely aligned with the processes of education grounded in human nature.<sup>139</sup> To establish this foundation, Cajete provided twenty-four guiding principles that would be applicable in any teaching situation, regardless of subject matter or age group. While Cajete's proposals represented an early effort to combine the pedagogies of the Anglophone and indigenous traditions, more research is needed to evaluate their viability.<sup>140</sup>

Some useful examples of how Cajete's ideas might be implemented effectively were illustrated in Medin and Bang's research. In their 2014 book, entitled *Who's Asking? Native Science, Western Science and Science Education*, they grappled with the tensions between Anglophone and indigenous pedagogies. They reported encouraging results from their collaborative projects—specifically

---

<sup>137</sup> Ledward, Takayama and Elia.

<sup>138</sup> G. Cajete, *Ignite the Sparkle: An Indigenous Science Education Model* (Skyland, NC: Kivaki Press, 1999).

<sup>139</sup> *Look to the Mountain: An Ecology of Indigenous Education*.

<sup>140</sup> G. Cajete, *Native Science: Natural Laws of Interdependence* (Skyland, NC: Kivaki Press, 2000).

that Native American youth showed a significant shift after only a few weeks toward owning the scientific knowledge and practices as a core heritage of their people--instead of a body of facts that had nothing to do with them.<sup>141</sup>

Demmert and Towner's survey of the literature previously mentioned made a seminal contribution to this literature review because it covered so much initial ground and provided insight into the numerous problems encountered in proving, in a statistically reliable way, whether CBE programs are capable of influencing the progress of indigenous students. Jesse, Northrup and Worthington's 2016 annotated bibliography also made an important contribution to the corpus of literature tied to the use of CBE/CRE pedagogies to improve Native American student academic achievement.<sup>142</sup>

Demmert and Towner concluded in their 2003 study that the most important future task for educators working with indigenous students would be to produce more quantitative studies validating the effectiveness of CBE and CRE.<sup>143</sup>

Analysis of the corpus of scholarship since 2003 revealed that meaningful progress had been made toward answering the evidence-based dilemma.

In addition to scholarship tied to CBE/CRE pedagogies with indigenous students in Hawaii, studies focused on indigenous populations in New Zealand,

---

<sup>141</sup>. Douglas L. Medin and Megan Bang, *Who's Asking? Native Science*, Western Science and Science Education (Cambridge, MA, USA: MIT Press, 2014).

<sup>142</sup> D. Jesse and others, *Promising Education Interventions to Improve the Achievement of Native American Students: An Annotated Bibliography*, (West Comprehensive Center at WestEd, 2015).

<sup>143</sup> Demmert and Towner, p. 40.

and Canada also demonstrated the positive benefits derived from the use of a culture-based curriculum. Two of the more significant examples are:

1) *Ka Hikita – The Māori Education Strategy (2005-2018)* – This multi-year New Zealand Ministry of Education study demonstrated how the integration of Western standards-based education and indigenous CRE pedagogies and epistemologies could be adapted for use with Māori students to improve their academic progress.<sup>144</sup>

2) *The Canadian Council on Learning (CCL-2009)* – When CBE/CRE pedagogies were used, this Canadian study examined how the assessment of indigenous student performance in public schools throughout Canada's ethnically diverse Provinces could be both redefined and more effectively measured.<sup>145</sup>

### **Summary of Argument A**

*A review of the corpus of the literature suggests that the use of CBE/CRE pedagogies demonstrate substantial promise towards reducing the educational achievement disparities between United States indigenous students and their mainstream peers.*

### **Gaps and Recommendations for Future Research**

Besides studies conducted in Alaska and Hawaii, the majority of the scholarship analyzed was predominantly qualitative and situational. In 2003, Demmert and

---

<sup>144</sup> Bishop, Russell and others, pp. 734-742.

For Ka Hikitia studies Refer to the following links to New Zealand Ministry of Education publications:<http://www.education.govt.nz/assets/Documents/Ministry/Strategies-and-policies/Ka-Hikitia/KaHikitia2009PartOne.pdf>.

<sup>145</sup> Canadian Council on Learning, *Redefining how Success is Measured in First Nations, Inuit and Metis Learning*, (2009).

Towner asserted that the primary reasons for the lack of experimental and quasi-experimental studies verifying CBE/CRE effectiveness were attributable to inadequate funding sustaining longitudinal research in the field and quality professional development.<sup>146</sup>

Kana'iaupuni and Ledward summarized where most CBE/CRE research historically has fallen short and suggested several areas of improvement, namely that: (1) cause/effect linkages to student educational indicators must be established; (2) that further accounting for the wide variance or range of culture-based instructional strategies and their differential effects must be corroborated; and, that (3) more measurement against valid comparison groups on a longitudinal basis should be conducted.<sup>147</sup> While it is perhaps essential to mention the persistent gap in the existence of quantitative CBE/CRE research data, *this qualitative thesis will not focus on addressing the issue.*

A possible relationship between Cajete's and Deloria's pedagogical principles and indigenous epistemologies, and how those two independent variables might be integrated effectively in US classrooms presents an avenue for future research. Even though many scholars referenced these two pioneering

---

<sup>146</sup> Demmert and Towner, pp. 16.

Shawn Malia Kana'iaupuni, Brandon Ledward and Nolan Malone, "'Mohala i Ka Wai": Cultural Advantage as a Framework for Indigenous Culture-Based Education and Student Outcomes', *American Educational Research Journal*, 54 (2017), pp. 311-339.

<sup>147</sup> Shawn Malia Kana'iaupuni, Brandon Ledward and Umi Jensen, *Culture-Based Education and Its Relationship to Student Outcomes*, (Honolulu, HI: Kamehameha Schools Research and Evaluation, 2010)  
[http://www.ksbe.edu/assets/spi/pdfs/CBE\\_relationship\\_to\\_student\\_outcomes.pdf](http://www.ksbe.edu/assets/spi/pdfs/CBE_relationship_to_student_outcomes.pdf)

Shawn Malia Kana'iaupuni, Brandon Ledward and Nolan Malone, pp. 311-339

Ledward, Takayama and Kahumoku.

indigenous educators, it was apparent in the literature examined that there were few, if any, instances where Cajete's twenty-four principles or Deloria's indigenous holistic approaches had been used meaningfully in U.S. classroom settings. It seemed strange that more studies had not been done incorporating these scholars' oft-referenced recommendations. A possible answer to this dilemma might be because their principles were viewed by non-indigenous scholars and educators as more theoretical than practical, although this is mere conjecture.

Digital-age technology-assisted educational tools are now being ubiquitously deployed to accelerate student learning in U.S. schools.<sup>148</sup> Despite this trend, one set of questions that remains unanswered is this: are indigenous students obtaining the full benefit of these technologies adapted to their culture? In this same regard, another research topic that required further exploration could be the potential of combining the two CBE/CRE standards identified by the CREDE scholars as embedded *only* in Native American pedagogies with 21<sup>st</sup>-century digital-media tools to leverage the proclivities exhibited by indigenous students for visual, observational and group learning activities. A future research effort in this direction has significant potential for testing the

---

<sup>148</sup> Heisawn Jeong, Cindy E. Hmelo-Silver and Kihyun Jo, Ten Years of Computer-Supported Collaborative Learning: A Meta-Analysis of CSCL in STEM Education during 2005–2014, *Educational Research Review*, 28(100284) (2019).

Manuel Ferraz Lorenzo and Cristian Machado Trujillo, 'Cognitive Processes, ICT, and Education: A Critical Analysis', *Computers in the Schools*, 35 (2018), p. 186.

Anymir Orellana and Vanaja Nethi, 'RESEARCH IN DISTANCE EDUCATION: Trends in the Quarterly Review of Distance Education from 2002 to 2017', *Quarterly Review of Distance Education*, 20 (2019), pp. 1-14.

effectiveness of combining these verified CBE pedagogies with Western TEL methods.

## **ARGUMENT B – CULTURAL ADAPTATION OF ASSESSMENTS**

*The educational assessments of indigenous students attending U.S schools have frequently been viewed as lacking cultural adaptation and sensitivity. The corpus of literature examined also suggested that the evaluations of indigenous students have been stereotypically biased and non-inclusive of environmental factors occurring outside of the classroom. Several scholars have posited that indigenous pedagogies are more likely to foster higher-order thinking skills among the student populations in question.*

### **Analysis of the Corpus of Literature**

Several scholars recommended that the influences of culture, the home environment, and other factors occurring outside of the classroom as considerations to achieve more culturally balanced indigenous student evaluations. For instance, Castaneda suggested that U.S school administrators and teachers adopt a more positive expectation of the academic potential of indigenous students.<sup>149</sup> Deyhle's research verified the efficacy of the removal of potential ethnic stereotypes by non-native teachers as a critical factor in the achievement of less biased assessment.<sup>150</sup> Demmert, Garrett & Pichette

---

<sup>149</sup> Lillian Vega Castaneda, *Improving Programs of Schools Serving Culturally and Linguistically Diverse Student Populations*, (1992).

<sup>150</sup> 'Learning Failure: Tests as Gatekeepers and the Culturally Different Child', in *Success Or Failure*, ed. Trueba, pp. 85-108.

D. Deyhle, 'Constructing Failure and Maintaining Cultural Identity: Navajo and Ute School Leavers', *Journal of American Indian Education*, 31 (1992), pp. 24-47.

observed that the type of assessment strategy used (e.g., objective or subjective) could be an influential factor—both positive and negative—upon an indigenous student's self-concept and learning self-confidence. Moreover, they indicated that the influence of negative school counseling sessions experienced by American Indian students tended to hinder their academic progress and cause them to be categorized as learning disabled or at-risk of failure.<sup>151</sup>

Other studies broadly affirmed that indigenous student evaluations should be unbiased and devoid of cultural prejudice.<sup>152</sup>

Reinhart and Maday suggested that because the interpretation of AI/AN student school progress assessments has not been balanced for cultural factors, the result is that these students have been evaluated as performing at lower levels.<sup>153</sup>

---

<sup>151</sup> William Demmert, 'The Influences of Culture on Learning and Assessment among Native American Students', *Learning Disabilities Research and Practice*, 20 (2005), pp. 16-23.

Garrett and Pichette, pp. 3-13.

Kana'iaupuni, Malone and Ishibashi.

<sup>152</sup> *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice, Volume II*, ed. by Ah Nee-Benham.

'The Influences of Culture on Learning and Assessment among Native American Students', pp. 16-23.

Veronica F. Ogata, Patricia H. Sheehy and Mary Jo Noonan, 'Rural Native Hawaiian Perspectives on Special Education', *Rural Special Education Quarterly*, 25 (2006), pp. 7-15.

A. Ortiz and I. Heavyrunner, 'Student Access, Retention, and Success: Models of Inclusion and Support', in *the Renaissance of American Indian Higher Education*, ed. by Maenette K. P. Ah Nee-Benham and W. Stein (Mahwah, NJ: Lawrence Erlbaum Associates, 2003).

<sup>153</sup> Martin Reinhardt and Traci Maday, *Interdisciplinary Manual for American Indian Inclusion*, (Ed Options, Inc., 2006).



The implications from LeCompte and Deyhle's Navajo community study suggested that if cultural differences are not considered and possible teacher biases mitigated in the early elementary school grades, the effect of these negative assessments may be difficult to reverse when students transition to secondary schools.<sup>154</sup>

Kana'iaupuni concurred with LeCompte and Deyhle's view and suggested that the preponderance of negative reports, judgments and openly shared opinions of educators regarding Native Hawaiian's capacity to learn has had an adverse effect on these student's self-confidence.<sup>155</sup> As a consequence, Kana'iaupuni advocated for the use of culturally adapted and strengths-based assessments versus deficit-based methods as tools for enhancing Native Hawaiian student self-efficacy, positive self-identity, and learning confidence.<sup>156</sup>

Takayama and Ledyard proposed a potential classroom critical classroom practice for those working with Native Hawaiian students. They felt that what needs to transpire is the creation within the mind and heart of each learner, a feeling that – "I matter therefore school matters," and "I am not a second-class citizen."<sup>157</sup> Survey data from parallel research conducted by Revilla and Sweeney indicated that a crucial factor aiding CLD students' progress would be to instill an overall sense of belonging for them in the schools they attended.

---

<sup>154</sup> M. D. LeCompte and D. Deyhle, 'Cultural Differences in Child Development: Navajo Adolescents in Middle Schools.', *Theory into Practice*, 33 (1994), pp. 156-166.

<sup>155</sup> Shawn Malia Kana'iaupuni, 'Ka'Akalai Ku Kanaka: A Call for Strengths-Based Approaches from a Native Hawaiian Perspective', *Educational Researcher*, 34 (2005), pp. 32-38.

<sup>156</sup> Ibid.

<sup>157</sup> Ledward, Takayama and Elia.

Almeida argued for the adoption of this same objective in the classroom and further recommended that a critical assessment practice should be to have teachers examine their own beliefs regarding AI/AN students before teaching them.<sup>158</sup>

A goal of some of the more vocal scholars and educators of common indigenous heritage (e.g., Cajete and Deloria) has been to recast mainstream school curriculum from the perspective of indigenous knowledge and culture. They believe such an adaptation would result in a more culturally balanced and accurate evaluation of indigenous student progress.<sup>159</sup> An argument can be made that this goal is impractical and unrealistic. In the United States today, the vast majority of indigenous students attend public schools and colleges, not private or Native-led institutions. Therefore, while this objective might be ideal from the perspective of the indigenous scholar, assessments based on indigenous knowledge might not be feasible. The accomplishment of such a goal presupposes an ability to alter systemically the common core curricula and standardized-testing methods that currently dominate U.S. public education. Nevertheless, Cajete and other indigenous scholars have questioned what they term is the “tacit infrastructure” of modern U.S. education and argued that traditional indigenous pedagogies are “an expression of environmental education” that could “have a profound meaning for the kind of modern

---

<sup>158</sup> Almeida.

<sup>159</sup> *Ignite the Sparkle: An Indigenous Science Education Model.*

*Native Science: Natural Laws of Interdependence.*

*Look to the Mountain: An Ecology of Indigenous Education*

education required to face the challenges of living in the 21<sup>st</sup> century.”<sup>160</sup> Medin and Bang’s studies affirmed the positive influence that science subject-matter adapted to include an indigenous perspective could have on Native student engagement in the classroom.<sup>161</sup>

During 2008, *The American Indian Higher Education Consortium (AIHEC)*, a system of 39 indigenous educator-led community colleges in the United States, recommended another approach to improve AI student standardized test performance. The AIHEC leaders posited that indigenous culture and knowledge-based pedagogies would help AI/AN students remain competitive in school.<sup>162</sup> The implication was that this would decrease the gaps in AI/AN academic performance, thus making the United States more globally competitive. There is no evidence in the literature that the AIHEC recommendation has been implemented.

Faircloth and Tippeconnic asserted that the accuracy of indigenous student assessments, especially the evaluation of those exhibiting some form of learning disability, could be better ensured if efforts are made to carefully separate cultural learning preferences from any physical or emotional learning difficulties.<sup>163</sup>

---

<sup>160</sup> Cajete and Pueblo, pp. 1126-1132.

<sup>161</sup> Medin and Bang

<sup>162</sup> George and McLaughlin, pp. 18-22.

<sup>163</sup> Faircloth and Tippeconnic.

Tippeconnic.

Measuring academic achievement through testing is unavoidable. Bloom's taxonomy could have some application for more balanced indigenous student evaluations aligned with the research question posed by this thesis. More than sixty years ago, Bloom, Engelhart, Furst, Hill, and Krathwohl published their taxonomy for the assessment of the human cognitive domain.<sup>164</sup> Bloom's taxonomy specifies six levels of understanding and mastery, with each higher level subsuming the properties of the lower levels. The levels of the taxonomy are—from lowest to highest—*knowledge, comprehension, application, analysis, synthesis, and evaluation*. The research of several scholars has led to the conclusion that the taxonomy is a valid cognitive hierarchy, with perhaps one exception: evaluation and synthesis might be misplaced and reversed in order.<sup>165</sup>

Agarwal summarized the importance of higher-order learning and highlighted the longstanding debates in education concerning how to foster that ability:

The development of students' higher-order learning is a critical component of education. For decades, educators and scientists have engaged in an ongoing debate about whether higher-order learning can only be enhanced by building a base of factual knowledge (analogous to Bloom's taxonomy) or whether higher-order learning can be enhanced directly by engaging in complex questioning and materials. The relationship between fact learning and higher-order learning is often speculated, but empirically unknown.<sup>166</sup>

---

<sup>164</sup> B. S. Bloom and others, *Taxonomy of Education Objectives, Handbook I: Cognitive Domain*. (New York: David McKay, 1956).

<sup>165</sup> G. M. Seddon, 'The Properties of Bloom's Taxonomy of Educational Objectives for the Cognitive Domain.', *Review of Educational Research*, 48 (1978), pp. 303-323.

<sup>166</sup> Pooja K. Agarwal, 'Retrieval Practice & Bloom's Taxonomy: Do Students Need Fact Knowledge before Higher Order Learning?', *Journal of Educational Psychology*, 111 (2019), pp. 189-209.

Another recent study by Agarwal produced significant results. Middle school and college-aged students were placed in a situation where they had to practice retrieving fact, higher-order, and a mix of question types to ascertain which practice would enhance higher-order learning. Agarwal's research found that retrieval practice consistently increased delayed test performance, compared with rereading or no quizzes, and that higher-order and mixed quizzes improved higher-order test performance, but fact quizzes did not.<sup>167</sup> These more complex materials engaged students and assisted them in recalling more what they had learned. These results were contrary to popular intuition based on Bloom's taxonomy. If one assumes the point of view demonstrated by this study that factual test-taking only assesses the lower orders of learning—i.e., knowledge and comprehension, what might this mean for the incorporation of more holistic cognitive processes—e.g., application, synthesis, and evaluation preferred by indigenous pedagogies?

Western education psychologists, Hummel & Huitt posited that when it comes to actual student academic performance, "what you measure is what you get."<sup>168</sup> Hummel and Huitt's research suggested that the apparent shortage of students' higher-order thinking abilities may have been declining in education for some time. They supported this contention through a series of surveys indicating that up until recently, the general assumption by the majority of U.S. school administrators and faculty was that critical thinking would automatically

---

<sup>167</sup> Ibid., p. Abstract

<sup>168</sup> John Hummel and William Huitt, 'What You Measure is what You Get', *GaASCD Newsletter: The Reporter*, (1994), pp. 10-11 <http://www.edpsycinteractive.org/papers/wymiwyg.html> [accessed June 14, 2009].

develop as students acquired progressive knowledge.<sup>169</sup> Hummel and Huitt argued that in order to accomplish the objective of improving students' critical thinking abilities, educators must first address the issue of *defining and measuring critical thinking*.<sup>170</sup> *What You Measure Is What You Get*, or the acronym WYMIWYG solidified their primary point. In short, if educators develop and use assessments aimed at validating higher-level thinking skills, they will: (a) be more likely to teach content at those levels, and (b) students accordingly will be more likely able to master and perform at those levels.

Other studies concurred with the argument that the testing formats commonly used at all levels of U.S. public education overwhelmingly augment only the lower (i.e., knowledge and comprehension) levels of the Bloom taxonomy.<sup>171</sup>

Hill, Barnhardt & Kawagley argued that teachers are increasingly forced to choose between teaching to the test instead of teaching to student understanding in today's standards-driven educational environment in U.S. schools. They further observed that the sheer number of individuals taking high-stakes tests (e.g., SAT, ACT) has led to the dominance of multiple-choice spot

---

<sup>169</sup> W. Huitt, 'A Systems Model of Human Behavior', *Educational Psychology Interactive*, (2003).

<sup>170</sup> Ibid.

<sup>171</sup> K. Carter, 'Do Teachers Understand Principles of Writing Tests?', *Journal of Teacher Education*, 35 (1984), pp. 57-60.

N. L. Gage and D. C. Berliner, *Educational Psychology*, 5th edn (Boston: Houghton Mifflin, 1992).

R. J. Stiggins, E. Rubel and E. Quellmalz, *Measuring Thinking Skills in the Classroom (Revised Edition)* (Washington, DC: National Education Association, 1988).

A. E. Woolfolk, *Educational Psychology*, 5th edn (Boston: Allyn and Bacon, 1993).

checks of understanding and knowledge only, which fall short of approximating full comprehension.<sup>172</sup>

Deyhle's research affirmed the longstanding detrimental effects of standardized-testing and other traditional assessment practices on the learning outcomes of indigenous students.<sup>173</sup> Kana'iaupuni asserted that deficit-based social policies are the driving force behind educational assessments that do not empower indigenous learners.<sup>174</sup> In addition, Nelson, Barber and Trumball argued that these assessments do not adequately qualify or quantify the content knowledge of indigenous students.<sup>175</sup>

### **Summary of Argument B**

*Numerous studies indicated that in all too many instances, the assessments of indigenous students attending U.S schools have been stereotypically biased, lacking in cultural adaptation and sensitivity, and have not been inclusive of environmental factors occurring outside of the classroom. Despite this fact, improvements are being made, and some scholars have advanced theories that indigenous pedagogies have potential application to the fostering of higher-*

---

<sup>172</sup> Barnhardt, Kawagley and Hill.

Frank Hill, Angayuqaq Oscar Kawagley and Ray Barnhardt, *AKRSI Final Report: Phase I, 1995-2000*, (2000).

<sup>173</sup> 'Learning Failure: Tests as Gatekeepers and the Culturally Different Child', in *Success Or Failure*, ed. Trueba, pp. 85-108.

S. Nelson-Barber and E. Estrin, 'Bringing Native American Perspectives to the Teaching of Mathematics and Science', *Theory into Practice*, 34 (1995), pp. 174-185.

<sup>174</sup> 'Ka'Akalai Ku Kanaka: A Call for Strengths-Based Approaches from a Native Hawaiian Perspective', pp. 32-38.

<sup>175</sup> S. Nelson-Barber and E. Trumball, 'Making Assessment Practices Valid for Indigenous American Students', *Journal of American Indian Education*, 6 (2007).

*order thinking skills and a greater understanding of the 21<sup>st</sup>-century physical environment.*

### **Gaps and Recommendations for Future Research**

Perhaps a potentially important and timely topic for future research might be creating a curriculum and associated assessment tool devoid of indigenous stereotypes. While this issue is not within the scope of this thesis, it is nevertheless an example of one of the many challenges associated with achieving a more balanced assessment of indigenous student populations.

U.S. education and business leaders are demanding that students develop more critical thinking and problem-solving skills in school.<sup>176</sup> It is in the area of critical thinking that some of the traditional indigenous pedagogies might be helpful. As Meyer suggested, traditional indigenous Hawaiian pedagogies tend to emphasize the more holistic and higher-order thinking skills in their epistemology and heuristic methods.<sup>177</sup> Cajete also argued that because Native American educational methodologies are more “holistic and inter-relational,” they do not “intrinsically separate theory and practice, human beings and

---

<sup>176</sup> Christine Rivers and Ian Kinchin, 'Dynamic Learning: Designing a Hidden Pedagogy to Enhance Critical Thinking Skills Development', *Management Teaching Review*, 4 (2019), pp. 148-156 <https://doi.org/10.1177%2F2379298118807224> .

Maura Sellars and others, 'Conversations on Critical Thinking: Can Critical Thinking Find its *Way Forward as the Skill Set and Mindset of the Century?*', *Education Sciences*, 8 (2018).

<sup>177</sup> 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', pp. 54-62.

Manulani Aluli Meyer, 'Holographic Epistemology: Native Common Sense', *China Media Research*, (2013), p. 94.



nature, or the classroom (or the learning process) from the world.”<sup>178</sup> As a result, he states:

This makes native education eminently practical, while simultaneously developing higher, or more abstract knowledge and world view, emphasizing wisdom over scholarship (in the sense of formal learning). Thus, traditional native societies were very effective in enhancing the development of skills.<sup>179</sup>

Could these heuristic methods be useful for at least a partial synthesis between traditional indigenous (e.g., Native Hawaiian) and Anglophone pedagogies and assessment methodologies? Additional research focused on the benefit of more holistic indigenous pedagogies as an aid to the development of higher-order thinking skills is warranted. Further studies incorporating an inter-cultural dialog concerning the differing educational perspectives and metaphors would also be mutually beneficial.

Neri, Lozano and Gomez cautioned against looking too simplistically at the multitude of issues associated with the effective implementation of CBE/CRE or any other hybrid pedagogy. They argued against the notion that teacher resistance to CRE implementation stems solely from an instructor’s beliefs, assessments or doubts about the capabilities of the individual student. While they recognized the influence of an individual’s beliefs and doubts in fueling deficit-based perspectives about students and communities from non-dominant backgrounds, they advanced the notion that resistance is first and foremost a multilevel problem of learning. In short, that learning is reflected in the limited knowledge and know-how evident through standardization efforts,

---

<sup>178</sup> Cajete and Pueblo, pp. 1126-1132

<sup>179</sup> Ibid., p.1128.

accountability practices, and policy-induced mandates across multiple levels in systems of education, including assessment practices.<sup>180</sup> Future research should, therefore, take these multilevel learning challenges seriously. This same caution will also have a bearing in Chapter 9 of this thesis when the complexities of implementing new hybrid technology-enhanced learning systems are analyzed.

### **ARGUMENT C – DECOLONIALIZATION AND RECONCILIATION**

*U.S. standardized curricula require historical revisions that remove inferences to the colonization of indigenous populations.*

#### **Analysis of the Corpus of Literature**

Gram and Jojola asserted that nearly every attempt to modify the behavior of U.S. indigenous populations through education has failed. This has been particularly true when the US government has attempted to educate indigenous populations for the aims of the State. While the boarding school initiative may have had a disabling effect on indigenous cultural continuity and language, it likewise failed in terms of academic success.<sup>181</sup> Numerous government reports and other studies have established the need for educational reform in light of the failures of past assimilation policies.<sup>182</sup>

---

<sup>180</sup> Rebecca Colina Neri, Maritza Lozano and Louis M. Gomez, '(Re)Framing Resistance to Culturally Relevant Education as a Multilevel Learning Problem', *Review of Research in Education*, 43 (2019), 197-226 <https://doi.org/10.3102/0091732X18821120> .

<sup>181</sup> John R. Gram and Theodore Jojola, *Conclusion. the Successful Legacy of Assimilations Failure*, (Seattle: University of Washington Press, 2015), p. 171.

<sup>182</sup> Nations At Risk Task Force, *Indian Nations at Risk: An Educational Strategy for Action. Final Report* (Washington, DC: US Department of Education, 1991).

Scholars have recommended several approaches that might have a decolonizing effect on education for indigenous populations. These include, but are not limited to:

- 1) Investigating historical practices and implementing new effective school leadership and systemic improvement efforts;
- 2) Examining partnership building to improve schooling; and
- 3) More focus on improving CBE/CRE pedagogies for use by public and parochial schools because a large majority of indigenous students attend these schools; and
- 4) More research and reform efforts to improve instructional methods and the development of culturally compatible curricula.<sup>183</sup>

In their comparative review of U.S. educational policy involving AI/AN populations, Swisher and Tippeconnic indicated that many proposals recommended by the U.S. Government had not been implemented. Their

---

Deyhle and Swisher, pp. 113-194.

Leslie D. Hall and Kathryn Gomez-Tatum Powell, 'What Diverse, Rural Communities Need and Want from their Teachers', *Rural Educator*, 21 (1999), pp. 27-31.

Joseph F. Johnson Jr. and others, *Hope for Urban Education: A Study of Nine High-Performing, High-Poverty, Urban Elementary Schools*, (1999).

LeCompte and Deyhle, pp. 156-166.

J. Oakes, 'Tracking, Inequality, and the Rhetoric of School Reform: Why Schools Don't Change.', *Journal of Education*, 168 (1986), pp. 61-80.

<sup>183</sup> Senate Special Subcommittee on Indian Education, pp. 91-501.

White House Conference on Indian Education, *The Final Report of the White House Conference on Indian Education: Executive Summary*, (Washington, DC: White House Conference on Indian Education, 1992), in *ERIC Document Reproduction Service No. ED353124* <https://files.eric.ed.gov/fulltext/ED353124.pdf> .

studies verified that the primary causes of non-implementation were underfunding, ignorance and even open neglect.<sup>184</sup>

As Allen stated, “history does matter,” when it comes to the education of formerly colonized indigenous peoples.<sup>185</sup> One of the significant issues in the CBE/CRE literature surveyed by Demmert and Towner was that the divergent views of history between indigenous peoples and the U.S. government require “not only *reconciliation* but official redefinition” to be practical and useful.<sup>186</sup>

Hampton’s paper indicated that advocates for change have frequently brought forth “decolonizing” educational reforms in communities and schools where AI/AN students have represented the majority.<sup>187</sup> Recently, the United States and Canadian governments have sought reconciliation through formal apologies as a precursor to future school improvements. These proposals have included the following:

- The broader use of anti-biased instruction and assessment as a counter-balance to former colonial prejudice;<sup>188</sup>
- Giving more voice to indigenous populations in educational policymaking circles incident to the prior failures resulting from forced assimilation, and

---

<sup>184</sup> K. Swisher and J. W. Tippeconnic III (Eds), *Next Steps: Research and Practice to Advance Indian Education* (Charleston, WV: Clearinghouse on Rural Education and Small Schools, 1999).

<sup>185</sup> H. Allen, 'History Matters: A Commentary on Divergent Interpretations of Australian History', *Australian Aboriginal Studies*, 2 (1988), pp. 79-89.

<sup>186</sup> Demmert and Towner.

<sup>187</sup> E. Hampton, 'Toward a Redefinition of American Indian/Alaska Native Education', *Canadian Journal of Native Education*, 20 (1993), pp. 1-24.

<sup>188</sup> Almeida.

- The implementation of post-colonial strategies which provide new impetus and support to the importance of maintaining indigenous language and knowledge systems as a core component of education in Canadian schools.<sup>189</sup>

As a result of his examination of US educational policies during the boarding school era (1875-1928), Adams has advocated a wholesale revision of current policies and an apology for past mistakes.<sup>190</sup>

Despite recent attempts at reconciling this complex issue, Smith-Mohammed purported that as long as indigenous populations hold lingering suspicions that assimilation policies will be perpetuated by government-sponsored educational institutions, substantive change will likely yield to mistrust, thereby providing unwanted continuance of the status quo.<sup>191</sup> Furthermore, Adams, Garette, Pichette and Waterman indicated in their study that in many cases, significant barriers to reconciliation still exist because indigenous leaders have retained their belief that educators are still their adversaries.<sup>192</sup>

---

<sup>189</sup> L. R. Simpson, 'Anticolonial Strategies for the Recovery and Maintenance of Indigenous Knowledge', *American Indian Quarterly*, 28 (2004), pp. 373-384.

<sup>190</sup> D. W. Adams, *Education for Extinction: American Indians and the Boarding School Experience, 1875-1928* (Lawrence, Kansas: University of Kansas Press, 1995).

<sup>191</sup> Smith-Mohamed, pp. 238-250

<sup>192</sup> *Education for Extinction: American Indians and the Boarding School Experience, 1875-1928*.  
Garrett and Pichette, pp. 3-13.

Waterman, pp. 20-40.

The “decolonization” issue is bilateral in scope and complexity. Therefore, only an atmosphere of mutual trust and compromise will bring about a lasting solution.

Canadian researchers, Battiste, Bell, and Findlay, and Hawaiian scholar Kaomea, affirmed that the continued recalcitrance on both sides exists fundamentally because research recommendations and police statements remain far ahead of their implementation.<sup>193</sup> On a positive note, Clare’s paper, entitled *Decolonizing Consultation: Advocacy as the Strategy, Diversity as the Context*, referred to the recent emergence of advocacy consultation as promising conflict resolution method shown to facilitate the mitigation of longstanding mistrust issues.<sup>194</sup>

Brisk et al. indicated that on the local level, United States schools still favor assimilation over accommodation for indigenous students.<sup>195</sup> In addition, other scholars noted that the prejudices of some teachers and school administrators continue to inhibit the reconciliation of colonial-era grievances held by

---

<sup>193</sup> Battiste, Bell and Findlay, pp. 82-95.

Julie Kaomea, 'Reading Erasures and Making the Familiar Strange: Defamiliarizing Methods for Research in Formerly Colonized and Historically Oppressed Communities', *Educational Researcher*, 32 (2003), pp. 14-25.

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c82da96b9c61f478c125a0af3388ecc2bc37000fb0d09f4415&fmt=H>

Julie Kaomea, 'Indigenous Studies in the Elementary Curriculum: A Cautionary Hawaiian Example', *Anthropology & Education Quarterly*, 36 (2005), pp. 24-42

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c867b01b858b56c3df12d3124f44416bbd0dc2fd421893dc56&fmt=H>

<sup>194</sup> Mary M. Clare, 'Decolonizing Consultation: Advocacy as the Strategy, Diversity as the Context', *Journal of Educational & Psychological Consultation*, 19 (2009), pp. 8-25.

<sup>195</sup> Brisk.

indigenous populations.<sup>196</sup> Tierney agreed, suggesting that unofficial biases often stymie policies favoring accommodation against minority populations in the academe.<sup>197</sup> Finally, Kaomera asserted that if non-indigenous teachers and administrators were allies for decolonization and self-determination, it could have a unifying effect in Hawaiian schools at the grass-roots level.<sup>198</sup>

This has not been an exhaustive examination of the decolonization controversy. An in-depth analysis would be the topic of another thesis. This discussion has intended to highlight the fact that any attempt to synthesize indigenous and Anglophone pedagogies would require a negotiation of the tensions and mistrust precipitated by historical conflicts. It is also apparent that any consideration of the obstacles still hindering reconciliation would require that all parties seek answers to questions such as – What should be the roles of indigenous community scholars and non-indigenous educators in the resolution of this issue? What should be the role or responsibility of indigenous students?

### **Summary of Argument C.**

*U.S. educators, influenced by their systemic Anglophone traditions, have inadvertently and even intentionally attempted to assimilate instead of accommodate indigenous populations.<sup>199</sup> Colonial educational policies failed*

---

<sup>196</sup> B. Schissel and T. Wotherspoon, *The Legacy of School for Aboriginal People: Education, Oppression, and Emancipation* (Don Mills, ON: Oxford University Press Canada, 2003).

<sup>197</sup> W. G. Tierney, *Official Encouragement, Unofficial Discouragement: Minorities in Academe - the Native American Experience* (Norwood, NJ: Ablex, 1992).

<sup>198</sup> 'Indigenous Studies in the Elementary Curriculum: A Cautionary Hawaiian Example', pp. 24-42

<sup>199</sup> Kerri A. Inglis, *Ma'i Lepera: Disease and Displacement in Nineteenth-Century Hawai'i* (Honolulu: University of Hawaii Press, 2013).

*because indigenous peoples generally desired to retain their distinctive cultural heritage and identity. It is not the goal of this literature review to propose a set of recommendations to resolve tensions that have historically existed between indigenous peoples and those imposing colonial Anglophone policies. However, the pedagogies and policies recommended in this corpus of literature, if followed, might help to ameliorate the tensions and inherent conflicts historically experienced by both sides attributable to their differing worldviews.*

### **Gaps and Recommendations for Future Research**

For reconciliation and progress in the future to be a possibility, much less a reality, those on both sides of the decolonization issue would have to approach negotiations in the spirit of mutual trust, justice, balance and a desire for healing.

Future research might be more influential if it focused on how a sustainable reconciliation might be accomplished at the local level rather than through centralized political change. This is because it is primarily at the local level and particularly in the classroom where change happens and pedagogy is implemented. The answers to questions like the following might also be catalysts for mutual change: What should be the specific role of educators at the local level? What should be the parallel roles of the indigenous community, parents and leaders? What is the responsibility of the individual student?

### **ARGUMENT D – INDIGENOUS SOVEREIGNTY OVER THEIR EDUCATION**

*Indigenous peoples are demanding for more sovereignty over their educational future. Scholars recommended that these requests for control and more active participation should be leveraged to improve CBE/CRE pedagogies.*



### **Analysis of the Corpus of Literature**

Indigenous scholars observed that student outcomes would only improve when indigenous leaders, educators and parents embrace their leadership role in that process.<sup>200</sup> What is more, Barnhardt has noted that as CBE research produced by indigenous scholars has increased, so has the demand for indigenous sovereignty of educational policies.<sup>201</sup>

The sovereign governance of education was the primary goal underlying the establishment of the *Nā Lau Lama (NLL)* initiative launched in Hawaii during 2006.<sup>202</sup> The NLL leaders brought together representatives from a broad spectrum of Hawaii's public, charter and private schools and over 70 community-serving organizations. The objective of NLL was to improve the educational outcomes for Native Hawaiian students of all ages. The collaborators recognized early on that all participants had a shared *kuleana* (Hawaiian word for "responsibility") to create more effective CBE/CRE pedagogies. Importantly, Hawaiian community leaders took the forefront in directing the progress of the project. The NLL collaborators stated that their primary objective was to ensure that "how the students were taught and what they were learning would always be culturally relevant and meaningful for

---

<sup>200</sup> Refer to the reports and scholarship available from Kamehameha School Strategic Planning and Research division at the following link for a list of the broad range of CBE Hawaiian largely indigenous-led research., [https://www.ksbe.edu/research/na\\_lau\\_lama\\_community\\_report/](https://www.ksbe.edu/research/na_lau_lama_community_report/).

<sup>201</sup> Ray Barnhardt, 'Higher Education in the Fourth World: Indigenous People Take Control', *Canadian Journal of Native Education*, 18 (1991), pp. 199-231.

<sup>202</sup> *Nā Lau Lama Community Report - Executive Summary*, (Hawaii Department of Education, Office of Hawaiian Affairs, and Kanehameka schools in partnership with many community organizations, 2008) [http://www.ksbe.edu/assets/spi/pdfs/reports/na-lau-lama/Executive\\_Summary\\_Final.pdf](http://www.ksbe.edu/assets/spi/pdfs/reports/na-lau-lama/Executive_Summary_Final.pdf) [accessed May 15, 2014].

them.”<sup>203</sup> The NLL initiative verified the Hawaiian community's strong preference for the use of CBE in indigenous-led programs. Western scholars Lockett and Lockett posited that CBE programs aiming for self-determination in education must empower the indigenous students themselves to act as responsible agents for their educational progress in order to be successful.<sup>204</sup>

In the face of declining success in education and fiscal constraints, U.S. Federal and State governments are looking for new solutions. Stoll recommended that indigenous leaders and educators take a more active role in the direction of self-governance as a possible solution to increase student success.<sup>205</sup>

Unapologetic in her advocacy, Meyer asserted that it was time now for Native Hawaiians to move away from what she termed “the assimilationist past” to self-determination. and from “structural dependence” toward independence as a means to spur higher educational attainment.<sup>206</sup>

Sheehey emphasized that before any form of educational sovereignty or independence can be achieved, indigenous parents must be involved in the decision-making processes, especially for special education and other at-risk students.<sup>207</sup>

---

<sup>203</sup> Nā Lau Lama Community Report, Introduction, p.1

<sup>204</sup> Kathy Lockett and Thembi Lockett, 'The Development of Agency in First Generation Learners in Higher Education: A Social Realist Analysis', *Teaching in Higher Education*, 14 (2009), pp. 469-481.

<sup>205</sup> Amy Stoll, *Reclaiming Native Education: Activism, Teaching and Leadership*, 22 vols (Cambridge, MA: Cultural Survival, 1998) <https://eric.ed.gov/?id=ED455980> .

<sup>206</sup> *Ho'Oulu - our Time of Becoming - Hawaiian Epistemology and Early Writings*, p. 236.

<sup>207</sup> Patricia H. Sheehey, 'Parent Involvement in Educational Decision-Making: A Hawaiian Perspective', *Rural Special Education Quarterly*, 25 (2006), pp. 3-15

Gegeo maintained that indigenous-led educational models should first be examined as to their effectiveness from within the community. He viewed this approach as the only viable way to achieve a sustainable consensus, especially in rural indigenous school communities.<sup>208</sup> Cajete proposed the incorporation of traditional AI values, cultural principles and teaching methods together with Western pedagogies to benefit all students attending U.S. schools. Early on, he also strongly advocated indigenous community sovereignty for educational policies.<sup>209</sup> His advocacy included a “renewal of the ecology of indigenous education,” which he believed would naturally result in and provide support for self-determination.<sup>210</sup>

### **Summary Conclusions of Argument D**

*The dominant point of view expressed in this corpus of literature was that indigenous community leaders, educators and students are in the best position to direct their educational future. Moreover, that the consensus of all stakeholders at the local level is a requirement for the self-determination and sustainability of indigenous-led CBE programs.*

---

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c862613111d5526759abfe2088e7030faf0ff348396eaae00c&fmt=H> .

<sup>208</sup> D. W. Gegeo, *Indigenous Knowledge and Empowerment: Rural Development Examined from Within*, University of Hawaii-Manoa Campus, Honolulu, Hawaii edn, 20th Annual University of Hawaii Pacific Islands Studies Conference, (1995).

<sup>209</sup> *Ignite the Sparkle: An Indigenous Science Education Model.*

*Native Science: Natural Laws of Interdependence.*

*Look to the Mountain: An Ecology of Indigenous Education.*

<sup>210</sup> Cajete and Pueblo, pp. 1126-1132

## ARGUMENT E – INSTITUTIONAL PRIORITIES AND PARTNERSHIPS

*The integration of traditional Anglophone and indigenous pedagogies has spurred positive change; however, the commitment level dramatically affected sustainable systemic transformation.*

### Analysis of the Corpus of Literature

An educational institution's decision to utilize CBE and CRE pedagogies correlated directly to the size of the indigenous student population. This trend suggests that achieving a critical population size might be a catalyst compelling institutional focus and momentum for changes to pedagogy. Examples of this trend are observable in both the level of scholarship and ways that indigenous students are taught in places like Hawaii and Alaska, where:

- 1) A significant number of indigenous community scholars are now working in the local education systems and teaching disciplines, and
- 2) A determination has been made that the *inclusion of CBE/CRE pedagogies is a systemic imperative.*

The numbers and the ratios of indigenous students compared to other ethnicities attending public schools in these two states has seemingly propelled a stronger research interest as well as a higher level of political and institutional commitment. These trends are substantiated in the paragraphs below; however, a few data points may serve to illustrate this briefly.

<b>Table 3.2 – Percentages of the Alaska Native and Native Hawaiian Populations to Total Population of the States of Alaska and Hawaii.</b>
❖ <b>United States – State of Alaska</b> – American Indian/Alaska Native population = 15.3% (106,866 of 698,473)
❖ <b>United States – State of Hawaii</b> – 27% of K-12 children in public schools
Source: U.S. Census Estimates, 2010

Collaborative research conducted over the last 25 years in these two states has resulted in a significant number of studies validating the effectiveness of CBE/CRE pedagogies with indigenous students. Some examples of the institutional cross-cultural research efforts are:

1) *The Alaska Rural Systems Initiative* (1995-2000) and its successor organization, the *Alaska Native Knowledge Network* (ANKN) which is still producing significant new studies and publications on AN indigenous education and knowledge systems.<sup>211</sup>

2) *The Ka Huaka'i – Native Hawaiian Educational Assessments* completed in 2005, 2009, and 2014 – A series of data-driven multidisciplinary studies that synthesized an extensive body of research highlighting the factors that impacted the educational outcomes of Native Hawaiian students.<sup>212</sup>

3) *Hawaiian Cultural Influences in Education (HCIE)* – A joint research project of the Kamehameha Schools, the Hawaii Department of Education and an alliance of Hawaiian-focused public charters schools that produced a substantial body of scholarship focused on improving Native Hawaiian student outcomes as well as the sharing of effective CBE/CRE pedagogies.<sup>213</sup>

Noteworthy were the accomplishments of the *Alaska Rural Systemic Initiative* (AKRSI) and the *Alaska Native Knowledge Network* (ANKN) led by the University of Alaska, Fairbanks. These innovative long-term educational programs proved to be significant catalysts for the improvement of AN student

---

<sup>211</sup> Refer to ANKN website: <http://www.ankn.uaf.edu/index.html>.

<sup>212</sup> Kana'iaupuni, Malone and Ishibashi.

<sup>213</sup> Ledward, Takayama and Elia.

outcomes. AKRSI and ANKN established sustainable partnerships between the AN and non-native educators and a wide range of indigenous community stakeholders. Subsequently, other scholars and educators built upon their successful model and findings.<sup>214</sup>

The results of the programs in Alaska demonstrated that effective, sustainable school and community strategies should include:

- A) Involving teachers in a broader scale in the indigenous community.<sup>215</sup>
- B) The development of a congenial learning environment.<sup>216</sup>
- C) The creation of open, mutually respectful cross-cultural partnerships to bring about sustainable improvements in indigenous student performance.<sup>217</sup>

---

<sup>214</sup> 'Education Indigenous to Place: Western Science Meets Native Reality', in *Ecological Education in Action*, ed. Smith and Williams, pp. 117-140.

Ray Barnhardt and Angayuqaq Oscar Kawagley, *Alaska Rural Systemic Initiative*, (2001).

'*Culture, Chaos and Complexity: Catalysts for Change in Indigenous Education*', pp. 59-64.

'Indigenous Knowledge Systems and Alaska Native Ways of Knowing', pp. 8-23.

*AKRSI Final Report: Phase I, 1995-2000*.

Frank Hill, Oscar Kawagley and Ray Barnhardt, *AKRSI Final Report: Phase II – 2000-2005*, (Alaska Native Knowledge Network, 2006)

<http://www.ankn.uaf.edu/download/AKRSI2005FinalReport.doc> .

James W. Kushman and Ray Barnhardt, Study of Alaska Rural Systemic Reform. Final Report, (1999) <https://eric.ed.gov/?id=ED437251> .

<sup>215</sup> 'Education Indigenous to Place: Western Science Meets Native Reality', in *Ecological Education in Action*, ed. Smith and Williams, pp. 117-140

<sup>216</sup> Ray Barnhardt, 'Domestication of the Ivory Tower: Institutional Adaptation to Cultural Distance', *Anthropology & Education Quarterly*, 33 (2002), pp. 238-49.

Kirkness and Barnhardt, 'First Nations and Higher Education: The Four R's – Respect, Relevance, Reciprocity, Responsibility', pp. 1-15

<sup>217</sup> *AKRSI Final Report: Phase I, 1995-2000*.

AKRSI's strategic objective centered on the creation of a sustainable alignment between two functionally interdependent, but primarily disconnected complex systems—the indigenous epistemologies and pedagogies rooted in the Alaska Native cultures—and the public education system of the State of Alaska. This approach operated under the core assumption that the complementary knowledge and skills taken from both systems of education could be explicated and leveraged to strengthen the quality of educational experiences for both indigenous and non-indigenous students.<sup>218</sup>

It is important to indicate here that the educational system of the United States is currently administered mainly through various centralized Federal and State governed regulations, fiscal controls and guidelines.<sup>219</sup> The Alaskan and Hawaiian programs sought to implement their CBE initiatives within, not in opposition to, these centralized financial and administrative parameters.

Several indigenous scholars proposed combining traditional Anglophone and indigenous pedagogies synergistically. For example, both Hanohano and Cajete expressed their views that learning for all students, not just the natives, could be harmonized through the use of indigenous pedagogies.<sup>220</sup> While the holistic indigenous worldview might appear on the surface to conflict with the

---

<sup>218</sup> Ibid.

<sup>219</sup> Nancy Kober, Alexandra Usher and Center on Education Policy, *A Public Education Primer: Basic (and Sometimes Surprising) Facts about the U.S. Educational System. 2012 Revised Edition*, (Center on Education Policy, 2012).

<sup>220</sup> 'The Spiritual Imperative of Native Epistemology: Restoring Harmony and Balance to Education', pp. 206-19.

Peter K. Hanohano Jr., '*Restoring the Sacred Circle -Education for Culturally Responsive Native Families*' (unpublished Ph.D. in First Nations Education, University of Alberta, Department of Educational Policy Studies, 2001).

more linear Western scientific thinking, Navajo science professors, Maryboy and Begay, viewed the two epistemologies as paradoxical parts of a greater whole, existing to compliment and balance one other.<sup>221</sup>

Barnhardt and Kawagley recommended that any viable attempt to synthesize Anglophone and indigenous educational traditions must first extensively document the local native “knowledge systems.” Using this process in Alaska, these scholars first worked to integrate the AN knowledge systems within the existing framework of the Alaskan public education. The second step included an effort to determine which indigenous epistemologies might contribute to improving the overall school curriculum. A third step involved the development of curriculum and practices integrating the indigenous epistemologies and pedagogies into all aspects of public education as seamlessly as possible.<sup>222</sup> Formal, informal, in-class and external learning environments were shown to have a significant and favorable influence on indigenous student performance in the Alaskan context.<sup>223</sup> Their work included incorporating the inclusion of parents and indigenous elders as a pedagogical feature.

Kushman asserted that for a sustainable transformation to occur that would result in a positive systemic change, members of the minority indigenous

---

<sup>221</sup> Nancy C. Maryboy, David H. Begay and Lee Nichol, 'Paradox and Transformation', *World Indigenous Nations Higher Education Consortium Journal* 200, 2 (2006).

<sup>222</sup> 'Indigenous Knowledge Systems and Alaska Native Ways of Knowing', pp. 8-23

<sup>223</sup> 'Domestication of the Ivory Tower: Institutional Adaptation to Cultural Distance', pp. 238-49.

'Reforming Education from the Inside-Out: A Study of Community Engagement and Educational Reform in Rural Alaska', pp. 12-26



communities must take an active leadership role, as per the Alaskan precedents.<sup>224</sup>

Hillberg and Tharp conducted research pertinent to the questions posed by this thesis. They demonstrated in several studies that the use of instruction more aligned with AI/AN students' preferences for observational and collaborative activities in which information is presented holistically and with visuals, produced gains in student achievement.<sup>225</sup> Goldenberg argued that the research completed by Tharp and other CREDE scholars did not conclusively demonstrate the effects of CBE/CRE pedagogies on student outcomes.<sup>226</sup> However, Huitt's studies affirmed Tharp and other's findings that the use of CBE/CRE supported curriculum improved CLD student motivation, classroom engagement and willingness to take charge of their learning progress.<sup>227</sup> Reinhardt and Maday's *Interdisciplinary Manual for American Indian Education* contained substantial empirical research and practical recommendations on how U.S. teachers could adapt their pedagogies to support AI/AN learning

---

<sup>224</sup> *Study of Alaska Rural Systemic Reform. Final Report.*

'Reforming Education from the Inside-Out', pp. 12-26

<sup>225</sup> R. Soleste Hilberg and Roland G. Tharp, Theoretical Perspectives, Research Findings, and Classroom Implications of the Learning Styles of American Indian and Alaska Native Students. *ERIC Digest*, (Charleston, WV: ERIC/CRESS, 2002) <https://eric.ed.gov/?id=ED468000> .

<sup>226</sup> Claude Goldenberg, 'Teaching English Language Learners What the Research Does—and Does Not—Say,' *American Education*, pp 8 - 44). AFT publications and reports.2008}

Claude Goldenberg, 'Unlocking the research on English Learners: What we know—and don't yet know—about effective instruction,' *American Educator*, 37 (2), pp 4-11, 38j. 2013)

<sup>227</sup> 'A Systems Model of Human Behavior'.

*Becoming a Brilliant Star: A Model of Formative Holistic Education.*

preferences.<sup>228</sup> Lee, Gabbard and Reyhner substantiated the need for teachers to have a specialized CBE knowledge base in order to be more effective in helping indigenous students succeed.<sup>229</sup>

Partnerships formed in Hawaii involving indigenous and non-indigenous scholars, educators, government leaders and Native Hawaiian community leaders have collaborated to bring forth a significant volume of scholarship focused upon improving Native Hawaiian student outcomes using CBE pedagogies. Kana'iaupuni, Ledward, & Malone demonstrated in their paper how the Hawaiian public/private educational community established a robust statewide network that openly shared their most effective CBE pedagogies to improve Native Hawaiian student achievement.<sup>230</sup>

From 2005 to the present, the *Ka Huaka'i Native Hawaiian Educational Assessments* (NHEA) have made a seminal contribution to the overall understanding of the current status of and the factors still inhibiting Native Hawaiian student educational progress. The existence of committed partnerships between the Kamehameha Schools and the other Native Hawaiian public educators were pivotal to the success and credibility of these NHEA assessments. The NHEA research data documented the interrelated factors in and out of the school environment that have historically influenced, both positively and negatively, Native Hawaiian student achievement and their

---

<sup>228</sup> Reinhardt and Maday.

<sup>229</sup> Harry Lee, David Gabbard and Jon Reyhner, 'A Specialized Knowledge Base for Teaching American Indian and Alaska Native Students', *Tribal College*, IV (1993), p. 26 <http://proquest.umi.com/pqdweb?did=625182471&Fmt=3&clientId=1673&RQT=309&VName=PQD> .

<sup>230</sup> Kana'iaupuni, Ledward and Malone, pp. 311-339.

overall social, emotional and physical well-being. The primary objective of the NHEA research centered on empirically establishing the linkages between CBE/CRE pedagogies and their effect on Native Hawaiian students' socio-emotional development as well as their direct and indirect influence on school progress.<sup>231</sup>

Seminal in its importance to this thesis was the fact that the NHEA research incorporated a comprehensive emphasis on data-driven analysis and the establishment of a viable framework to longitudinally track and measure the impact of CBE/CRE pedagogies. The Kamehameha Schools Research Division-led NHEA studies further showed that rigorous Western analytical-style teaching methods could be effectively combined with traditional Hawaiian pedagogies. NHEA's research compiled over twelve years revealed that those students attending the Hawaiian language immersion and charter schools had the highest percentage gains in academic improvement.<sup>232</sup> In these language immersion and charter schools, instruction is delivered entirely in the Hawaiian language, with a focus on returning to the traditional Hawaiian cultural ways of transmitting knowledge, skills and values until the fifth grade, when English instruction is introduced.

---

<sup>231</sup> Ledward, Takayama and Elia.

<sup>232</sup> Kana'iaupuni, Ledward and Jensen.

Kana'iaupuni, Ledward and Malone, pp. 311-339.

Brandon Ledward and others, *Why Hawai'i Needs Public Charter Schools: The Positive Effects of Hawaiian-Focused Charter Schools on Student Outcomes*, (2010).

Kathy Tibbetts and others, *Pathways To prosperity through Linked Learning for Native Hawaiians*, (Honolulu, HI: Kamehameha Schools– Research & Evaluation, 2012).

The *Hawaiian Cultural Influences in Education* (HCIE) studies created several new research tools that increased the knowledge base concerning the most effective CBE/CRE pedagogies.<sup>233</sup> One example of a workable framework was *The Hawaiian Indigenous Education Rubric* (HIER). HIER was designed by the HCIE scholars to measure specific indicators and evaluate the use of CBE pedagogies by teachers across five domains: *language, content, context, family, and community*.<sup>234</sup> HCIE employed place-based, project-based and hands-on-learning—where indigenous Hawaiians have an innate preference—with other formal and informal pedagogies to produce improved student outcomes.<sup>235</sup>

HCIE involved 62 pre-schools and K-12 schools, 600 teachers, and over 3000 students from traditional public schools, charter and private schools representing all regions in the State of Hawaii. It was significant that the HCIE scholars also broadened their research focus beyond just measuring grades in school and standardized test results. An examination of the published reports of HCIE and their other partnering Hawaiian organizations revealed the following CBE contributions pertinent to this thesis.

- A. Empirical data showed that CBE/CRE strategies *could be effective in improving indigenous student outcomes*. In particular, the HIER rubric was peer-evaluated and found to be experimentally and statistically sound based upon the results for the five domains studied. HIER also

---

<sup>233</sup> Refer to studies and research tools available at the following website:  
[https://www.ksbe.edu/research/research\\_collection/](https://www.ksbe.edu/research/research_collection/).

<sup>234</sup> Kana'iaupuni and Kawai'ae'a.

<sup>235</sup> Ledward, Takayama and Elia.

correlated their test results with the universal standards recommended by the *Center for Education, Diversity, & Excellence (CREDE)*.<sup>236</sup>

- B. Using a modified version of Phinney's *Multigroup Ethnic Identity Measure (MEIM)*, HCIE found that CBE methodologies had a significant impact on indigenous students' ethnic identity and a positive correlational impact on self-concept and student outcomes.<sup>237</sup>
- C. The use of the HIER rubric and the other recommended CBE strategies had a statistically significant impact on Native Hawaiian students' cultural knowledge, their engagement in family and community matters, cognitive engagement in the classroom and the retention of information learned.<sup>238</sup>
- D. The use of the rubric showed a statistically significant positive impact on the increased language ability, cultural activity participation and the Hawaiian values orientation of students in instances where HIER employed project and place-based pedagogies.<sup>239</sup>
- E. The HCIE studies demonstrated that the promotion of active indigenous family and community involvement was a critical aid toward helping students learn.<sup>240</sup>

*In summary, the HCIE studies substantiated that the theories concerning the potential benefits of CBE/CRE methods were correct—namely that the*

---

<sup>236</sup> Ledward, Takayama, and Elia.

<sup>237</sup> Ibid.

<sup>238</sup> Brandon Ledward, Brennan Takayama and Walter Kahumoku III, *Kiki Nā Wai: Swiftly Flowing Streams. Examples of 'Ohana and Community Integration in Culture-Based Education*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation Division, 2008) [https://www.ksbe.edu/assets/research/collection/08\\_0201\\_ledward.pdf](https://www.ksbe.edu/assets/research/collection/08_0201_ledward.pdf) .

<sup>239</sup> Ledward, Takayama and Elia.

<sup>240</sup> Ledward, Takayama and Kahumoku.

*increased usage of native language and cultural pedagogies improved indigenous student academic performance levels in core subjects such as math and reading as well as their socio-emotional skills and development.*<sup>241</sup> Finally, the quantitative data gathered by HCIE researchers showed a strong correlation between CBE pedagogies and improved student outcomes. Neri et al., however, cautioned educational researchers that *CBE/CRE based instruction involves many multilevel learning challenges* (e.g., student, teacher, administrative and systemic), including overcoming teachers' opinions of its practical efficacy and their ability to implement it effectively.<sup>242</sup>

In addition to the excellent work done by HCIE researchers, a further examination of the literature revealed that *The Sociocultural Theory of Education (STE)* might be a useful construct for the synthesis of Anglophone and indigenous pedagogical traditions. For several decades, Western and indigenous community researchers associated with CREDE have produced a corpus of scholarship related to this theory.<sup>243</sup>

The mission of CREDE centers on the development of research concerned with improving the academic achievement of at-risk students. Their areas of study include such things as the practice of holistic learning principles, effective language learning, in-service professional development for teachers and the influence of family, peers and school/community interaction upon student

---

<sup>241</sup> Ledward, Takayama and Elia.

<sup>242</sup> Neri, Lozano and Gomez.

<sup>243</sup> Roland G. Tharp, *From at-Risk to Excellence: Research, Theory, and Principles for Practice*, (1997) <http://files.eric.ed.gov/fulltext/ED409717.pdf> .

progress. An analysis of multiple studies conducted over the last several decades by CREDE demonstrated that pedagogies for CLD students must accommodate the individual student and be grounded in theories (e.g., STE) that include a comprehensive set of pedagogical, social and classroom environmental processes.<sup>244</sup> CREDE scholars Tharp and LaFromboise, for example, posited that CLD students thrive in a context where CBE and Western pedagogies combine to create an “authentic biculturalism or third space.” Their research described this dualistic approach as uniformly resulting in better-than-average academic achievement levels by CLD students.<sup>245</sup>

Building on over three decades of research in working with and teaching indigenous populations, Tharp and other CREDE scholars identified five universal instructional methods that were effective in classrooms containing CLD students. The pedagogies discovered to be most influential with these students and present in numerous successful programs were: (1) *joint*

---

<sup>244</sup> R. G. Tharp and others, *Teaching Transformed: Achieving Excellence, Fairness, Inclusion and Harmony*. (Boulder, CO: Westview, 2000).

Roland G. Tharp and Ronald Gallimore, 'Rousing Schools to Life', *American Educator: The Professional Journal of the American Federation of Teachers*, 13 (1989), pp. 20-25,46-52.

Roland G. Tharp and Lois A. Yamauchi, *Effective Instructional Conversation in Native American Classrooms. Educational Practice Report: 10* (1994)  
<http://files.eric.ed.gov/fulltext/ED372896.pdf> .

Roland G. Tharp and Lois A. Yamauchi, 'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', *Journal of Early Education and Family Review*, 7 (2000), pp. 33-37.

Roland G. Tharp and Susan Entz, 'From High Chair to High School: Research-Based Principles for Teaching Complex Thinking', *Young Children*, 58 (2003), pp. 38-44.

Roland G. Tharp and Stephanie Stoll Dalton, 'Orthodoxy, Cultural Compatibility, and Universals in Education', *Comparative Education*, 43 (2007), pp. 53-70.

<sup>245</sup> T. D. LaFromboise and W. Rowe, 'Skills Training for Bicultural Competence: Rationale and Application', *Journal of Counseling Psychology*, 30 (1983), pp. 589-595.

*productive activity, (2) language & literacy across the curriculum, (3) contextualization, (4) challenging activities, and (5) instructional conversation.*<sup>246</sup>

The CREDE scholars also verified several other interventions shown to be effective when utilized by educators working in classrooms containing high ratios of indigenous students. According to the CREDE studies, school reform programs established to benefit CLD students have historically tended to concentrate on specific ethnic communities and locales. However, the research produced by CREDE *attempted to transcend specific groups and educational risk factors to create a universal framework*. Their research postulated that universals in education are possible but not necessarily of Western origin. Moreover, they openly questioned whether standard traditional Anglophone pedagogies were still broadly applicable in the demographically diverse environments found in most U.S. classrooms today.<sup>247</sup>

In summary, Tharp and his associates at CREDE made some valuable research-based contributions to the understanding of effective pedagogy practices for educating CLD students. Their core findings and pedagogical interventions include, but are not limited to, the following:

- (1) Culture does influence student expectations for classroom behavior and the social organization of CLD students.<sup>248</sup>

---

<sup>246</sup> *From at-Risk to Excellence: Research, Theory, and Principles for Practice*.

Tharp and Entz, pp. 38-44.

<sup>247</sup> Tharp and Dalton, pp. 53-70.

<sup>248</sup> *Teaching Transformed: Achieving Excellence, Fairness, Inclusion and Harmony*.



(2) Instructional Conversation (IC), a pedagogy developed by CREDE, was shown in their longitudinal studies to impact Native American student performance positively. IC involves a dialogue between teacher and learner in which prior knowledge and experiences (including cultural knowledge) are woven together with new material to build higher understanding. This more interactive CRE approach was favored by the majority of indigenous learners in contrast to the teacher-dominated lecture scripts of traditional schooling.<sup>249</sup>

(3) Intellectual growth is best encouraged by assisting and facilitating learning rather than assessing or judging student performance.<sup>250</sup>

(4) Classrooms must be settings that maximize opportunities for participation and open conversation.<sup>251</sup>

While CREDE scholars considered their findings to be crucial, they lamented the fact that the recommendations advanced by them had not been universally adopted nor implemented.<sup>252</sup> However, as a result of the examination of the literature, this thesis will advocate for the adoption of the seven universal standards of effective pedagogy and learning established by CREDE through

---

'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', pp. 33-37.

<sup>249</sup> *Effective Instructional Conversation in Native American Classrooms. Educational Practice Report: 10.*

<sup>250</sup> Tharp and Gallimore, pp. 20-25,46-52.

<sup>251</sup> Ibid.

<sup>252</sup> 'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', pp. 33-37.

their extensive analysis of the research and development literature in education and diversity.

### **Summary Conclusions of Argument E**

*A growing group of both indigenous and non-indigenous educators and scholars favor the combining of Western analytical and indigenous culture-based pedagogies in a complimentary manner. A committed cross-cultural effort is an essential ingredient in the formulation of high-impact CBE strategies. Analysis of the corpus of scholarship in this regard also revealed that the most beneficial CBE/CRE pedagogies have been multidisciplinary, collaborative, and more consensus versus competitively driven. The most significant improvements in pedagogy, curriculum development and systemic reform have taken place in locations where high ratios of indigenous students in attendance mandated institutional action. The considerable volume of ongoing CBE/CRE related research and collaborative initiatives found in Alaska and Hawaii verified this trend. Moreover, the impetus toward innovatively combining Western and indigenous pedagogies in these same regions appeared to be the result of indigenous scholars and community leaders asserting a greater influence.*

### **ARGUMENT F – APPLICATION OF CBE AND CRE PEDAGOGIES IN THE CLASSROOM AND CROSS-CULTURAL PROFESSIONAL DEVELOPMENT**

*The successful integration of traditional Anglophone and indigenous pedagogies in the classroom will require professional development for the teachers to facilitate the proper contextualization of CBE/CRE curriculum and methods.*

### **Analysis of the Corpus of Literature**

In the United States today, the public school classroom is the principal place for the education of age 5-18 age youth. For CBE/CRE pedagogies to achieve their potential influence, they must be effectively incorporated into the educational and social environment of K-12 classrooms.

Blumenfeld posited that the maintenance of a high degree of individual student motivation and the clarification of aspirations for all students were critical strategies required for the improvement of classroom-based learning.<sup>253</sup> While factors such as classroom size and the existence of a positive learning environment have always affected student performance, Cotton portrayed the common situation as dismal for the majority of indigenous students attending U.S. public schools today.<sup>254</sup>

Several studies showed that intentionally creating a classroom environment for indigenous students where their motivation and learning confidence was enhanced was a useful adaptation in the classroom. These studies suggested that a critical barrier to better indigenous student performance was not the language barrier, a dominant white mainstream culture, nor the ability to learn and perform, but a teacher's negative stereotypes, which resulted in the degradation of native students' self-confidence.<sup>255</sup> As Dufour pointed out, even

---

<sup>253</sup> P. Blumenfeld, 'Classroom Learning and Motivation: Clarifying and Expanding Goal Theory', *Journal of Education Psychology*, 84 (1992), pp. 272-281.

<sup>254</sup> K. Cotton, *School Size, School Climate, and Student Performance*, (Portland, OR: Northwest Regional Educational Laboratory, 1996). <http://www.nwrel.org/scpd/sirs/10/c020/html>

<sup>255</sup> C. Ames, 'Classroom Goals, Structures, and Student Motivation', *Journal of Educational Psychology*, (1992).

though public schools should be continuous learning environments for all participants (e.g., teachers, students, administrators and parents), determining the most effective educational strategies for implementation in the classroom remains challenging because the dynamics between students and their teachers are always changing.<sup>256</sup>

Another alternative approach to improved classroom-based pedagogy was proposed in a study undertaken by the University of Michigan's *Community Scholars Program* (MCSP). MCSP successfully brought together undergraduate college students into a highly collaborative, diversity-focused and democratic educational experience that capitalized on the individual cultural strengths of the participants. In MCSP's project-based learning initiative, students, faculty, community and staff created a microcosmic representation of a country built on the shared work and celebration of the participants' diverse contributions.<sup>257</sup> The MCSP project further demonstrated that sharing must be open, non-competitive and collaborative in order to optimize group learning results.

---

S. Amin, *Eurocentrism* (New York: Monthly Review Press, 1988).

L. Cleary and T. Peacock, *Collected Wisdom: American Indian Education* (Boston: Allyn and Bacon, 1999).

<sup>256</sup> R. DuFour, 'The School as a Learning Organization: Recommendations for School Improvement', *NASSP Bulletin*, 81 (1997), pp. 81-87.

<sup>257</sup> David Schoem, 'Modeling a Diverse and Democratic America: The Michigan Community Scholars Program', *About Campus*, 10 (2005), pp. 18-23.

Ortiz and Heavyrunner suggested in their study that improved models of inclusion and positive support were critical when considering improvements in indigenous student retention and success.<sup>258</sup>

As previously noted, Hummel and Huitt's longitudinal studies showed that forced answer testing taps only the lower-level intellectual skills of knowledge and comprehension, not the higher-order skills of analytical reasoning, synthesis and problem-solving.<sup>259</sup> As one possible solution to this problem, Hummel and Huitt recommended the use of a *Constructivist Learning Model* (CLM) based on the theory that students learn best by actively constructing their own knowledge in the classroom.<sup>260</sup>

Danyluk and Da Costa argued that because the majority of indigenous students attend urban classrooms in the United States, they often face unique acculturation challenges. Like other studies previously mentioned, they posited that the most significant challenge for indigenous students, compared with their mainstream peers, occurs because native students generally have a higher degree of preference for visual versus text-based learning. Their studies provided substantial survey data corroborating that in the majority of U.S. classrooms, the overwhelming emphasis focused on individual competition over group performance. Danyluk and Da Costa recommended the active use of

---

<sup>258</sup> Ortiz and Heavyrunner.

<sup>259</sup> Hummel and Huitt, pp. 10-11

<sup>260</sup> Ibid.

CRE strategies that aligned more effectively with these indigenous students' cultural identities and practices.<sup>261</sup>

Hilberg and Tharp were forceful in their opinion that teachers seriously interested in positively affecting the progress of indigenous students must utilize pedagogies more in sync with these native learning preferences.<sup>262</sup> In using the term “learning preferences”—the inference is not being made to worn-out terms such as “learning styles” or “best practices”--- we are speaking of contexts in which indigenous students have been shown through evidence-based research to increase their participation in a competitive group or classroom setting. The categorization of learners into fixed “learning styles” is problematic and is scientifically inaccurate by recent research in educational psychology.<sup>263</sup> In addition, the term “best practice” has been widely used throughout U.S. scholarly circles despite the lack of evidence or consensus for what practices are “best.” According to Ermeling, Hiebert and Gallimore, the pervasive use of this term has frequently promoted the superficial selection and use of teaching methods that discouraged the continuous improvement of teaching, and, all too often, prioritized activity over achievement.<sup>264</sup>

---

<sup>261</sup> R. C. Danyluk and J. L. Da Costa, *Identifying and Addressing Challenges Encountered by Educators of Aboriginal Children in an Urban Setting*, Montreal, Quebec, Canada edn, Annual Meeting of the American Educational Research Association, (1999).

<sup>262</sup> Hilberg and Tharp.

<sup>263</sup> Daniel T. Willingham, Elizabeth M. Hughes and David G. Dobolyi, 'The Scientific Status of Learning Styles Theories', *Teaching of Psychology*, 42 (2015), 266-271.

<sup>264</sup> Bradley Ermeling, James Hiebert and Ronald Gallimore, "'Best Practice"--the Enemy of Better Teaching', *Educational Leadership*, 72 (2015), 48-53.

Bilingual classrooms in most U.S. schools today are often the norm rather than the exception.<sup>265</sup> Andersson and Boyer offered an excellent definition of bilingual education as “instruction in two languages and the use of those two languages as mediums of instruction for any part, or all, of the school curriculum.”<sup>266</sup>

The learning of English as a second language is an issue faced by many indigenous students in the United States.<sup>267</sup> Ovando and Combs completed a comprehensive study of bilingual and English as a Second Language (ESL) education in the United States. Their research illustrated numerous examples of pedagogies suited for use with CLD students attempting to learn English.<sup>268</sup> Trueba edited an ethnographic research collection tied to bilingual classrooms, which affirmed that significant challenges to a teacher’s effectiveness occurred when CLD students enter their first classroom.<sup>269</sup>

Forty years of research and scholarship on immersive bilingual education has produced a broad array of analyses and models. Stephen May synthesized

---

<sup>265</sup> Paul J. Ramsey, *The Bilingual School in the United States: A Documentary History* (Charlotte, N.C.: Information Age Publishing, 2012).

<sup>266</sup> Theodore Andersson, Mildred Boyer and Southwest Educational Development Laboratory, *Bilingual Schooling in the United States* (Austin, Texas: Southwest Educational Development Laboratory., 1970).

<sup>267</sup> Lee Little Soldier, 'Language Learning of Native American Students', *Educational Leadership*, 46 (1989), pp. 74-75.

A. R. Scoon, 'Affective Influences on English Language Learning among Indian Students', *TESOL Quarterly*, 5 (1971), p. 285.

<sup>268</sup> Carlos J. Ovando and Mary Carol Combs, *Bilingual and ESL Classrooms: Teaching in Multicultural Contexts*, Sixth edn (Lanham, MD: Rowman & Littlefield, 2018).

<sup>269</sup> Au and Jordan, pp. 139-152.

these models into meaningful categories that highlighted broad agreements among researchers.<sup>270</sup> May defined most bilingual programs as being either *subtractive or additive*. According to May, a bilingual program can be considered subtractive if it promotes monolingual learning in the dominant language, either losing or replacing one language with another. A program can be regarded as additive if it promotes bilingualism over the long term, usually by adding another language to the student's existing mother tongue.<sup>271</sup> May stated that a distinguishing feature of two-way language immersion education was that, compared to other types of language teaching and learning, it had enabled a greater degree of academic success for language minority students. According to several other studies, language minority students performed better academically after having participated in bilingual immersion programs in their native language.<sup>272</sup> Other scholarship showed that CLD students with high levels of literacy in their native language performed better in their English language subjects as well.<sup>273</sup>

---

<sup>270</sup> S. May, 'Bilingual/Immersion Education: What the Research Tells Us', in *Encyclopedia of Language and Education*, ed. by J. Cummins and N. H. Hornberger, 2nd edn, Bilingual Education vols (Springer Science+Business Media LLC, 2008), pp. 19-34.

<sup>271</sup> *Ibid.*, pp 19-21.

<sup>272</sup> J. Greene, *A Meta-Analysis of the Effectiveness of Bilingual Education*, (Austin, TX: University of Texas at Austin, Thomas Rivera Policy Institute, 1998)  
<http://www.languagepolicy.net/archives/greene.htm> .

Wayne Thomas and Virginia Collier, *A National Study of School Effectiveness for Language Minority Students' Long-Term Academic Achievement: Final Report, Executive Summary*, (Santa Cruz, CA and Washington, DC: Center for Research on Education, Diversity & Excellence., 2002) <https://escholarship.org/content/qt65j213pt/qt65j213pt.pdf?t=krnd6g>

Ann C. Willig, 'A Meta-Analysis of Selected Studies on the Effectiveness of Bilingual Education', *Review of Educational Research*, 55 (1985), pp. 269-317.

<sup>273</sup> Virginia P. Collier, 'A Synthesis of Studies Examining Long-Term Language Minority Students Data on Academic Achievement', *Bilingual Research Journal: The Journal of the*



One study conducted back in 1981 by Au and Jordan revealed that the most effective bilingual teaching strategies for young Native Hawaiian English learners emphasized “doing and experiencing” over normative formal language pedagogies.<sup>274</sup>

In 2010, the Kamehameha Schools and the *Pacific Policy Research Center* (PPRC) in Hawaii completed a meaningful literature review and analysis of successful bilingual education and language immersion programs.<sup>275</sup> Their findings have relevance to the topic of this dissertation because they established a causal link between the performance of indigenous students in English/Hawaiian bilingual immersion programs and Hawaiian Charter Schools. Kamehameha Schools and the PPRC were quick to point out that while the immersion programs in these Hawaiian schools had demonstrated substantial success and good practice in bilingual education, it was still too early to draw conclusions as to their overall effectiveness. Their hesitancy to evaluate these Hawaiian bilingual initiatives more positively was because these programs,

---

*National Association for Bilingual Education*, 16 (1992), pp. 187-212.  
<https://www.tandfonline.com/doi/abs/10.1080/15235882.1992.10162633>

Milagros Lanauze and Catherine Snow, 'The Relation between First and Second Language Writing Skills: Evidence from Puerto Rico Elementary School Children in Bilingual Programs', *Linguistics and Education*, 1 (1989), pp. 323-339.  
<https://www.sciencedirect.com/science/article/pii/S0898589889800051>

<sup>274</sup> Au and Jordan, pp. 139-152.

<sup>275</sup> Pacific Policy Research Center, *Successful Bilingual and Immersion Education Models/Programs*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation Division, 2010)  
[http://www.ksbe.edu/assets/spi/pdfs/Bilingual\\_Immersion\\_full.pdf](http://www.ksbe.edu/assets/spi/pdfs/Bilingual_Immersion_full.pdf)

which were fast-tracked by the Board of education in Hawaii at that time, were not the type of curriculum initially intended for these schools.<sup>276</sup>

During 2001, the United States Department of Education mandated a new set of common performance standards entitled “No Child Left Behind” (NCLB). The NCLB standards were intended to diminish persistent disparities in school achievement, including gaps in the performance of indigenous students.

However, many in U.S. education circles voiced their opinions that NCLB was one of the most problematic pieces of legislation ever promulgated in U.S. educational history because of its unrealistic standards, the disproportionate impact it had on high-poverty schools, its narrow outcome measurements and impractical theoretical classroom approaches.<sup>277</sup> Researchers in Hawaii also criticized the NCLB and suggested that by holding all schools to the same rigid standard, the NCLB threatened the benefits and progress achieved by Hawaiian charter and language immersion schools using culturally relevant curriculum and pedagogies.<sup>278</sup> Reyes concurred with this assessment, recommending that classrooms in the United States needed to allow indigenous students to learn from their own cultural and historical perspective.<sup>279</sup>

---

<sup>276</sup> Pacific Policy Research Center, p. 11

<sup>277</sup> J. Reyhner and D. S. Hurtado, 'Reading First Literacy, and American Indian/Alaska Native Students', *Ibid.*(2008), pp. 82-95.

T. Winstead and others, 'Language, Sovereignty, Cultural Contestation, and American Indian Schools: No Child Left Behind and a Navajo Test Cst', *Journal of American Indian Education*, 47 (2007), pp. 46-64.

<sup>278</sup> *A Brief Overview of Culture-Based Education and Annotated Bibliography.*

<sup>279</sup> Raymond Reyes, *A Native Perspective on the School Reform Movement: A Hot Topics Paper*, (Portland, OR: Northwest Regional Educational Laboratory, 1998).  
<https://eric.ed.gov/?id=ED423101>

Indigenous students in special education and remedial programs are over-represented demographically compared to other racial and ethnic groups.<sup>280</sup>

Discussions have been ongoing regarding reasons for this statistical anomaly.

A U.S. Department of Education study indicated that influences such as substandard school environments and political and economic oppression are contributing factors to this overrepresentation.<sup>281</sup>

Ogata, Sheehy, and Noonan verified this U.S. Department of Education premise in their study and asserted that factors like sub-standard and ill-equipped schools, less qualified teachers and economic oppression contributed to the overrepresentation of Native Hawaiian children in Special Education and remedial classrooms. Other Hawaiian studies showed that factors such as second language learning, frequent teacher turnover in schools having high CLD student ratios, the lack of training in cultural competence for instructors and evaluators as well as mismatches between student and adult behavioral expectations had a negative influence on Native Hawaiian student achievement.<sup>282</sup>

Tharp, Yamauchi, Gallimore and Entz produced studies that showed which classroom pedagogies were more productive when used by teachers with at-

---

<sup>280</sup> American Indian College Fund, *Facts about American Indian Education*, (American Indian College Fund, 2010) <https://eric.ed.gov/?id=ED527093>

Terris Ross and others, *Higher Education: Gaps in Access and Persistence Study*. Statistical Analysis Report. NCES 2012-046, (National Center for Education Statistics, 2012). <https://eric.ed.gov/?id=ED534691>

<sup>281</sup> Aud, Fox and Kewalkamani.

<sup>282</sup> Ogata, Sheehy and Noonan, pp. 7-15.

risk Native American students. Based on their empirical research into improving indigenous students' academic performance, they recommended an emphasis on observational learning and group social organization in addition to the other standards mentioned by the CREDE scholars on pages 50-52 of this thesis.<sup>283</sup> Rogoff, Mejia and Arauz, et al. examined how people learn by actively observing and “listening-in” on ongoing activities as they participate in a shared or group learning environment. According to these same researchers, keen observation in this context is especially valued and used by many cultures, including indigenous communities as a pedagogical methodology.<sup>284</sup>

### **Summary Conclusions of Argument F**

*Any attempt at arriving at a plausible integration of traditional Anglophone and indigenous pedagogies must address the realistic cross-cultural challenges encountered by both teachers and AI/AN/NH students in the classroom. Recent studies on the effectiveness of bilingual immersion models suggested that more significant academic progress may be possible if indigenous students are first grounded in their culture and native language and afterward in the English-language curriculum.*

---

<sup>283</sup> Tharp and Entz, pp. 38-44.

*Effective Instructional Conversation in Native American Classrooms. Educational Practice Report: 10.*

'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', pp. 33-37.

<sup>284</sup> Barbara Rogoff and others, 'Firsthand Learning through Intent Participation', Annual Review of Psychology, 54 (2003), 175-203 <https://doi.org/10.1146/annurev.psych.54.101601.145118> .

## **ARGUMENT G – THE SYNTHESIS OF CBE/CRE PEDAGOGIES AND CURRICULUM USING TECHNOLOGY-- ENHANCED LEARNING AND EMERGING DIGITAL--AGE PLATFORMS**

*Technology-enhanced learning (TEL), Information and Communications*

*Technology (ICT) and mobile devices are rapidly transforming educational delivery options worldwide. The innovative use of digital-age systems could have significant potential to benefit indigenous communities. If deployed widely and economically, these tools could provide opportunities for indigenous learners to better incorporate their cultural identities, strengths, place-based, and group-centered instructional preferences into a useful solution capable of improving their academic progress.*

### **Analysis of the Corpus of Literature**

The concept of creating personalized learning approaches has been studied for nearly fifty years.<sup>285</sup> This form of learning aims to provide resources and activities that adapt to the needs and abilities of the learner. As evidenced by the previous examination of the literature, indigenous leaders and scholars are increasingly advocating for CBE/CRE educational approaches customized to their needs.

Over the past twenty years, researchers from around the world have discussed the potential benefits for indigenous peoples' adoption or non-adoption of ICT.<sup>286</sup> By definition, ICTs are technologies that enable the handling, capturing,

---

<sup>285</sup> Dodd, B., Sime, M. and Kay, H. (1968). *Teaching Machines and Programmed Instruction*, London: Penguin Books.

<sup>286</sup> Valerie Alia, 'Outlaws and Citizens: Indigenous People and the New Media Nation', *International Journal of Media & Cultural Politics*, 5 (2009), pp. 39-54.

processing, storing, and disseminating of information that facilitates different forms of communication. Today, this definition would include such things as personal computers, cellphones and other devices that interface with the Internet. Levy argued that ICTs and the Internet have already become essential tools allowing numerous indigenous individuals and communities to have increased access to information.<sup>287</sup>

According to Chikonzo, ICTs have played an essential role in facilitating the archival of indigenous verbal language, knowledge and stories.<sup>288</sup> Joseph and Uther discussed in their paper how the development of mobile technology had opened a wide array of possibilities for literacy development with underserved

---

Donald Cowan and others, 'Dreamcatcher: IT to Support Indigenous People', *IT Professional*, 14 (2012), pp. 39-47.

Laurel Evelyn Dyson and Jim Underwood, 'Indigenous People on the Web', *Journal of Theoretical and Applied Electronic Commerce Research*, 1 (2006), pp. 65-76.

Judy M. Iseke-Barnes, 'Aboriginal and Indigenous People's Resistance, the Internet, and Education', *Race, Ethnicity and Education*, 5 (2002), pp. 171-198.

Brett Parker, 'Maori Access to Information Technology', *The Electronic Library*, 21 (2003), pp. 456-460.

<sup>287</sup> Pierre Levy, 'Education and Training: New Technologies and Collective Intelligence', *Prospects*, 27 (1997), pp. 248-263.

<sup>288</sup> Agnes Chikonzo, 'The Potential of Information and Communication Technologies in Collecting, Preserving and Disseminating Indigenous Knowledge in Africa', *International Information & Library Review*, 38 (2006), pp. 132-138.

Marcia Haag and F. Wayne Coston, 'Early Effect of Technology on the Oklahoma Chotaw Language Community', *Language Learning & Technology*, 6 (2002), pp. 70-82.  
[https://scholarspace.manoa.hawaii.edu/bitstream/10125/25161/1/06\\_02\\_haag.pdf](https://scholarspace.manoa.hawaii.edu/bitstream/10125/25161/1/06_02_haag.pdf)

Charles Kamau Maina, 'Traditional Knowledge Management and Preservation: Intersections with Library and Information Science', *International Information & Library Review*, 44 (2012), pp. 13-27.

populations in rural locales.<sup>289</sup> Other recent research also recommended that ICTs should be used as a tool to promote literacy, group interaction, and even educational advancement because they could be more easily customized to indigenous student's needs and preferences.<sup>290</sup> In this regard, Kral observed that remote indigenous cultures in Australia had used digital age technologies to maintain their cultural heritage and strengthen community cohesion.<sup>291</sup>

Heckman, Peterman, and Montera proposed a conceptual model for improving the average United States multi-ethnic classroom environment. They argued that modern ICT trends and project-based learning techniques might be more consistent with what they termed "indigenous invention."<sup>292</sup> By "indigenous invention," these scholars shared their experience stemming from a research

---

<sup>289</sup> Sam Joseph and Maria Uther, *Mobile Language Learning with Multimedia and Multimodal Interfaces*, Washington, DC edn, Fourth IEEE International Workshop on Wireless, Mobile and Ubiquitous Technology in Education, (IEEE, 2006).

<sup>290</sup> Dania Bilal and Joe Kirbry, 'Differences and Similarities in Information Seeking: Children and Adults as Web Users', *Information Processing & Management*, 38 (2002), pp. 649-670.  
<https://www.sciencedirect.com/science/article/pii/S0306457301000577/pdf?md5=ffcb064a307b7e638cdaa12b01e47ce4&pid=1-s2.0-S0306457301000577-main.pdf> .

Paul Kim, Talia Miranda and Claudia Olaciregui, 'Pocket School: Exploring Mobile Technology as a Sustainable Literacy Education Option for Underserved Indigenous Children in Latin America', *International Journal of Educational Development*, 28 (2008), pp. 435-445.

Donna Rogers and Karen Swan, 'Self-Regulated Learning and Internet Searching', *Teachers College Record*, 106 (2004), pp. 1804-1824.  
[https://www.itma.vt.edu/courses/tel/resources/rogers\(2004\)\\_self-regulated\\_internet.pdf](https://www.itma.vt.edu/courses/tel/resources/rogers(2004)_self-regulated_internet.pdf) .

Marion Walton and Arlene Archer, 'The Web and Information Literacy: Scaffolding the use of Web Sources in a Project-Based Curriculum', *British Journal of Educational Technology*, 35 (2004), pp. 173-186.

<sup>291</sup> Inge Kral, 'Plugged in: Remote Australian Indigenous Youth and Digital Culture (CAEPR Working Paper no. 69)', *Center for Aboriginal Economic Policy Research*, (2010).  
[https://caepr.cass.anu.edu.au/sites/default/files/docs/WP69\\_0\\_0.pdf](https://caepr.cass.anu.edu.au/sites/default/files/docs/WP69_0_0.pdf)

<sup>292</sup> Paul E. Heckman and Viki L. Montera, 'School Reform: The Flatworm in a Flat World – from Entropy to Renewal through Indigenous Invention', *Teachers College Record*, 111 (2009), pp. 1328-1351.

initiative conducted by the University of Arizona entitled the *Educational and Community Change (ECC) Project*. The ECC project's basic premise was that those individuals "indigenous to the school and neighborhood" had the highest probability of promoting student learning. The ECC studies advocated for every aspect of schooling to be reinvented based on this same premise.<sup>293</sup>

The University of Arizona researchers recommended that teachers should embrace daily each student's individual choices as a central feature of this type of personalized education.<sup>294</sup> In concert with this recommendation, Heckman and Montera argued that if teachers wanted to ensure that students were fully engaged in the classroom, then each child's unique interests and contributions must be considered.<sup>295</sup>

In 2017, Du completed a literature review and an in-depth assessment concerning the role that digital age technologies might play in influencing indigenous populations.<sup>296</sup> She concluded that since research on the use of

---

<sup>293</sup> Paul E. Heckman and Francine Peterman, 'Indigenous Invention: New Promise for School Reform', *Teachers College Record*, 98 (1996), pp. 307-327.

<sup>294</sup> Paul E. Heckman and Viki L. Montera, 'From School Choice to Student Voice', *School Administrator*, 58 (2001), pp. 40-44, 46.

<sup>295</sup> Ibid.

<sup>296</sup> Clifton Chadwick and Soledad Valenzuela, 'Culture, Change, and Educational Improvement', *Educational Technology Magazine: The Magazine for Managers of Change in Education*, 48 (2008), pp. 27-36.

Richard Culatta, 'From Innovation Clusters to Datapalooza: Accelerating Innovation in Educational Technology', *Educause Review*, November/December (2012), p. 26.

Jia Tina Du, 'Research on Indigenous People and the Role of Information and Communications Technology in Development: A Review of the Literature', *Journal of the Australian Library & Information Association*, 66 (2017), pp. 344-363.



ICTs to benefit indigenous populations was still in the formative stages, there remained many questions to yet to be answered and gaps in the literature to be filled. Nonetheless, Du revealed that the most recent scholarship suggested that, “the modern information and communications technology, media-rich world, amplified with text, graphics, audio and video files, is believed to suit well many of the indigenous people’s strengths in art, music and visual forms of passing on knowledge.”<sup>297</sup>

British scholar, Sir Kenneth Robinson, purported that U.S. educational institutions are basically neglecting 21st-century thinking skills associated with the cognitive, affective and volitional domains of the brain. Concerning this, Robinson criticized the current trend in U.S. education to overlook the critical skills developed through music and other liberal arts disciplines in favor of the physical sciences.<sup>298</sup> In 1998, Robinson chaired a National Advisory Committee on Creative and Cultural Education in the United Kingdom and helped author a report entitled *All Our Futures: Creativity, Culture and Education*. This committee was charged to study and make recommendations to the U.K.

---

Jared Keengwe, Terry Kidd and Lydia Kyei-Blankson, 'Faculty and Technology: Implications for Faculty Training and Technology Leadership', *Journal of Science Education and Technology*, 18 (2009), pp. 23-28.

Martin Nikirk, 'Today's Millennial Generation: A Look Ahead to the Future they Create', *Techniques: Connecting Education and Careers*, 84 (2009), pp. 20-23.  
<https://eric.ed.gov/?id=EJ840445>.

Jayson W. Richardson and Scott McLeod, 'Technology Leadership in Native American Schools', *Journal of Research in Rural Education*, 26 (2011).

<sup>297</sup> *Information Technology and Indigenous People*, ed. by Laurel Evelyn Dyson, Max Hendriks and Stephen Grant (Hershey, PA: Information Science, 2007), in *Google Scholar*.

<sup>298</sup> Ken Robinson, *Out of our Minds: Learning to be Creative* (Chichester, West Sussex, England, Oxford, U.K.: Capstone Publishing Ltd. (a Wiley Company), 2001), pp. 3-10.

government on “the creative and cultural development of young people through formal and informal education: to take stock of current provision and to make proposals for principles, policies and practice.”<sup>299</sup> The report’s major themes focused on the need for more creative educational approaches, cross-cultural understanding and the use of a systemic approach to bring about effective change; issues that are also relevant to improving CBE/CRE pedagogy as well as the educational environments encountered by indigenous students in U.S. schools today.<sup>300</sup>

Further examination of the literature revealed other TEL currently being advanced to integrate Internet and cloud computing systems and facilitate “anywhere, anytime” learning environments. The adaptability of mobile technologies to a variety of physical and social settings has generated a form of TEL in education called *mobile learning* or *m-learning* for short.<sup>301</sup>

In 2006, Chan et al. used the term “seamless learning” to describe these new environments.<sup>302</sup> Milrad et al. further summarized the options available for students and educators through seamless learning in the following way:

Seamless learning implies that students can learn whenever they are curious, in a variety of situations. They can easily and quickly switch from one scenario to another using their personal mobile device as a mediator and can maintain the continuity of their learning across technologies and settings. These scenarios include learning individually, with another student, a small group, or a large

---

<sup>299</sup> National Advisory Committee on Creative and Cultural Education, *All our Futures: Creativity, Culture, and Education*, (London: DFEE, 1999), p. 2.

<sup>300</sup> Ibid.

<sup>301</sup> M. Sharples, 'Methods for Evaluating Mobile Learning', in *Researching Mobile Learning: Frameworks, Tools and Research Designs*, ed. by G. N. Vavoula, N. Pachler and A. Kukulska-Hulme (Oxford: Peter Lang Publishing Group, 2009), pp. 17-39.

<sup>302</sup> Chan and others, pp. 3-29.

online community, with possible involvement of teachers, relatives, experts and members of other supportive communities, face-to-face or in different modes of interaction and at a distance in places such as classroom, outdoors, parks and museums, or on cyberspace such as in virtual worlds and social networking spaces.<sup>303</sup>

Subsequent chapters of this thesis will explore and analyze specific new technological tools (e.g., distributed ledger technology) that might provide a framework to facilitate and enhance the effectiveness of CBE/CRE to improve secondary and college student engagement and academic achievement.

Recent research has investigated the concept of “seamless learning” to support continuous learning across contexts and devices, including mobile phones.<sup>304</sup> A global collaboration proposed doing research that would explore a learning environment where every person has a networked personal computing device and can use it to learn across a variety of contexts.<sup>305</sup>

In 2010, Chen et al. responded to a gap in this research by proposing a longitudinal study that would explore the affordability of a seamless learning environment to propel modern tech-savvy students’ 21st-century knowledge, skills and positive attitudes towards schooling in general.<sup>306</sup>

---

<sup>303</sup> M. Milrad and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Z. L. Berge and L. Y. Muilenburg (New York: Routledge, 2013) p. 98.

<sup>304</sup> M. Sharples, 'Mobile Learning: Research, Practice and Challenges', *Distance Education in China*, 3 (2013), pp. 5-11.

<sup>305</sup> Chan and others, pp. 3-29.

<sup>306</sup> Wenli Chen and others, *Extending Students' Learning Spaces: Technology-Supported Seamless Learning*, Chicago, Illinois edn, 9th International Conference of the Learning Sciences (ICLS) 2010, (International Society of Learning Sciences (ISLS), 2010), p. 484.

Ubiquitous Learning or *u-Learning* is the term used by researchers to define the potential for a continuous learning experience made possible by the rapid development of hand-held computers, broadband WIFI and ubiquitous (cloud) computing.<sup>307</sup> According to Milrad et al., an essential aspect of *u-learning* is that it affords context-awareness and adaptivity. Milrad et al. define these as:

By context-awareness, we mean that the system providing pedagogical flow and content to the learning environment should be aware of the learner's situations. By context adaptivity, we mean that different learning contents should be adaptable to the particular settings in which the learners are situated.<sup>308</sup> [underline added]

Despite the significant growth in the number of recent studies focused on TEL, m-learning, seamless and ubiquitous learning, these forms of educational delivery are still in the early pilot stages. Many uncharted areas and numerous questions remain unanswered and have yet to be investigated to move from theory to mainstream practice.

One area that has not yet been researched in detail is the impact that these new forms of technology-facilitated learning might have on indigenous peoples. TEL, m-learning and u-learning have the potential of supporting new pedagogies that allow the learning experience to be unbound by time or space. This could, of course, include CBE/CRE supported place-based learning environments like those being used in Hawaii.

---

<sup>307</sup> Y. Rogers and S. Price, 'Using Ubiquitous Computing to Extend and Enhance Learning Experiences', in *Ubiquitous Computing in Education: Invisible Technology, Visible Impact*, ed. by M. van't Hooft and K. Swan (Lawrence Erlbaum Associates, Inc., 2006), pp. 329-347.

<sup>308</sup> Milrad and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Berge and Muilenburg, pp. 95-108.

The expanded use of seamless learning techniques and pedagogies described above are sure to demand changes in the way education is delivered and how educational institutions and teachers must prepare and package it for dissemination. To that end, MIT educator, Peter Senge promoted the value of creating “learning organizations.” He defined these schools and other entities as places “in which new and expansive patterns of thinking are nurtured, collective aspirations are set free, and people are people are continually learning to create the results they truly desire.”<sup>309</sup> In *Schools that Learn: A Fifth Discipline Fieldbook for Educators, Parents and Others Who Care About Education*, Senge and his colleagues described three decades of helping hundreds of institutions to design and operate as learning organizations. They defined these as institutions where, “people who may have been suspicious of one another—parents, teachers, educators...people in and outside the school walls—students and adults recognize their common stake in each other’s future and the future of their community.”<sup>310</sup>

Senge further recommends the use of systems-thinking as a mental map to help educators change their organizational behaviors and work more effectively together. Systems-thinking incorporates a holistic approach to analysis and focuses on the way that a system's constituent parts interrelate and how they work over time and within the context of larger eco-systems. The systems-thinking approach contrasts with traditional analysis, which studies systems by

---

<sup>309</sup> P. M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday, 2006) Quoted from cover page of the book.

<sup>310</sup> P. M. Senge and others, *Schools that Learn: A Fifth Discipline Fieldbook for Educators, Parents, and Everyone Who Cares about Education*, updated and revised edn (New York: Crown Publishing Group, 2012) p. 5.

breaking them down into their separate elements. Systems-thinking can be used in any area of research and has been applied to the study of medical, environmental, political, economic, human resources, and educational systems, among many others.<sup>311</sup> The proponents of TEL, m-learning and u-learning necessarily are suggesting the use of a systems-thinking approach to facilitate new forms of human interaction and collaborative behaviors.

Scharmer's *Theory U*<sup>312</sup> actively promotes the importance of human creativity and collaboration as a method to transform ineffective business, societal and educational processes. Scharmer accurately characterizes the 21<sup>st</sup>-century dilemma faced by many educational institutions in the United States when he asserts:

We also pour considerable amounts of money into our educational systems, but we haven't been able to create schools and institutions of higher education that *develop people's innate capacity to sense and shape their future, which I view as the single most important core capacity for this century's knowledge and co-creation economy.*<sup>313</sup> [Italics added]

How will indigenous students fit into the economy described by Scharmer?

Fortunately, scholars have studied this question. For example, Gould proposed aligning the curriculum and traditional structures of U.S. education with the principles of living systems (open self-organizing life forms that interact with their environment, e.g. ecological and biological systems). He suggested

---

<sup>311</sup> Donella H. Meadows, *Thinking in Systems: A Primer*, ed. by Diana Wright (Chelsea Green Pub, 2008) <https://wtf.tw/ref/meadows.pdf>.

*The Fifth Discipline: The Art and Practice of the Learning Organization.*

<sup>312</sup> Otto Scharmer & Katrin Kaufer, *Leading from the Emerging Future: From Ego-System to Eco-System Economies*, First edn (San Francisco, CA: Berrett-Koehler Publishers, Inc, 2013).

<sup>313</sup> C. O. Scharmer, *Theory U: Leading from the Future as it Emerges*, First edn (San Francisco, CA: Berrett-Koehler Publishers, Inc., 2009) p. 71.

shifting the industrial-age metaphor of schools as “production lines” to “one of schools as ‘seedbeds’ and students as ‘seeds; based on principles of systems-thinking and ecology.”<sup>314</sup> Such a change in paradigm would better align, at least metaphorically, with the underlying worldviews of the AI/AN/NH indigenous cultures. In addition, this same paradigm could potentially be utilized to create a new *u-learning* curriculum for improving CBE/CRE pedagogies in and out of the classroom

Cost and efficiency are important factors today in delivering any form of education. In the United States, many indigenous learners are low-income and first-generation students. Because of this fact, Du indicated in her study that the effective use of ICT technologies could be a vital factor in helping bring about increased access to education and the lowering of the average distributed costs of schooling for these students.<sup>315</sup> As early as 2001, Beare predicted that ICT facilitated learning would be crucial to the creation of the schools of the future and essential to lower overall education costs.<sup>316</sup> Kritt and Winegar also forecasted that solving cost-effective ICT distribution issues would be a critical

---

<sup>314</sup>John M. Gould, (2017). Shifting the Metaphor: Designing 21<sup>st</sup> Century Curriculum Based on the Principles of Living Systems and Sustainability (unpublished essay shared with the author of this thesis)

<sup>315</sup> Du, pp. 344-363

<sup>316</sup> H. Beare, *Creating the Future School* (London: Routledge, 2001).

Michiel Van Eijck and Nicholas Xumthoult Claxton, 'Rethinking the Notion of Technology in Education: Techno-Epistemology as a Feature Inherent to Human Praxis', *Science Education*, 93 (2009), pp. 218-232.

task ahead for all 21<sup>st</sup>-century educators, especially those working with disadvantaged and lower-income target populations.<sup>317</sup>

It is plausible that innovative ICT tools, digital apps and m-learning could be used interactively to facilitate the “instructional conversations” described by the CREDE scholars as having a positive impact on indigenous student progress. In his research, Tharp attributed part of the effectiveness of “instructional conversations” to the proclivities that Native American students exhibited toward visual learning, observational group processing and non-competitive learning environments.<sup>318</sup> Perhaps these same indigenous strengths and preferences could be leveraged to accelerate student progress if used in tandem with video-based group learning systems and other seamless learning modalities.

The development and promotion of open educational resources (OER) is often motivated by a desire to provide an alternate or enhanced educational paradigm. OER broadens access to the learning and training traditionally offered through formal education systems and could have a significant role to play in expanding access for indigenous learners worldwide. Millions of individuals have already taken an online lesson at the Khan Academy (3,200

---

<sup>317</sup> David W. Kritter and Lucien T. Winegar, *Education and Technology: Critical Perspectives, Possible Futures* (Lanham, MD: Lexington Books, 2007). <https://eric.ed.gov/?id=ED498757> .

<sup>318</sup> *Effective Instructional Conversation in Native American Classrooms. Educational Practice Report: 10.*

'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', pp. 33-37



video lessons, 168 million views),<sup>319</sup> been enlightened by a TED Talk (1,300 talks, 800 million views),<sup>320</sup> watched a videotaped academic lecture or enrolled in a MOOC (Massive Open Online Course).<sup>321</sup>

The use of open pedagogy is one other aspect of the open educational movement. Hodgkinson-Williams and Gray defined open pedagogy as “the opening up of educational processes...enabled by Web 2.0 technologies.” They argued that open pedagogy could likely play a more transformational role than open content (OER) in the future. They further suggested that these technologies have the potential to put disadvantaged learners (e.g., indigenous students) more on a level plane with their mainstream peers.<sup>322</sup>

DuFeu’s study referenced the increased development of open pedagogy, describing it as “a philosophy in which the content of the course as well as its progression can be *determined by the unique individualized needs and preferences of participants, which may include their culture-based learning*

---

<sup>319</sup> Refer to: <https://www.khanacademy.org/> Khan Academy is a non-profit educational organization created in 2008 by Salman Khan with the goal of creating a set of online tools that help educate students. The organization produces short lessons in the form of YouTube videos. Its website also includes supplementary practice exercises and materials for educators.

<sup>320</sup> Refer to: <https://www.ted.com/> TED Talks are influential videos from expert speakers on education, business, science, tech and creativity, with subtitles in 100+ languages.

<sup>321</sup> MOOCs are a recent and widely researched development in distance education, first introduced in 2006 and emerged as a popular mode of learning in 2012.

Andreas M. Kaplan and Michael Haenlein, 'Higher Education and the Digital Revolution: About MOOCs, SPOCs, Social Media, and the Cookie Monster', *Business Horizons*, 59 (2016), pp. 441-450.

<sup>322</sup> Cheryl Hodgkinson-Williams and Eve Gray, 'Degrees of Openness: The Emergence of Open Educational Resources at the University of Cape Town', *International Journal of Education and Development using Information and Communication Technology*, 5 (2009), pp. 101-116 [https://open.uct.ac.za/bitstream/handle/11427/8860/CHED\\_article\\_OERemergence\\_HodgkinsonWilliams\\_2009.pdf?sequence=1](https://open.uct.ac.za/bitstream/handle/11427/8860/CHED_article_OERemergence_HodgkinsonWilliams_2009.pdf?sequence=1).

*preferences*.”<sup>323</sup> Daniel referred to open pedagogy as one “that treats the student as an intellectual equal.”<sup>324</sup> Mai proposed the creation of an informal classroom where CLD students would be “allowed and trusted to learn by exploring according to their interests, instead of being bored, demeaned and alienated.”<sup>325</sup>

In their published research, Wiley et al. argued for the creation of more open education initiatives. They described such projects as having significant potential to accelerate learning progress for all students.<sup>326</sup> Wiley and Hilton posited that both “open pedagogy” and student-centered learning have already benefitted from numerous advances in interactive technologies and will likely continue to do so in the future.<sup>327</sup> They further argued that these pedagogies have the potential to propel disadvantaged learners upward (e.g., indigenous students) to compete with their mainstream peers.<sup>328</sup> The concepts associated

---

<sup>323</sup> B. DuFeu, 'For an Open Pedagogy', *Francais Dans Le Monde*, 246 (1992), pp. 39-45.

<sup>324</sup> John Daniel, *From the Triangle to the Pentagon: Open Universities in the 21st Century*, Shanghai China edn, Asian Association of Open Universities - Quality Education for all: New Missions and Challenges Facing Open Universities, (Commonwealth of Learning, 2004). [http://oasis.col.org/bitstream/handle/11599/1446/2004\\_Daniel\\_Triangle\\_Pentagon\\_Transcript.pdf?sequence=1&isAllowed=y](http://oasis.col.org/bitstream/handle/11599/1446/2004_Daniel_Triangle_Pentagon_Transcript.pdf?sequence=1&isAllowed=y) .

<sup>325</sup> Robert Paul Mai, 'Open Education: From Ideology to Orthodoxy', *Peabody Journal of Education*, 53 (1978), pp. 231-237.

<sup>326</sup> David Wiley and others, 'A Preliminary Exploration of the Relationships between Student-Created OER, Sustainability, and Student Success', *International Review of Research in Open and Distributed Learning*, 18 (2017). [http://scholar.google.com/scholar\\_url?url=http://www.irrodl.org/index.php/irrodl/article/download/3022/4198&hl=en&sa=X&scisig=AAGBfm2kDrFqL8MpFoVXL7MgrzAilPNhpg&nossl=1&oi=scholar](http://scholar.google.com/scholar_url?url=http://www.irrodl.org/index.php/irrodl/article/download/3022/4198&hl=en&sa=X&scisig=AAGBfm2kDrFqL8MpFoVXL7MgrzAilPNhpg&nossl=1&oi=scholar) .

David Wiley and John Levi Hilton III, 'Defining OER-Enabled Pedagogy', *International Review of Research in Open & Distance Learning*, 19 (2018), pp. 133-147.

<sup>327</sup> Ibid.

<sup>328</sup> Ibid.

with open pedagogy and its use referenced by the above-listed scholars could have significant relevance for educating indigenous populations, especially if combined with the effective use of DLT and smart contracts.

Researchers in the Netherlands suggest that some indigenous populations might have a barrier hindering them from integrating modern science and technology. Van Eijk et al. argue that because technology has become distanced from the applied sciences, it has a unique epistemology that they term “techno-epistemology.” These scholars argue that since technology has historically and typically been taught from the premise of a Western-scientific worldview, this pedagogical reality has overshadowed other ways of knowing (e.g., indigenous epistemology). As a result, this educational hegemony has tended to favor students who hold the same Western scientific worldview.<sup>329</sup>

The Netherlands scholars proposed an alternative indigenous-inspired method to understand the role technology plays in education. In order to understand the unique epistemology required for technology education for indigenous populations, their *Cultural Historical Activity Theory* (CHAT) study was based on an indigenous case study. According to Van Eijck, et al., the CHAT model concept was “both relevant and useful to demonstrate how technology has been understood inherent to human praxis and the development of tools associated with human activity.”<sup>330</sup>

---

<sup>329</sup> Van Eijck and Claxton, 'Rethinking the Notion of Technology in Education: Techno-Epistemology as a Feature Inherent to Human Praxis', pp. 218-232.

<sup>330</sup> Van Eijck and Claxton, p. 230.

The Netherlands research method and findings aligned closely with Meyer's argument that many indigenous cultures presuppose a unique and dialectically related epistemology that cannot be reduced to the Western scientific worldview.<sup>331</sup> Cajete argued that a practical solution for this problem might be an epistemology that emerged organically—based in ecology and inspired by the indigenous population. Cajete further recommended that this might also help address many of the environmental challenges of the 21<sup>st</sup> century.<sup>332</sup>

Well before the explosion of the Internet and the advancement of these emerging tech systems, forward-thinking educators such as Huitt argued for the customized use of computer-based technologies to propel positive learning outcomes.<sup>333</sup> Ruth and Houghton recommended that wiki-based collaborative methods of aggregating learning content exhibit considerable promise to foster the more egalitarian sharing of knowledge.<sup>334</sup>

If the future is about the education of our youth, what skills will they need? In partial answer to that question, a recent study produced by Looi et al. in Singapore forecast in 2010 that personal, portable, wirelessly networked

---

<sup>331</sup> 'Holographic Epistemology: Native Common Sense', p. 94.

<sup>332</sup> Cajete and Pueblo, pp. 1126-1132.

<sup>333</sup> W. Huitt, *Success in the Information Age: A Paradigm Shift*, (Atlanta, Georgia: 1995) <http://chiron.valdosta.edu/whuitt/col/student/scanspap.html> [accessed March 1999].

'A Systems Model of Human Behavior'.

<sup>334</sup> Alison Ruth and Luke Houghton, 'The Wiki Way of Learning', *Australasian Journal of Educational Technology*, 25 (2009), pp. 135-152. <https://ajet.org.au/index.php/AJET/article/view/1147>.

technologies would become ubiquitous in the lives of learners.<sup>335</sup> In most countries today this is already a reality, creating the potential for a new phase in the evolution of technology-enhanced learning.

According to some scholars and recent government studies, the emerging technologies of virtual reality (VR),<sup>336</sup> AI,<sup>337</sup> deep machine learning,<sup>338</sup> and distributed ledger technology (blockchain or DLT)<sup>339</sup> are anticipated to dramatically change the world of work in the next decade of the 21<sup>st</sup> century.

A recent Stanford University study entitled, *Artificial Intelligence and Life in 2030*, identified eight domains where artificial intelligence is already having or could be projected to have the most significant impacts, each with a high level of human-machine symbiosis. The eight areas specified were transportation, healthcare, education, low-resource communities, public safety and security, employment and the workplace, home/service robots and entertainment. This study concluded that society is now at a crucial juncture in determining how to

---

<sup>335</sup> Chee-Kit Looi and others, 'Leveraging Mobile Technology for Sustainable Seamless Learning: A Research Agenda', *British Journal of Educational Technology* (BJET), 41 (2010), pp. 154-169.

<sup>336</sup> Zachary B. Hill, *Virtual Reality: Advances in Research and Applications* (Hauppauge, New York: Nova Science Publishers, Inc, 2016).

<sup>337</sup> Jim E. Greer, Kenneth R. Koedinger and Rosemary Luckin, *Artificial Intelligence in Education: Building Technology Rich Learning Contexts that Work* (Amsterdam, Netherlands: IOS Press, 2007)

<sup>338</sup> Sunila Gollapudi and V. Laxmikanth, *Practical Machine Learning* (Birmingham, UK: Packt Publishing, 2016).

<sup>339</sup> Grech, Alexander and Anthony F. Camilleri, *Blockchain in Education*, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017).

Jinwook Lee and Paul Moon Sub Choi, *Chain of Antichains: An Efficient and Secure Distributed Ledger Technology and its Applications*, (2018).

deploy AI-based technologies in ways that promote rather than hinder democratic values such as freedom, equality, and transparency.<sup>340</sup>

Today, many individuals take for granted that they are carrying supercomputers around in their pockets capable of running their lives and their learning. This mobile technological phenomenon has emerged almost entirely within the last ten years. According to U.S. government forecasts and other studies, this trend will only accelerate in the future with the proliferation of hand-held devices and computers driven by artificial intelligence (e.g., smart homes, autonomous cars) and the rapid emergence and commercialization of AI, DLT and 5G facilitated platform-based interactive systems.<sup>341</sup>

Digital platforms have also transformed the way we live, work, travel and learn. Parker, Van Alstyne and Choudary explored the evolution of “the platform economy” and defined a platform as:

A platform is a business based on enabling value-creating interactions between external producers and consumers. The platform provides an open, participative infrastructure for these interactions and sets governance conditions for them. The platform’s overarching purpose: to consummate matches among users and facilitate the exchange of goods, services, or social

---

<sup>340</sup> *One Hundred Year Study on Artificial Intelligence (AI100)*, <https://ai100.stanford.edu/>, August 1, 2019 vols (Stanford, CA: Stanford University).

<sup>341</sup> Kanad Chatterjee, 'Shaping the Future: An Online Education Ecosystem', *Childhood Education*, 94 (2018), pp. 56-59.

Xiaoqing Gu, Yuankun Zhu and Xiaofeng Guo, 'Meeting the "Digital Natives": Understanding the Acceptance of Technology in Classrooms', *Educational Technology & Society*, 16 (2013), pp. 392-402.

Christopher Washington, *Virtual Learning Ecosystems: A Proposed Framework for Integrating Educational Games, E-Learning Methods, and Virtual Community Platforms*, (Online Submission, 2015). <http://files.eric.ed.gov/fulltext/ED560265.pdf>

currency, thereby enabling value creation for all participants.<sup>342</sup>  
[Underline added for emphasis]

In addition, Millennial (born 1981-1996) and Gen Z (born 1996-2012) students are increasingly demanding knowledge and educational content more relevant and applicable to their digital world lifestyles.<sup>343</sup> In this context, if educators are seriously interested in improving the academic achievement levels of indigenous millennials and Gen Z students (many of whom must still cross the “digital divide”), then ICT tools and curriculum must be provided. However, Meyer cautioned that one significant barrier hindering ICT among some indigenous peoples is literacy.<sup>344</sup>

In 2007, Beard, Schwieger and Surendran examined the difficulties in educating Millennial students. The authors found this group could be characterized as having a sense of entitlement, a desire for customization, availability on-demand and a preference for immediate benefits.<sup>345</sup> A decade later, U.S. schools face a new set of challenges unique to Generation Z students. Similar to their Millennial predecessors, Gen Z students have been raised with easily accessible technology; however, the level at which technology has been

---

<sup>342</sup> Geoffrey G. Parker, Marshall W. Van Alstyne and Sangeet Paul Choudary, *Platform Revolution: How Networked Markets are Transforming the Economy - and how to make them Work for You* (New York: W.W. Norton & Company, Inc., 2016).

<sup>343</sup> Nikirk, pp. 20-23.

<sup>344</sup> Hester W. J. Meyer, 'The Influence of Information Behaviour on Information Sharing Across Cultural Boundaries in Development Contexts', *Information Research: An International Electronic Journal*, 14 (2009). <http://files.eric.ed.gov/fulltext/EJ837280.pdf>

<sup>345</sup> Dana Schwieger and Christine Ladwig, 'Reaching and Retaining the Next Generation: Adapting to the Expectations of Gen Z in the Classroom', *Information Systems Education Journal*, 16 (2018), pp. 45-54.

incorporated into their everyday lives has been unlike that of any prior generation.

Hora's research indicated that Gen Zs share many of the same expectations and traits as the Boomer generation (born between the early 1940s to early 1960s), including the hope to save toward the future, and the values of security and respect. Because Gen Zs are technologically savvy and accustomed to being "always online," they are interested in determining their schedules, creating their career paths and doing things independently.<sup>346</sup>

How will all these crucial technologies affect the learning progress of indigenous Gen Z students? How can educators better prepare indigenous students to benefit from the platform economy? What would it look like if CBE and the new emerging technologies such as AI and DLT were integrated? How can these pedagogies and emerging technologies be synergized in a meaningful and impactful way for indigenous populations?

These are compelling questions demanding answers which heretofore have not been deeply examined. In fact, an extensive search of the corpus of the literature discovered that no research had been conducted that analyzed the combination of CBE/CRE pedagogies with these critical emerging platforms and technological systems. Thus, a crucial area of future research might be to explore how CBE/CRE curriculum could be synthesized or facilitated with m-learning and other seamless learning tools and systems.

---

<sup>346</sup> Matthew T. Hora, 'Beyond the Skills Gap', *NACE Journal*, *NACE Web*, (2017).  
<https://www.naceweb.org/career-readiness/trends-and-predictions/beyond-the-skills-gap/> .



### **Summary of Argument G**

*A limited number of CBE studies have been produced proposing the use of modern digital age tools to improve the educational advancement of indigenous peoples. A larger corpus of scholarship has argued for the alignment of CBE/CRE pedagogies and interventions with indigenous peoples' visual, group and observational learning preferences. A considerable research gap exists regarding the potential benefits of combining CBE/CRE pedagogies and curriculum with the latest TEL (e.g., m-learning and u-learning, seamless learning) and the emerging tech systems (i.e., AI, DLT, digital platforms). All of these systems and technologies are projected to significantly change most forms of business and educational delivery in the future. Serious consideration should be given to innovatively adapt and utilize these tools and systems to provide greater access and accelerate the educational opportunities and learning for indigenous peoples.*

### **Gaps and Recommendations for Future Research**

Digital age technologies are now so ubiquitous in every aspect of modern life, that it appears more important than ever to keep fundamental questions about their potential in the foreground of discussions regarding the future of education and learning. Given the growing cultural diversity of United States' public school classrooms, it would seem that culturally relevant, student-centric pedagogical approaches are a fundamental requirement, *not only as it pertains to the emerging technologies themselves, but more importantly, for the potential they could have in delivering curriculum and other forms of multimedia content.*

An examination of the pertinent literature discovered no studies directed to the investigation of the use of CBE/CRE pedagogies combined with TEL and seamless learning systems. Additional research synergizing these pedagogies and technologies could have a significant impact on closing the gaps in CLD students' academic achievement.

Other questions and potential implications for future research might be:

- What are the impacts of indigenous culture and values on their information behavior in the context of social media?
- What are the opportunities and barriers faced by indigenous people who are already connected to digital technologies?
- How might the use and the critical emergence of AI, VR, 5G and DLT be combined with effective CBE/CRE pedagogies to enhance the learning progress of indigenous students?
- What ICT tools and technologies, if any, are best suited to integrate with indigenous student identities and practices?
- How can both educators and students work to achieve both the objectives of authentic seamless learning via the use of mobile devices and provide improved CBE/CRE curricular options, individualized instruction to advance the academic progress of indigenous students?  
This question will be explored in-depth in Chapter 9 of this thesis.
- How might the research-verified indigenous cultural strengths in visual and observational learning and their preference for group-related learning activity be synergized with these modern technological systems to further enhance their classroom adaptivity and academic success?

The answers to any one or all of these questions could aid the creation of a productive synthesis between traditional Anglophone and indigenous pedagogical methods in new and influential ways.

### **CONCLUSIONS BASED ON THE REVIEW OF THE LITERATURE**

Outlined sequentially below is a summary of each argument and conclusive findings from the literature examined under the seven categories proposed:

#### **ARGUMENT A – THE IMPORTANCE OF CULTURE-BASED EDUCATION AND CULTURALLY RELEVANT EDUCATION PEDAGOGIES**

*A review of the corpus of literature suggests that the use of CBE/CRE pedagogies demonstrate substantial promise towards reducing the educational achievement disparities between United States indigenous students and their mainstream peers.*

#### **ARGUMENT B – CULTURAL ADAPTATION OF ASSESSMENTS**

*Numerous studies indicated that in all too many instances, the assessments of indigenous students attending U.S schools have been stereotypically biased, lacking in cultural adaptation and sensitivity, and have not been inclusive of environmental factors occurring outside of the classroom. Despite this fact, improvements are being made, and some scholars have advanced theories that indigenous pedagogies have potential application to the fostering of higher-order thinking skills and a greater understanding of the 21st-century physical environment.*

#### **ARGUMENT C – DECOLONIALIZATION AND RECONCILIATION**

*U.S. educators, influenced by their systemic Anglophone traditions, have inadvertently and even intentionally attempted to assimilate instead of*

*accommodating indigenous populations. Colonial educational policies failed because indigenous peoples generally desired to retain their distinctive cultural heritage and identity. It is not the goal of this literature review to propose a set of recommendations to resolve tensions that have historically existed between indigenous peoples and those imposing colonial Anglophone policies. However, the pedagogical and policy recommendations in this corpus of literature, if followed, might lead to a reconciliation between both parties.*

#### **ARGUMENT D – INDIGENOUS SOVEREIGNTY OVER THEIR EDUCATION**

*The dominant point of view expressed in the literature was that indigenous community leaders, educators and students are in the best position to direct their educational future. Moreover, that the consensus of all stakeholders at the local level is a requirement for the self-determination and sustainability of indigenous-led CBE programs.*

#### **ARGUMENT E – INSTITUTIONAL PRIORITIES AND PARTNERSHIPS**

*A growing group of both indigenous and non-indigenous educators and scholars favor the combining of Western analytical and indigenous culture-based pedagogies in a complimentary manner. A committed cross-cultural effort is an essential ingredient in the formulation of high-impact CBE strategies. Analysis of the corpus of scholarship in this regard also revealed that the most beneficial CBE/CRE pedagogies have been multidisciplinary, collaborative, and consensus-driven. The most significant improvements in pedagogy, curriculum development and systemic reform have taken place in locations where high ratios of indigenous students in attendance mandated institutional action. The substantial volume in ongoing CBE/CRE related research and collaborative*

*initiatives found in Alaska and Hawaii verified this trend. Moreover, the impetus toward innovatively combining Western and indigenous pedagogies in these same regions appeared to be the result of indigenous scholars and community leaders asserting a greater influence.*

#### **ARGUMENT F – APPLICATION OF CBE AND CRE PEDAGOGIES IN THE CLASSROOM AND CROSS-CULTURAL PROFESSIONAL DEVELOPMENT**

*Any attempt at arriving at a plausible integration of traditional Anglophone and indigenous pedagogies must address the realistic cross-cultural challenges encountered by both teachers and AI/AN/NH students in the classroom. Recent studies on the effectiveness of bilingual immersion models suggested that greater academic progress may be possible if indigenous students are first grounded in their culture and native language and afterward in the English-language curriculum.*

#### **ARGUMENT G – THE SYNTHESIS OF CBE/CRE PEDAGOGIES AND CURRICULUM USING TECHNOLOGY--ENHANCED LEARNING AND EMERGING DIGITAL AGE PLATFORMS**

*A limited number of CBE studies have been produced proposing the use of modern digital age tools to improve the educational advancement of indigenous peoples. A larger corpus of scholarship has argued for the alignment of CBE/CRE pedagogies and interventions with indigenous peoples' visual, group and observational learning preferences. A considerable research gap exists regarding the potential benefits of combining CBE/CRE pedagogies and curriculum with the latest TEL (e.g., m-learning and u-learning, seamless learning) and the emerging tech systems (i.e., AI, DLT, digital platforms). All these systems and technologies are projected to significantly change most forms of business and educational delivery in the future. Serious consideration*

*should be given to innovatively adapt and utilize these tools and systems to provide greater access and accelerate the educational opportunities and learning for indigenous peoples.*

### **RECOMMENDATION FOR THE RESEARCH FOCUS OF THIS THESIS**

A digital transformation propelled fundamentally by platform economies; cloud-based and edge computing systems are enabling commercial enterprises to enhance their capabilities, increase their reach, maximize returns and expand their value chains. The algorithmic revolution and cloud computing are the foundations of the platform economy.<sup>347</sup> In the past decade, platform-based entities such as Amazon, Alphabet (Google), Facebook, Apple, Tencent and Alibaba are among the top ten most valuable companies by market capitalization in the world.<sup>348</sup>

Moreover, emerging technologies like edge computing, AI, VR, 5G and DLT have begun to rapidly transform the fundamental infrastructure underlying these and many other company strategies which Gush and Jackson purport has established the foundation for what they term a “new learning economy.”<sup>349</sup>

Recent U.S. and European education sector studies forecasted the imperative to train students in the use of these emerging technologies as well as utilize

---

<sup>347</sup> Martin Kenny and John Zysman, The Rise of the Platform Economy. Issues in Science and Technology. Vol 32 (3) (Spring 2016) Accessed at <https://issues.org/the-rise-of-the-platform-economy/>.

<sup>348</sup> Refer to 2019 data found at: <https://www.gfmag.com/global-data/economic-data/largest-companies#ncap>.

<sup>349</sup> Jason Gush & Jackson Smith (2019) The Promise of the New Learning Economy, Childhood Education, 95:4, 38-40.

them to improve school efficiencies, individualize educational delivery and accelerate institutional progress to match the ongoing technological transformation.<sup>350</sup>

The Millennial-age (born 1981-1996) and Gen Z (born 1996-2012) students are increasingly demanding knowledge and educational content relevant and applicable to their digital world lifestyles. In this context, if educators are seriously interested in improving the academic achievement levels of indigenous millennials and Gen Z students (many of whom must still cross the “digital divide”), then TEL tools and curricular elements should be seriously considered as modalities for educational dissemination

The alignment of pedagogies best suited for use by indigenous populations, together with the potential impact of these emerging platforms and systems, represents a significant unexamined area of research concentration. An in-depth analysis of the corpus of literature found that a crucial gap in the research exists in the study of the combination of effective CBE/CRE pedagogies with TEL and the critical emerging systems and tools which will have to be understood and utilized by indigenous students in today’s platform economy.

Some questions and implications for future educational research are:

- 1) How might the innovative use of AI, VR, 5G and DLT provide greater access and educational opportunity for indigenous learners? What

---

<sup>350</sup> Grech and Camilleri.

Don Tapscott and Alex Kaplan, *Blockchain Revolution in Education and Lifelong Learning: Preparing for Disruption, Leading the Transformation*, (Blockchain Research Institute; IBM Institute for Business Value, 2019). <https://www.ibm.com/downloads/cas/93DDVAKE>

pedagogies and technologies would be best suited to their learning preferences and styles?

2) How might educators use ICTs, in particular, DLTs with m-learning, u-learning and seamless learning modalities to propel additional CBE/CRE curricular options, forms of instruction and close the gaps in the academic progress for indigenous students?

3) Given the significant digital transformation taking place and forecasted for the next few decades of the 21st century, how will indigenous populations keep pace?

Answers to one or all of these unanswered questions might aid in the creation of a productive synthesis between traditional Anglophone and indigenous traditions and pedagogical methods in new and influential ways.

### **The Proposal for the Remaining Chapters of this Dissertation**

This literature review proposed the examination of the following two research questions:

(1) How to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students?

(2) How to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?

As a result of the examination of the literature, this thesis advocates for the adoption of the seven standards of effective pedagogy and learning established



by CREDE through their extensive analysis of the research and development literature in education and diversity. A set of five universal standards were initially defined by CREDE scholarship as: (1) Joint Productive Activity – *teacher and students producing together*; (2) Language Development--*developing language and literacy across the curriculum*; (3) Contextualization--*making meaning: connecting school to students' lives*; (4) Challenging Activities--*teaching complex thinking*; and (5) Instructional Conversation—*teaching through conversation*.

The University of Hawaii at Manoa, College of Education, maintains the only operating *Center for Research on Education, Diversity & Excellence* (CREDE) today.<sup>351</sup> The Hawaiian educators have added two more standards to the original five established, namely: Modeling--*promoting observational learning*, and Student-Directed Activity--*encouraging students' decision-making*. It is significant to note that these two additional standards roughly parallel the standards found by the early CREDE scholars to be distinctly evident in Native American pedagogical styles. In current their current practice, the University of Hawaii is emphasizing the implementation and use of their CREDE standards for the professional development of teachers in the early childhood and elementary educational contexts.

This pedagogical framework was selected because these standards represented recommendations on which the literature examined by this thesis and by CREDE scholars agreed across all cultural, racial, and linguistic groups

---

<sup>351</sup> Refer to the University of Hawaii at Manoa-College of Education CREDE website at: <https://manoa.hawaii.edu/coe/crede/>

in the United States, at all age levels, and with all subject matter. Thus, because these standards express the principles of effective pedagogy *for all students*, they also theoretically have the potential for the integration of both traditional Anglophone and indigenous pedagogical methods and effective CBE/CRE principles. The fact that the only remaining CREDE center is located in Hawaii was also a significant consideration in the choice of this model. Lastly, this same teaching and learning framework serves well as a foundation for the determination of the effectiveness of the integrated model that utilizes DLTs for enhancing the facilitation of mobile seamless learning interactions. This model and its appropriateness is described in detail in Chapter 9 of this paper.

This literature review found that over the last thirty years, scholars and educators in Hawaii created theoretical models fundamentally grounded in CREDE's universal standards and also other Native Hawaiian and CBE/CRE pedagogies and rubrics (e.g., Nā Honua Maoli Ola, HIER, HCIE); all of which have been shown to influence NH students' learning self-confidence and academic achievement positively.

For the above mentioned and other reasons, the Hawaiian cultural worldview and Native Hawaiian students' performance in the State of Hawaii's educational system--secondary school through college undergraduate level--were selected for an in-depth examination. Furthermore, Millennial and Gen Z age-groups are active users of edge computing devices and the most likely end-users and beneficiaries of TEL and the future applications of AI and DLT and other advanced systems that are at the forefront of the platform-based economies developing worldwide. In particular, DLTs are capable of empowering

individuals to design their own educational and career pathways. DLTs also offer lower-cost, secure, place-based education in a broad spectrum of learning contexts, including mobile seamless learning utilizing edge computing devices. These benefits are multiplied by the power of DLTs to create secure networks for educational institutions to customize learning for today's highly diverse classrooms and the learning preferences demanded by Millennials and Gen Z students. The safe, personalized sharing and mutual exchange of data in a self-sovereign framework shift the onus and control of learning to the individual. If intelligently deployed utilizing seamless learning options and techniques, DLTs have the potential to enable both teachers and learners to enjoy the benefits of customized, anytime, anywhere, any pace *instruction and learning at scale, and at a substantially reduced cost.*

Because this thesis has selected the indigenous Hawaiian educational experience as the cultural context for a more in-depth analysis, it will be necessary first to examine the following six issues:

1. The epistemological and ontological foundations forming the basis of the indigenous Hawaiian worldview.
2. In order to situate the educational experience and issues encountered by Native Hawaiians from a scholarly perspective, it will be necessary to compare the modern histories of AI and AN indigenous peoples under the Anglophone educational traditions of the United States and other English-speaking countries in the Pacific Rim. Only those countries with analogous educational histories and sizable indigenous populations (e.g., the United States, Australia, New Zealand and Canada) will be examined.

3. The history and heritage of Native Hawaiian education, both ancient and modern, will then be summarized and examined. This examination will include an analysis of the modes of education in Hawaii before Western contact in 1778 until the present day.

4. After that, the modern successes and remaining challenges faced by collaborators in the State of Hawaii to create and develop effective CBE/CRE curriculum and pedagogies within the public education system will be analyzed.

Subsequent to the examination of the history and issues listed under items 1-4 above the remaining chapters of the thesis will analyze and propose:

5. Some potential epistemological bridges for combining the Anglophone and Hawaiian worldviews and educational traditions to benefit indigenous student progress, and

6. A hypothetical examination of the potential for advancing the research answering the second thesis question posed above, namely: How can the emerging digital-age technology platforms such as edge computing and distributed ledger technology (DLT) be combined with CBE and CRE pedagogies to improve the learning opportunities and educational progress of Native Hawaiian and other indigenous students?

**PART II: Issues in Indigenous Education –**

**The Case for Hawaii**

## CHAPTER 4

### A Comparative Overview of Modes and Models of Indigenous Education

*“Civilization is not inherited; it has to be learned and earned by each generation anew; if the transmission should be interrupted for one century, civilization would die, and we should be savages again. So, our finest contemporary achievement is our unprecedented expenditure of wealth and toil in the provision of education for all.”*

—Will and Ariel Durrant

Thousands of tribal or indigenous communities exist on this earth, all of which have substantial linguistic, geographical and cultural variation. About 350 million indigenous peoples are living in over seventy countries across six continents, accounting for approximately five percent of the total world population, who represent more than 5000 languages and cultures.<sup>352</sup> Indigenous people include Native Americans, Native Hawaiians, Aboriginal and Torres Strait Islander Peoples in Australia, the Māori Peoples of New Zealand, indigenous minorities in Africa as well as various tribal peoples throughout Europe and Asia.<sup>353</sup>

Several factors summarized in the literature review determined the scope of this thesis. First, the examination was primarily limited to English-language sources pertaining to the American Indian, Alaskan Native and Native Hawaiian populations educated under the United States educational system. Data and research from other English-speaking countries on the Pacific Rim were

---

<sup>352</sup> United Nations Educational, Scientific and Cultural Organization (UNESCO), *Indigenous Peoples: Partnership for Cultural Diversity*, (2006).  
<https://unesdoc.unesco.org/ark:/48223/pf0000135656?posInSet=3&queryId=acdd24c1-167e-4317-b2eb-676d9a9da9b2>

<sup>353</sup> Dyson and Underwood, pp. 65-76

included for comparative purposes where indigenous peoples represented a statistically significant demographic sub-population (i.e., 3% or higher). The nations of Australia, New Zealand and Canada all fit these criteria.

The purpose of this chapter is to provide a brief overview of the modern development of education in the Anglophone tradition for indigenous minorities in the countries considered to be part of the “Anglosphere”<sup>354</sup> An exception to the above-referenced definition would be the modern-day Canadian context which has two official language education policies, the Anglophone and the Francophone.<sup>355</sup>

An outline of some of the more prominent characteristics separating the worldviews of traditional indigenous and Western industrial societies is provided below. This summary, not intended to be all-inclusive, establishes a conceptual foundation for the comparative analysis and focus of this chapter as well as the in-depth examination of the Native Hawaiian worldview and its traditional pedagogies that will be examined in a subsequent section. The comparison of worldviews also serves to inform the selection of the five universal CREDE standards of effective pedagogy and teaching as a framework capable of

---

<sup>354</sup> The term *Anglosphere* was first coined, but not explicitly defined, by the writer Neal Stephenson in his book *The Diamond Age*, published in 1995. John Lloyd adopted the term in 2000 and defined it as including the United Kingdom and the United States along with English-speaking Canada, Australia, New Zealand, Ireland, South Africa and the British West Indies. The Merriam-Webster dictionary defines the Anglosphere as “the countries of the world in which the English language and cultural values predominate.”

<sup>355</sup> Barbara Burnaby, Language Policy and Education in Canada. [https://www.researchgate.net/publication/227194713\\_Language\\_Policy\\_and\\_Education\\_in\\_Canada](https://www.researchgate.net/publication/227194713_Language_Policy_and_Education_in_Canada). (2008).

potentially bridging the gaps between these different cultural perspectives both in and out of the classroom.

<b>Table 4.1- Generic Comparison of Worldviews</b>	
<b>Indigenous Society</b>	<b>Western Industrial Society</b>
<ul style="list-style-type: none"> <li>• Small groups, local community and governing processes prevail</li> </ul>	<ul style="list-style-type: none"> <li>• Large groups, corporations and centralized government processes dominate</li> </ul>
<ul style="list-style-type: none"> <li>• Strong emphasis upon cooperation and interdependence</li> </ul>	<ul style="list-style-type: none"> <li>• Individualism and independence are highly valued</li> </ul>
<ul style="list-style-type: none"> <li>• Fairness and equality carry a high value</li> </ul>	<ul style="list-style-type: none"> <li>• Dominance-based hierarchies are the expected norm</li> </ul>
<ul style="list-style-type: none"> <li>• Democratic or consensus decision-making is the norm</li> </ul>	<ul style="list-style-type: none"> <li>• Largely enforced rules or decision-making authority structures</li> </ul>
<ul style="list-style-type: none"> <li>• Cohesiveness needed for survival and sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Competitiveness dictates survival and sustainability</li> </ul>
<ul style="list-style-type: none"> <li>• Shared responsibility and total cooperative community approach dominate</li> </ul>	<ul style="list-style-type: none"> <li>• Personal responsibility, the unequal division of labor and specialization dominates</li> </ul>
<p>Sources adapted from:                      Literature and information at: <a href="http://www.indigenouspeople.net/">http://www.indigenouspeople.net/</a>.                      A.M. Jariya, Western Cultural Values and Its implications on Management Practices, South East Asian Journal of Contemporary Business, Economics and Law, Vol. 1 ISSN 2289-1560 (2012). <a href="https://pdfs.semanticscholar.org/0bc0/73aa9b16044152c9ecd71b7570aa385f9e59.pdf">https://pdfs.semanticscholar.org/0bc0/73aa9b16044152c9ecd71b7570aa385f9e59.pdf</a>                      .                      The Europeans, Culture and Cultural Values, Qualitative study by Optem for DG EAC, pp.34-38. (June 2006)  <a href="http://ec.europa.eu/culture/eac/sources_info/studies/pdf_word/report_synth_Cult_06_en.pdf">http://ec.europa.eu/culture/eac/sources_info/studies/pdf_word/report_synth_Cult_06_en.pdf</a></p>	

The following sections will demonstrate that the indigenous populations of the United States and the three other Anglosphere nations have experienced analogous stages in their educational histories. Periods of colonialization, marginalization, and assimilation have been followed by a resurgence of the languages, cultural heritage and values of the indigenous groups beginning in the 1950s. The examination of the educational experiences of the indigenous



populations in these countries (circa 1950 to the present) will further support the argument for the selection of the educational system of Hawaii for in-depth focus and examination.

The nomenclature designating indigenous peoples in the studies and statistical reports varies by country. In Canada, the general term Aboriginals is commonly used: this is then divided into three sub-groups—First Nations, Métis, and Inuit. In Australia, the terms Aboriginal and Torres Straits peoples are officially preferred. New Zealand uniformly uses the term Māori. As previously mentioned, the standard nomenclature used in the United States is American Indian (AI), Alaska Native (AN) and Native Hawaiian (NH).

The comparative analysis will be organized in this chapter as follows:

1. The modern educational histories of indigenous peoples in the United States, Australia, New Zealand and Canada in that order.
2. First, a table providing the demographics of the indigenous community in each nation will be presented along with educational performance data where relevant.
3. Next, a historical examination of the development of education since the 1950s for indigenous students in each country will be summarized and compared.

## United States – American Indian and Alaska Native Education

**Table 4.2 – The United States of America (AI and AN Demographics)**

- The total U.S. population in 2017, according to the U.S. Census report estimate is 325,719,178. AI/AN population numbers (in combination with other races) are 6,795,785 or 2.09%, and AI and AN (alone) is 4,104,295 or 1.26% of the population.
- Population concentration in the Western U.S. States: The highest proportion of AI and AN: Alaska (20.0%), Oklahoma (12.9%), New Mexico (10.7%), Arizona (9.7%) and South Dakota (8.8%). Oglala Lakota County, South Dakota, had the most significant percentage of the AI population (93.9 percent).
- Urban and Off-Reservation Residency: 78% of Native Americans live outside a reservation, the majority of which live in urban areas. Full-blood individuals are more likely to live on a reservation than mixed-blood individuals.
- A Young Population Needing Education: About 32 percent of AI/AN are under the age of 18, compared to only 24% of the total population who are under the age of 18. The median age for AI and AN on reservations is 26, compared to 37 for the entire nation. The AI/AN population from birth through age 24 makes up 42 percent of the total AI/AN population, whereas the under 25 population for the United States is only 34 percent of the total population.
- Education Status: Only five percent of AI and AN have received graduate or professional degrees, compared to 10 percent for the total U.S. population, and only nine percent of AI have earned bachelor's degrees compared to 34 percent for the U.S. population.
- Diversity of Tribal Reservations and Geographic Dispersion: There are 573 federally recognized Indian Nations (variously called tribes, nations, bands, pueblos, communities and native villages) in the United States, the majority of which have fewer than 1000 tribal members.
- Five Nations—the Navajo, Cherokee, Chippewa, Sioux and Choctaw make up over 60% of the total continental U.S. American Indian population.
- Approximately 229 of these highly ethnically, culturally, and linguistically diverse nations are in Alaska; the other federally recognized tribes are located in 35 different states, most of which are in the Western United States.

[Underline added for emphasis]

Sources adapted from:

Jill Fleury DeVoe, Kristen Darling-Churchill and National Center for Education Statistics, *Status and Trends in the Education of American Indians and Alaska Natives: 2008*. NCEES 2008-084, (Washington, DC: National Center for Education Statistics; Institute of Education Science; U.S. Department of Education, 2008)

National Congress of American Indians – <http://www.ncai.org/about-tribes/demographics>.

U.S. Census, *2010 Census Redistricting File*, <https://www.census.gov/data/datasets/2010/dec/redistricting-file-pl-94-171.html>.

U.S. Census 2017 Report Estimates. <https://newsmaven.io/indiancountrytoday/news/census-releases-latest-population-numbers-native-americans-are-at-2-09-uf7gL2XbP0SRzFml7jXUXQ/>.

Numerous research studies support the need for transition strategies for American Indian and Alaska Native students.<sup>356</sup> In the 2013-2014 school year, only 69.6% of AI/AN students graduated high school, compared with 82.3% of the total U.S. population.<sup>357</sup> The AI/AN graduation rate was the lowest among all races/ethnicities, and even lower than economically disadvantaged youth. Roughly, a 30-point graduation gap separates Asians and AI/AN students, the nation's highest and lowest-performing groups. An average of only 10 to 18% of AI/AN students will go on to attend college.<sup>358</sup>

The chart below illustrates further the comparison of AI/AN student performance compared to statistics for the general U.S. population:

<b>Table 4.3 – AI/AN Education Achievement Levels</b>	<b>AI/AN</b>	<b>U.S. Overall</b>
Drop-Out Rate	25.4%	12.1%
% Attaining High School diploma or equivalent	62.7%	84.2%
% Matriculating to Higher Education (some college – graduate degree), but as shown below, only a small percentage persist in obtaining a degree.	33%	51.7%
% Attaining a Bachelor's Degree	6.9%	27.2%
% Attaining a graduate degree	1.9%	8.9%
<u>Source:</u> Native Education 101: Basic Facts about American Indian, Alaska Native, and Native Hawaiian Education (2005) Washington, DC, <i>National Indian Education Association</i> .		

<sup>356</sup> J. Reyhner, 'Changes in American Indian Education: A Historical Retrospective for Educators in the United States', *ERIC Clearinghouse on Rural Education and Small Schools - ERIC Digest*, (1989). <https://files.eric.ed.gov/fulltext/ED314228.pdf> .

<sup>357</sup> National Center for Education Statistics, *Table 1. Public High School 4-Year Adjusted Cohort Graduation Rate (ACGR), by Race/Ethnicity and Selected Demographics for the United States, the 50 States, and the District of Columbia: School Year 2013–14*, (Washington, D.C.: Department of Education, 2015). [https://nces.ed.gov/ccd/tables/ACGR\\_RE\\_and\\_characteristics\\_2013-14.asp](https://nces.ed.gov/ccd/tables/ACGR_RE_and_characteristics_2013-14.asp) .

<sup>358</sup> Thomas D. Snyder and Sally A. Dillow, *Digest of Education Statistics 2010*, (National Center for Education Statistics, 2011). <https://nces.ed.gov/programs/digest/d10/>

An adequate explanation of the causes and effects of the dismal situation reflected in these statistics is the subject of this thesis. However, as a starting point, a brief review of the history regarding the education of these indigenous students will facilitate further discussion of the nuanced and multi-faceted issues involved.

In their 1972 book, *To Live on This Earth*, Fuchs and Havighurst characterized the results of a national study of American Indian education stating that; “With minor exceptions, the history of Indian education had been primarily the transmission of White American education, little altered, to the Indian child as a one-way process.” They further noted that this policy of assimilation, with its long-standing records of dismal student progress, chronic absenteeism and high drop-out rates, was a testament to its ineffectiveness.<sup>359</sup>

U.S. Federal regulations favoring Native American cultural assimilation were implemented after policies of extermination and removal were set aside. Historically, the Bureau of Indian Affairs (BIA) in Washington, D.C., dominated the procedures governing the education of Native American youth. During most of its administration period, the BIA developed a policy of assimilation.

The formation of the Indian Boarding Schools by the United States government for the teaching of AI youth and adults has had a far-reaching and detrimental impact upon the preservation of their native languages and cultures. These schools were designed for the express purpose of assimilation in the host

---

<sup>359</sup> Estelle Fuchs and Robert Havighurst, *To Live on this Earth: American Indian Education* (New York, NY: Anchor Press/Doubleday, 1973).

culture while suppressing the language and spirituality of tribal nations throughout the continental United States.<sup>360</sup> The U.S. government mandated boarding school attendance beginning in the late 1800s through the 1950s. Thus, from the age of 5 through 18, Native American students were removed from their families most often during the school year but sometimes for many years and placed in the boarding school where indoctrination occurred.<sup>361</sup> The systematic suppression of culture during this era included the banning of spiritual practices and the speaking of native language, which frequently led to physical punishment if disobeyed. For example, the curriculum of the Carlisle Indian Industrial School was designed to train Native American children to work in factories by focusing on their vocational skills; the same approach promoted for the education of African Americans at the time.<sup>362</sup>

The American Boarding School initiative has waned yet still sustains a minor presence, although attendance is voluntary. Most schools now work closely with surrounding tribes, employing tribal members as staff, all together reflecting the culture of students and community as part of their educational programming

### **The Era of the Termination of Indian Tribes (1953-1975)**

In 1953, the United States Congress passed House Concurrent Resolution 108 (HCR 108), which implemented a new direction in federal policy aimed at

---

<sup>360</sup> C. E. Trafzer, J. A. Keller, & L. Sisquoc, 'Boarding School Blues: Revisiting American Indian Educational Experiences'. Lincoln, Nebraska: University of Nebraska Press, (2006)

<sup>361</sup> John Sanchez, & Mary E. Stuckey. 'From Boarding Schools to the Multicultural Classroom: The Intercultural Politics of Education, Assimilation, and American Indians.' *Teacher Education Quarterly*, (1999), 26(3), p. 83.

<sup>362</sup> 'Changes in American Indian Education: A Historical Retrospective for Educators in the United States'.

terminating the legal status of selected tribes, including the cessation of tribal control over education. Senator Arthur Watkins, a sponsor of this legislation, expressed the philosophy of the termination policy when he stated: “As rapidly as possible we should end the status of Indians as wards of the government and grant them all the rights and prerogatives pertaining to American citizenship.”<sup>363</sup>

HCR 108 included mandates terminating both the legal status of specific reservations and their tribal sovereignty with the express intent to *force* the Native Americans into mainstream U.S. society.<sup>364</sup> It listed 109 specific Native American sovereign entities that were to be dissolved, including almost all of the tribes located in Oregon and California.<sup>365</sup>

Bill, a member of the Muckleshoot nation, in his paper *From Boarding School to Self-Determination*, provided a Native American point of view of this period of history in the following terms: “By 1948 the Commissioner of Indian Affairs was setting up criteria for determining the readiness for withdrawing tribes from federal services. The termination goal was to have tribes rid themselves of Indian trust land and to terminate federal recognition and services. Indians

---

<sup>363</sup> A. Bowker, *Sisters in the Blood: The Education of Women in Native America* (Netwon, MA: WEEA Publishing Center, 1993) pp. 20-21.

<sup>364</sup> Andrew Boxer, 'Native Americans and the Federal Government', *History Today - History Review*, (2009). <https://www.historytoday.com/archive/native-americans-and-federal-government>

<sup>365</sup> *Indian Affairs: Laws and Treaties, Volume 6 (Laws) - Compiled from February 10, 1939 to January 13, 1971*, ed. by Charles Joseph Kappler (Washington, DC: Government Printing Office, 1971). <https://dc.library.okstate.edu/digital/collection/kapplers/id/29334>

would leave the reservation and relocate to cities.”<sup>366</sup> The U.S. government continued to withdraw services during the 1950s, and during 1952 the Bureau of Indian Affairs closed all of its federal schools in Idaho, Michigan, Washington, and Wisconsin.<sup>367</sup>

Subsequently, the *Indian Relocation Act of 1956* imposed a type of forced resettlement of Native Americans to urban areas like Minneapolis, Los Angeles, Chicago, and San Francisco to receive vocational training. This policy effectively scattered these Native Americans from their tribal homes.<sup>368</sup> The beginning of the *American Indian Movement (AIM)*, also termed the “Red Power Movement,” was, in part, a response to the turmoil caused by the termination of Native American tribal nations and the subsequent relocation that occurred during the 1950s.<sup>369</sup> By 1960, sixty-one sovereign Native American nations had been dissolved.<sup>370</sup>

In 1968, President Lyndon Johnson’s message to Congress regarding Indian Affairs called for Federal support of his initiative to end paternalism and encourage self-determination for and by Native Americans.<sup>371</sup>

---

<sup>366</sup> Willard E. Bill and Washington Office of the State Superintendent of Public Instruction, *From Boarding Schools to Self Determination*, (1988).

<sup>367</sup> Ibid..

<sup>368</sup> *American Indian Urban Relocation*, <https://www.archives.gov/education/lessons/indian-relocation.html> (National Archives - Educator Resources, 2016).

<sup>369</sup> *Termination and Relocation*. [http://www.c3ta.org/knowledgebases/resources/termination-and-relocation-1389.html?node=1\\_1\\_3](http://www.c3ta.org/knowledgebases/resources/termination-and-relocation-1389.html?node=1_1_3) (Central Comprehensive Center, Knowledge Bases).

<sup>370</sup> Stan Juneau, *History and Foundation of American Indian Education*, ed. by Walter Fleming and Lance Foster (Helena, MT: Indian Education for All Division, Montana Office of Public Instruction, 2001).

<sup>371</sup> S. Lyman Tyler, *A History of Indian Policy* (Honolulu, HI: University Press of the Pacific, 2001), pp. 172-176.

President Richard Nixon also criticized former paternalistic policies regarding Native Americans in his opening address to Congress in 1970 stating that:

Forced termination is wrong, in my judgment, for a number of reasons. First, the premises on which it rests are wrong... The second reason for rejecting forced termination is that the practical results have been clearly harmful in the few instances in which termination actually has been tried.... The third argument I would make against forced termination concerns the effect it has had upon the overwhelming majority of tribes which still enjoy a special relationship with the Federal government.... The recommendations of this administration represent a historic step forward in Indian policy. We are proposing to break sharply with past approaches to Indian problems.<sup>372</sup>

AI/AN peoples, along with Blacks and other minorities began to actively promote civil rights policies aimed at self-determination throughout the 1960s and 1970s. The 1972 *Indian Education Act* funded supplementary programs to help native students both on and off reservations. In so doing, it recognized that 50% of all Indians lived in urban areas and 75% lived off reservations.

With the passage of the 1975 *Indian Self-Determination and Education Assistance Act*, Congress implicitly rejected the tribal termination policy; however, there was no explicit repudiation of termination until President Ronald Reagan issued a policy statement rejecting it in 1983.<sup>373</sup>

### **The Era Self-Determination and Educational Reform (1969 to Present)**

The United States government promulgated a series of policies favoring self-determination in the field of public education for AI and AN youth beginning in the late 1960s. In 1969, a *Special Senate Subcommittee on Indian Education*

---

<sup>372</sup> Richard Nixon, *President Nixon, Special Message on Indian Affairs*, (U.S. Environmental Protection Agency, 1970). <https://www.epa.gov/sites/production/files/2013-08/documents/president-nixon70.pdf>

<sup>373</sup> Tyler, pp. 172-176.



issued a final report entitled, "*Indian Education: A National Tragedy - A National Challenge*." This report focused national attention on the educational situation of AI and AN students.<sup>374</sup> Two major federal government laws put money behind the recommendations of the 1969 report—*The Indian Education Act (1972)*<sup>375</sup> and the *Indian Self-Determination and Educational Assistance Act (1975)*.<sup>376</sup> These 1972 and 1975 Acts established a comprehensive approach to meeting the needs of AI and AN students. Aspects of the original authority under the 1970s legislation have been retained through subsequent legislative reauthorizing statutes. A chronological listing of these statutes is given below.

<b>Table 4.4 -American Indian Education Act Amendments 1969 to Present</b>
<ul style="list-style-type: none"><li>• 1974: PL 93-380 amended the 1972 Indian Education Act to add a teacher training program and a fellowship program.</li></ul>
<ul style="list-style-type: none"><li>• 1988: PL 100-297 made BIA funded schools eligible to apply for formula grants. It also created authorization for Gifted and Talented education.</li></ul>
<ul style="list-style-type: none"><li>• 1994: PL 103-382 reauthorized Indian Education as Title IX Part A of ESEA. The formula grant's reauthorization was amended to require a comprehensive plan to meet the academic and culturally related academic needs of American Indian and Alaska Native students.</li></ul>
<ul style="list-style-type: none"><li>• 2001: PL 107-110 Indian Education is reauthorized as Title VII Part A of the <i>No Child Left Behind Act</i>. The formula grants are to be based on challenging State academic content and student academic achievement standards that are used for all students and designed to assist Indian students in meeting those standards.</li></ul>
<b>Source:</b> United States Department of Education website link located at <a href="https://www2.ed.gov/about/offices/list/oese/oie/history.html">https://www2.ed.gov/about/offices/list/oese/oie/history.html</a>

<sup>374</sup> Senate Special Subcommittee on Indian Education, *Indian Education: A National Tragedy - A National Challenge*, pp. 91-501

<sup>375</sup> *Indian Education Act of 1972*, <https://www.justice.gov/crt/title-ix-education-amendments-1972>.

<sup>376</sup> Russel Lawrence Barsh and Ronald L. Trosper, 'Title I of the Indian Self-Determination and Education Assistance Act of 1975', *American Indian Law Review*, 3 (1975), pp. 361-395.

The U.S. Department of Education summarized how the Indian Education Acts and subsequent amendments had impacted AI/AN educational self-determination in the following terms:

1. It recognizes that American Indians have unique, educational and culturally related academic needs and distinct language and cultural needs;
2. It is the only comprehensive Federal Indian Education legislation, that deals with American Indian education from pre-school to graduate-level school and reflects the diversity of government involvement in Indian education;
3. It focuses national attention on the educational needs of American Indian learners, reaffirming the Federal government's exclusive responsibility related to the education of American Indians and Alaska Natives; and
4. It provides services to American Indians and Alaska Natives that are not provided by the Bureau of Indian Affairs.<sup>377</sup>

*(Note: the above is a direct quote from the website footnoted below):*

In the early twenty-first century, some schools on the tribal reservations remain under the control of the Bureau of Indian Affairs (BIA); however, the majority of AI/AN students are educated “off-reservation” in public high schools under the auspices of U.S. state governments.<sup>378</sup> Today, 56 tribal community-controlled schools operate under contracts from the BIA. In addition, 20 autonomous

---

<sup>377</sup> *History of Indian Education*, <https://www2.ed.gov/about/offices/list/oese/oie/history.html> (U.S. Department of Education - Office of Elementary and Secondary Education).

<sup>378</sup> Fox (Comanche), Mary Jo Tippeconnic, Shelly C. Lowe (Navajo) and George S. McClellan, 'Where we have been: A History of Native American Higher Education', *New Directions for Student Services*, 109 (2005), pp. 7-15.

community colleges have been established. The 103 elementary and secondary schools managed directly by the BIA have local Indian school boards with a voice in the operation of the school, including the selection of staff.<sup>379</sup>

One of the most promising trends in AI education has been the growth of the tribal college movement. Navajo Community College (now Diné College) opened its doors in 1969.<sup>380</sup> While Diné College and others were established because of the low success rate of Native students in mainstream community colleges, they have also developed a tribal-specific curriculum. Tribal colleges primarily serve indigenous students who most likely would not have an opportunity to attend elsewhere because of the expense.<sup>381</sup>

In 1973, the first six American Indian tribal controlled colleges established the *American Indian Higher Education Consortium (AIHEC)* to provide a support network while they concurrently worked to influence federal policies on American Indian higher education. Today, AIHEC has grown to include 37 Tribal Colleges and Universities (TCUs) in the United States. These institutions serve over 27,000 students from more than 250 tribal nations. Each of these institutions was created and chartered by its tribal government and/or the federal government for a specific purpose: to provide higher education opportunities to American Indians through programs that are locally and

---

<sup>379</sup> Haskie M. Jenson & B. Shreve. 'Remembering Diné College: Origin Stories of America's First Tribal College' *Tribal College Journal*, 30(1), pp. 20–21

<sup>380</sup> C. Billy, & M. Goetz. 'Advancing Tribal Students and Sovereign Nations: AIHEC's Vision for the Tribal College Movement.' *Tribal College Journal of American Indian Higher Education*. (2016), 28(2).

<sup>381</sup> Ibid.

culturally based, holistic, and supportive.<sup>382</sup> All of these colleges have received regional accreditation. For example, Sinte Gleska University and Oglala Lakota College in South Dakota have developed four-year teacher preparation programs. Both Diné College in Arizona, Haskell Indian Nations University in Kansas, and the Navajo Technical University in New Mexico have also developed teacher education programs and some baccalaureate and specialized graduate programs.<sup>383</sup>

The passing of the *Equity in Educational Land-Grant Status Act of 1994* secured a place for TCUs with the U.S. land-grant system. This Act brought these institutions much-needed facilities and instrumentation programs. The 1994 legislation provided funding from the *National Aeronautics and Space Administration (NASA)* and the *National Science Foundation (NSF)*, helping the TCUs expand their science-based education and research programs and become more self-sustaining.<sup>384</sup>

---

<sup>382</sup> Refer to the American Indian Higher Education Consortium AIHEC, <http://aihec.org/index.html>.

<sup>383</sup> AIHEC website <http://aihec.org/index.html>.

<sup>384</sup> Pat William Rep., *Equity in Educational Land-Grant Status Act of 1994*, [Part C of Title V of the Improving America's Schools Act of 1994]. Public Law 103–382; 108 Stat. 4048; 7 U.S.C. 301 Note; as Amended through P.L. 113–79, Enacted February 7, 2014. trans. by 103rd Congress, H.R.4806 vols (1994). [http://www.aihec.org/what-we-do/docs/govRel/laws/7USCsec301\\_2-7-2014.pdf](http://www.aihec.org/what-we-do/docs/govRel/laws/7USCsec301_2-7-2014.pdf)

### Native Hawaiian Education in the United States

**Table 4.5 – Native Hawaiian (NH) and Pacific Islander Demographics in the United States**

- Growth Rate and Size: The Native Hawaiian or Other Pacific Islander population in the United States increased to 1.6 million in 2017. The population of these groups mixed with two or more races in the same year (2017, the population was estimated to be 8.7 million. This aggregate population was 32% higher than the entire AI/AN population of mixed race.
- The median age of the Native Hawaiian or Other Pacific Islander population increased the most of any race group (2.3 years), rising from 26.4 years old in April 2010 to 28.7 years old in July 2017.
- The State of Hawaii had the most significant number (382,000) and proportion (26.8 percent) of the Native Hawaiian or Other Pacific Islander population of any U.S state.
- Honolulu County, Hawaii, had the largest Native Hawaiian or Other Pacific Islander population (245,000) in 2017. Clark County, Nevada, had the largest numeric increase for the Native Hawaiian or Other Pacific Islander population in 2017.
- Significant is that fact Native Hawaiians (NH only) comprise 16% of the population of the State of Hawaii, and Native Hawaiian students make up 26.7% of the public school system in that state (2016 statistics).

Source: Indian Country Today, 'Census Releases Latest Population Numbers, Native Americans are at 2.09%', (2018) Native Hawaiian Statistics: Retrieved at <https://newsmaven.io/indiancountrytoday/news/census-releases-latest-population-numbers-native-americans-are-at-2-09-uf7gL2XbP0SRzFml7jXUXQ/>

A careful analysis of U.S. demographics, as well as the methods employed to educate AI/AN vs. NH students, provides a compelling argument for the Hawaiian educational system as the focus of this thesis. The following further establishes that rationale:

1. Homogeneous Cultural History, Language and Educational Environment – Elsewhere in the United States (including Alaska), the cultural backgrounds of the AI and AN indigenous communities are incredibly diverse. These communities are geographically dispersed as to location and size. Students attend schools in 35 states with varying education systems, languages and school environments (urban, rural, rich and poor).

In contrast, the Native Hawaiian context is very homogeneous. Students in Hawaii attend schools where, under the direction of one statewide school district, the Hawaiian history, culture and language are prioritized and where CBE pedagogies are being actively integrated. In the absence of the disparate educational, geographical and linguistic conditions of both the AI and AN indigenous student populations, the comparatively homogenous educational situation of the NH indigenous students offers a good baseline for a qualitative analysis of the potential for the synthesis of Anglophone and indigenous pedagogies.

2. The Size and Importance of the NH Indigenous Community and Student Demographics in Hawaii. – The data contained in Tables 4.2 and 4.5 above illustrate that NH students represent a much larger population (26.7%) attending Hawaii's schools than is the case for any other AI/AN community in the United States.

Since the Hawaiian cultural renaissance that began in the early 1960s, the education of Native Hawaiians in the State of Hawaii has undergone a gradual, yet significant, systemic transformation. Today, the Hawaiian language, cultural values and the use of traditional pedagogies have blossomed, primarily due to the establishment of new indigenous-led Hawaiian CBE initiatives and scholarship. In addition, the creation of a growing number of Hawaiian Language Immersion and Public Charter Schools has elevated Native Hawaiian CBE teaching methods to a new level of importance within the public education system of Hawaii.

Another important rationale for the selection of Hawaii was the volume of research that has been produced in the last twenty years focused on integrating Hawaiian CBE into the public school system. Scholars and educators have collaborated to incorporate favorable aspects of both Anglophone and Hawaiian pedagogies. Moreover, these scholars adopted an approach that was a cultural strengths-based and data-driven to bring about improvements for NH students along the entire educational pathway.

While the use of CBE/CRE pedagogies in Hawaii has modestly improved the academic performance of NH students, significant gaps persist. Educators in Hawaii admit that NH students are still falling behind the achievements of their peers in other ethnic groups. Of particular concern now to educators in Hawaii is how to motivate indigenous Gen Z students to see the relevance of their education and prepare them for careers in a rapidly changing world.<sup>385</sup>

Because of this challenge, a thesis question posed by this paper was to examine the potential benefit that the use of TEL (e.g., AI and DLTs) might have to influence indigenous student academic attainment. Therefore, given the significant baseline development of the CBE research concentration and other factors described above, this made the indigenous Hawaiian educational system a favored context within which to examine the potential for the synthesis of effective CBE pedagogies facilitated by these same emerging technological platforms.

---

<sup>385</sup> Kamehameha Schools. Ka Huaka'i: 2014 Native Hawaiian Educational Assessment. Honolulu, HI: Kamehameha Publishing. Retrieved from [http://www.ksbe.edu/assets/spi/pdfs/kh/Ka\\_Huakai\\_2014.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/Ka_Huakai_2014.pdf).

Seldon argues the importance of educators understanding these technologies and of using them to shape the educational environment of the future:

There is no more important issue facing education or humanity at large than the fast-approaching revolution in Artificial Intelligence or AI.... many of the tasks that we have allowed ourselves to believe can be done uniquely by the teacher, can, in fact, be as well, or better carried out by AI machines....AI will be an altogether new way spreading quality education across the world...as well as to disadvantaged students elsewhere in the developed world..... We have to place education and its responsibility for developing human skills at the heart of our strategy of AI.... and ensure that we shape it to the best advantage of humanity.<sup>386</sup>

An in-depth investigation and examination of this potential will be the subject of the remaining chapters of this thesis and thus will not be examined here.

### Australia - Aboriginal and Torres Straits Islander Education

<b>Table 4.6 - Australia (Aboriginal and Torres Strait Demographics)</b>
<ul style="list-style-type: none"><li>• In 2016, the <u>total Australian population was 23,392,540</u>, and the Aboriginal and Torres Strait Islander population stood at <u>798 365 or 3.3% of the total population.</u></li><li>• Among the Aboriginal and Torres Strait Islander population in 2016, 91% of people (727,500) identified as being of Aboriginal origin only, 5% (38,700) were of Torres Strait Islander origin only, and 4% (32,200) were of both Aboriginal and Torres Strait Islander origin.</li><li>• The median age of the Aboriginal and Torres Strait Islander population at 30 June 2016 was 23.0 years, compared to 37.8 years for the Non-Indigenous population.</li><li>• The largest populations of Aboriginal and Torres Strait Islander Australians lived in New South Wales (265,700 people) and Queensland (221,400 people)</li><li>• Aboriginal and Torres Strait Islander Australians comprised 30% of the population of the Northern Territory, the highest proportion of any state or territory.</li></ul>
Source: Australian Government Census Statistical Reports (2016) Retrieved at” <a href="http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001">http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001</a>

Australian Aboriginals are believed to belong to one of the oldest civilizations on earth. Archeological evidence links the aboriginal population to ancestors who

<sup>386</sup> Anthony Seldon, *The Fourth Education Revolution: Will Artificial Intelligence Liberate or Infantilize Humanity*. United Kingdom: University of Buckingham Press, (2018). pp.1-4.



arrived in Australia via the Indonesian archipelago approximately 50,000 years ago. Aboriginal Australians originally formed semi-nomadic tribes of hunters and gatherers that lived within well-defined geographical boundaries.

Historically, each Aboriginal group remained independent, which led to the development of hundreds of language dialects, many of which are now extinct. Australia's Aboriginal population today includes approximately 400 Aboriginal groups that speak over 20 unique languages.<sup>387</sup>

Australian Aborigines were forced to move from their ancestral lands and adopt colonial customs beginning in 1788. After that, because they were designated as lower-class citizens, most Aborigines who joined white rural or urban communities became economically marginalized and many died from exposure to new diseases. The result was massive depopulation and the entire extinction of some Aboriginal tribes.<sup>388</sup>

Australian historian Klar suggested that the Aborigines removed from their native context were negatively impacted by the Australian colonial-style of education and forced assimilation. Klar used the term "stolen generations" for the children of Aboriginal descent who were removed from their families by the government and church missions between 1869 and 1970. Klar further argued that the Australian government forced children to relocate away from their native environments and family groupings because of the so-called "evil

---

<sup>387</sup> Josephine Flood, *The Original Australians: Story of the Aboriginal People* (Crows Nest, New South Wales: Allen & Unwin, 2006).

<sup>388</sup> Ricco Villanueva Siasoco, *Aboriginal Australia: History and Culture of Australia's Indigenous Peoples*, <http://www.infoplease.com/spot/aboriginal1> (Pearson Education, Inc., 2007).

influence of their parents” and required to attend Anglophone schools to gain a proper education.<sup>389</sup>

Furthermore, according to Klar, the progress of most Aborigines in Australian society was stymied because of their legal designation as neither Christian nor as recognized British subjects. Thus, as non-British Commonwealth subjects, Aborigines could not be tried in court or give evidence, so they were declared by default to be “in a state of war.” In this case, according to Klar, “the Australian government displayed publicly the best of intentions, but also the pervading ethnocentricity of the time. Some thought was given to the Aborigines’ welfare, however, for the most part, basic Aboriginal life systems and customs were ignored and judged as inferior.”<sup>390</sup> Klar indicated that as a result of this designation, throughout the nineteenth century, there were few meaningful employment opportunities for Australian Aborigines and fewer chances of moving beyond menial tasks even if they had received an education.<sup>391</sup>

Despite forced assimilation, several studies indicated that a significant factor still retarding the development of Aboriginal education in Australia in the modern era has been the exclusion of Aborigines from the full range of educational services and options consistent with their needs and aspirations. According to Bin-Sallik, studies undertaken from 1970-2000 revealed that

---

<sup>389</sup> Nicholas Klar, *How did European Settlement of South Australia Prove to be so Destructive of Aboriginal Society?* <http://www.klarbooks.com/academic/aborig.html> (1993).

<sup>390</sup> Ibid.

<sup>391</sup> Ibid.

Aborigines were consistently denied educational opportunities despite Australian government policies.<sup>392</sup> Rigney summarized the general frustrations of many educators in Australia working with Aboriginal students over the last three decades: “The status quo is no longer acceptable.... No longer is it justified for the magnifying glass in the sun to be focused on the so-called ‘Aboriginal deficit.’ Rather, robust analysis and critique of educational systems, structures, and jurisdictions must be interrogated for their role in inequality.”<sup>393</sup>

Beginning in 1989, a more equitable approach began to take hold in Australian society and government circles regarding the plight of Aborigines enrolled in all levels of schooling. At that time, the *National Aboriginal and Torres Strait Islander Education Policy* set specific goals to increase the access, rates of participation and outcomes of Aboriginal students in post-secondary education to levels that were commensurate with those of all Australians.<sup>394</sup>

Unfortunately, almost three decades later, these goals have yet to be achieved. Anderson et al. attributed this lack of progress to the fact that the majority of efforts to improve the educational opportunities for Australian Aboriginal students have focused on perpetuating the status quo rather than on securing

---

<sup>392</sup> Mary Ann Bin-Sallik, 'Aboriginal Tertiary Education in Australia: How Well is it Serving the Needs of Aborigines' (Doctor of Education, Harvard University, 1989).  
<http://hdl.voced.edu.au/10707/101445>

<sup>393</sup> Lester I. Rigney, 'Indigenous Education and Treaty: Building Indigenous Management Capacity. [Paper in: Treaty - Let's Get it Right.]', *Balayi: Culture, Law, and Colonialism*, 4 (2002), pp. 73-82.

<sup>394</sup> Department of Employment Education and Training, *National Aboriginal and Torres Strait Islander Education Policy: Joint Policy Statement*, (Canberra, Commonwealth of Australia: Australian Government Publishing Service, 1989).

lasting changes to institutional practices.<sup>395</sup> Anderson et al. further argued that because the primary focus for change in Aboriginal education has been on academic practice ( e.g., changes to curricula, pedagogy and forms of assessment), little has been done to diminish Aboriginals' unfamiliarity with and/or resistance to both the content and methods of the Western academic disciplines.<sup>396</sup>

Devlin suggested that this situation has come about in Australia because there has been much less consideration on what it is that indigenous students do to construct their pathways to success. For example, what behaviors, habits, and strategies do Aboriginals possess or still need to develop to engage the various challenges they encounter to persist in their studies? <sup>397</sup> Devlin further asserted that these contextual challenges worked against self-determination in the learning experiences of Aboriginal students attending Australian schools, and negatively influenced their academic persistence and the quality of their educational outcomes.<sup>398</sup>

Australian scholar Martin developed a framework utilizing ideas from motivational psychology in an attempt to improve the cognitive and affective aspects of Aboriginal engagement with education. Martin drew attention to the

---

<sup>395</sup> Clair Andersen, Tracey Bunda and Maggie Walter, 'Indigenous Higher Education: The Role of Universities in Releasing the Potential', *The Australian Journal of Indigenous Education*, 37 (2008), pp. 1-8.

<sup>396</sup> Andersen, Bunda, and Walter.

<sup>397</sup> Marcia Devlin, 'Indigenous Higher Education Student Equity: Focusing on what Works', *Australian Journal of Indigenous Education*, 38 (2009), pp. 1-8.

<sup>398</sup> Ibid.

importance of the family and significant others as an aid to expand the context in which education could be successful for Aboriginal students.<sup>399</sup>

Martin's framework provides a method of categorizing the range of different areas in which strategies to improve educational progress for indigenous students might be developed. For example, under the theme of self, Martin proposed three sub-themes: 1) positive identity as an indigenous person, 2) positive identity as a student and academic self-concept, and 3) academic resilience. He further identified the need for educational providers to encourage pride in culture, consider indigenous perspectives in the curriculum, and use culturally familiar and relevant materials.<sup>400</sup> Martin's framework also suggests that strategies in the cognitive and affective domain should include those that facilitate academic achievement, motivation, attendance and learning.

Efforts to eliminate the marginalization of Australia Aboriginals in education created by past colonial and assimilationist policies were evidenced in *The National Aboriginal and Torres Strait Islander Education Policy of 2004-2006* and updated in the subsequent policy statements covering 2010-2014 and 2015-2019.<sup>401</sup> In each instance, these Australian government reports identified specific goals to improve Aboriginal education, including involving Aborigines in the curricular decision-making. Despite these efforts, the educational attainment levels of indigenous students have remained flat and in some academic

---

<sup>399</sup> Andrew J. Martin, 'A Motivational Psychology for the Education of Indigenous Australian Students', *Australian Journal of Indigenous Education*, 35 (2006), pp. 30-40.

<sup>400</sup> Martin, pp. 30-40.

<sup>401</sup> Statistics Retrieved from [http://www.scseec.edu.au/site/DefaultSite/filesystem/documents/ATSI%20documents/NATSI\\_EducationStrategy\\_v3.pdf](http://www.scseec.edu.au/site/DefaultSite/filesystem/documents/ATSI%20documents/NATSI_EducationStrategy_v3.pdf)

disciplines declined since the year 2000.<sup>402</sup> Moreover, the goals stated in these policy initiatives have yet to demonstrate real engaged participation by Aboriginal groups. In short, in order to produce an equitable educational experience, the contributions of Aboriginal curricula ought to be inclusive, multilingual, culturally relevant and ideally operate with indigenous leadership. Increased engagement from the Aboriginal community leaders and educators will seemingly be needed to accomplish the stated goals.

Fahad and Venkatraman asserted that the current Australian educational policy process engenders a view in the community that elected officials and the nation as a whole are nonetheless seeking to 'do the right thing' for Aboriginal citizens, even if the targets are not being met in full.<sup>403</sup> They further posited that this process of justification operates to perpetuate a prevailing attitude that is counterproductive to the inducement of meaningful systemic change. The net result is that the Australian educational system continues to perpetuate the historical norm of exclusion, rather than inclusion, with respect to Aboriginal students' interests and needs.

---

<sup>402</sup> David Gonski and others, *Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools*, (Australian Government, March 2018) [https://docs.education.gov.au/system/files/doc/other/662684\\_tgta\\_accessible\\_final\\_0.pdf](https://docs.education.gov.au/system/files/doc/other/662684_tgta_accessible_final_0.pdf).

<sup>403</sup> Kiran Fahd and Sitalakshmi Venkatraman, 'Racial Inclusion in Education: An Australian Context', *Economies*, 7 (2019), p. 27.

## New Zealand – Māori Education – Modern Trends and Models

**Table 4.7 – New Zealand (Māori Demographic Characteristics)**

- ❖ Total New Zealand Population - 4,510,327 (July 2017 estimate.) Major Ethnic Groups: European 71.2%, Maori 14.9%, Asian 11.3%, Pacific Peoples 7.6%. The total Māori population was 598,605 in 2013 or 14.9% of the total population as of the 2013 Census.
- ❖ On 30 June 2018: New Zealand's estimated Māori population was 744,800, up 1.4 percent from the estimate for the previous year. There were 363,800 Māori males and 381,000 Māori females. The median ages for Māori males and females were 23.1 and 26.1 years, respectively vs. 30 for the general New Zealand population.
- ❖ The largest Māori tribe (iwi) is Ngāpuhi, with 125,601 people or 18.8 percent of the Māori population. Auckland is the most ethnically diverse region in New Zealand, with 59.3 percent identifying as Europeans, 10.7 percent as Māori and 14.6 percent as Pacific Islanders.

Sources adapted from:

*Demographics of New Zealand*, [https://en.wikipedia.org/wiki/Demographics\\_of\\_New\\_Zealand](https://en.wikipedia.org/wiki/Demographics_of_New_Zealand)

*Maori Population Estimates: On 30 June 2018*, <https://www.stats.govt.nz/information-releases/maori-population-estimates-at-30-june-2018>.

*The population of New Zealand*, <https://www.explore-new-zealand.com/population-of-new-zealand.html>.

Two New Zealand government reports published in the early 1960s first called attention to the plight of the Māori people and their education. After surveying the educational attainment, retention and other socio-economic factors such as employment, health, housing, and welfare—the Māori were depicted as a depressed ethnic minority in these reports. The same reports concluded that education had a significant role to play in the social and economic advancement of the Māori people in New Zealand.<sup>404</sup> There has been a steady proliferation of Māori education programs within the New Zealand public education system through separate Māori community initiatives starting approximately in the early 1970s. The discussion concerning education in New Zealand below focuses on

---

<sup>404</sup> Dale Titus, *High Stakes Down Under for Indigenous Peoples: Learning from Maori Education in New Zealand; an Outsiders Perspective*, Las Vegas, NV edn, The 11th Annual Meeting of the National Association for Multicultural Education, (2001).

the CBE methodologies that have emerged since the late 1990s to improve the progress of Māori students.

New Zealand education leaders have historically differed widely concerning their analysis of the primary reasons for the lower academic progress of Māori students compared with non-Māori students. For example, a 1997 study called the *Chapple Report* concluded that the gaps in academic achievement were primarily because of the lower socio-economic status of the Māori population as opposed to ethnic factors. This report indicated that there was nothing significant about “being Māori” that affected educational success.<sup>405</sup> However, in 2007, Harker further analyzed the data used by Chapple et al. and concluded that ethnicity was a significant factor influencing underachievement over and above socioeconomic status. Harker suggested that the explanation lay in how teachers and schools responded to Māori students’ distinctive ethnicity.<sup>406</sup>

Creating an education system that expects and supports young Māori to engage and to achieve academic success as Māori is the shared vision of the current New Zealand Ministry of Education, *iwi* (tribal) leaders, education providers and the *whānau* (extended family) Māori today. The expectation is

---

<sup>405</sup> Simon Chapple, Richard Jefferies and Rita Walker, *Māori Participation & Performance in Education: A Literature Review and Research Programme*, (New Zealand: Ministry of Education, 1997).

<sup>406</sup> Richard Harker, *Ethnicity and School Achievement in New Zealand: Some Data to Supplement the Biddulph Et Al (2003) Best Evidence Synthesis: Secondary Analysis of the Progress at School and Smithfield Datasets for the Iterative Best Evidence Synthesis Programme*, (Wellington: Ministry of Education, 2007).



that this “whole-community approach” will benefit individual young Māori, their *whānau*, communities and New Zealand as a whole.<sup>407</sup>

*Ka Hikitia – Accelerating Success (2013-2017)* is the New Zealand Government's latest strategy to improve educational outcomes for Māori students. Significant progress has been achieved at each level of the educational system toward this goal since the launch of the first *Ka Hikitia* in 2008-2012. The next page below offers an overview of the current situation in each of the focus areas of the *Ka Hikitia* initiative called Accelerating Success.<sup>408</sup>

It is important to note here that the use of the CREDE's universal standards and pedagogical framework would not differ in its application at all levels of education by the governments of New Zealand, Australia or Canada. However, the users of TEL, in particular those benefiting from the facilitation of mobile seamless learning through DLTs, would require widely differing levels of sophistication, content delivery and variations by age-groups when considering the optimal application and use of this technology.

---

<sup>407</sup> New Zealand - Ministry of Education, *Education Counts*, <https://www.educationcounts.govt.nz/home>, (New Zealand Government).

<sup>408</sup> Maori Education Strategy, *Ka Hikitia - Accelerating Success 2013-2017*, (New Zealand Government) <http://www.education.govt.nz/our-work/overall-strategies-and-policies/ka-hikitia-accelerating-success-20132017/the-maori-education-strategy-ka-hikitia-accelerating-success-2013-2017/>.

**Table 4.8 – Ka Hikitia-Accelerating Success 2013-2017 Reports Outcomes Summary**

**1. Māori Language in Education (MLE)** – The objective of the New Zealand Ministry of Education is that all Māori students have access to high-quality Māori language medium in school. This includes the use of both full Māori language-based content and/or combined with English subject matter. The measures selected by the Ministry for success in this focus area were:

(1) the availability of Māori language-based education, (2) the participation rates by all students, and (3) the achievements of Māori medium education at the primary and secondary schooling levels.

At the tertiary or college level, the measurements include: (1) the participation rates in Māori language education, and (2) the number of Māori-language teaching qualifications—both of which are indicative of the availability of high-quality Māori language education in the future. The proportion of Māori participating in Māori medium education (MME) is higher in early learning (22.5%) than in any other sector of education. The *Ka Hikitia* target that 22% of all students would participate in the Māori Language in Education (MLE) program during 2015 was met. In 2016 there were 179,825 (22.8%) students participating in Māori language in education.

**2. Primary and Secondary Education** – Overall, across the schooling system, Maori students have exhibited improved results in achievement and engagement in recent years. In 2016, 65.3% of Maori students in years 1-8 scored at or above the national standard in math, reading and writing. In the same period, the achievement gap between Māori and non-Māori students narrowed for all measures of achievement in secondary education

**3. Tertiary Education** –The proportion of the Māori 25-year-old population who completed a qualification through the New Zealand tertiary education system has increased each year since 2007 to 30% in 2014, a total increase of ten percentage points. At all levels of tertiary qualification except doctorate qualifications, the median earnings of Māori graduates are similar to non-Māori one year after completing the study, but by five years post-study non-Māori have higher median incomes. This gap is smallest for graduates with a bachelor's/level 7 qualification. Māori doctorate graduates earn more five years post-study than non-Māori graduates do.

Source: Maori Education Strategy, *Ka Hikitia - Accelerating Success 2013-2017*, (New Zealand Government) <http://www.education.govt.nz/our-work/overall-strategies-and-policies/ka-hikitia-accelerating-success-20132017/the-maori-education-strategy-ka-hikitia-accelerating-success-2013-2017/>.

It appears that the policies implemented by the New Zealand Ministry of Education have succeeded in bringing about a significant integration of language and culture-based education. Since the *Ka Hikitia* initiative began in 1999, systemic changes have been made to bring about a positive synthesis between traditional Western and Māori pedagogies. The fact that this has been

accomplished at *all levels of the education pathway*—from early childhood through post-secondary work—is also significant. The primary factor leading to the success of this program has been extensive, ongoing teacher training conducted at every level of the educational system.<sup>409</sup> Educational statistics also demonstrate that Māori learners have benefited. These same pedagogies and strategies have involved the active participation of Māori educators, leaders, parents and communities in the formation of the strategy and the formative assessment of its success or failure.<sup>410</sup>

The New Zealand Ministry of Education indicated that “The *Māori Education Strategy 2013-2017* promotes a Māori potential approach—that is, an approach that invests in success in things that have been shown to work.”<sup>411</sup> The New Zealand strategy was built under a framework whereby new investments in education have been continuously evaluated by how they can allow success to be more systemically based, rather than investing in initiatives primarily focused on targeting problems and addressing failure in local areas. Data compiled by the New Zealand Ministry of Education indicates that this strengths-based total community approach for Maori education is closing the achievement gaps that have historically defined their indigenous students—in a way that is superior to what has been generally achieved in other Anglosphere countries.

---

<sup>409</sup> Ka Hikitia – Accelerating Success (2013-2017)

<sup>410</sup> Ibid.

<sup>411</sup> Ibid.

## The Canadian Model – First Nations, Inuit and Métis Education

**Table 4.9 – Canada (First Nations, Métis and Inuit Demographics)**

- In 2016, there were 1,673,785 Aboriginal people in Canada, accounting for 4.9% of the total population. This percentage was an increase from 3.8% in 2006 and 2.8% in 1996.
- High Relative Population Growth and Rates: Since 2006, the total Aboriginal population in Canada has grown by 42.5%—more than four times the growth rate of the non-Aboriginal population over the same period. The First Nations population—including both those who are registered or treaty Indians under the Indian Act and those who are not—grew by 39.3% from 2006 to reach 977,230 people in 2016. The Métis population (587,545) had the most substantial increase of any of the groups over the ten years, rising 51.2% from 2006 to 2016. The Inuit population (65,025) grew by only 29.1% from 2006 to 2016.
- The Aboriginal population in Canada is young and growing. The average age of the Aboriginal population was 32.1 years in 2016—almost a decade younger than the non-Aboriginal population (40.9 years).
- Canada’s Diverse but Geographically Concentrated Aboriginal Population: There are more than 600 unique First Nations/Indian
- Bands in Canada. The First Nations population was concentrated in the western provinces, with more than half of First Nations people living in British Columbia (17.7%), Alberta (14.0%), Manitoba (13.4%) and Saskatchewan (11.7%). By comparison, only 30.3% of the non-Aboriginal Canadian population lived in the western provinces. There were 587,545 Métis in Canada in 2016, accounting for 1.7% of the total population. Most (80.3%) of the Métis population lived in Ontario and the western provinces.

Source: Canadian Statistical Source - <https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm>

The British Crown assumed sovereignty over Canada’s land and natural resources during what has been termed the Post-Confederation Era (1867-1914). Legal control was accomplished in exchange for future benefits that would be given to the indigenous First Nations, Inuit and Métis peoples. In the case of the *Numbered Treaties* or *Post-Confederation Treaties* signed between 1871 and 1921, a parity in educational opportunity represented one of the significant benefits. The eleven treaties granted large tracts of land in exchange for promises made to the indigenous peoples of the nation. This resulted in the expansion of Canada’s domain. These agreements were created to allow the

Government of Canada to pursue settlement and resource extraction in the affected regions, which include modern-day Alberta, British Columbia, Manitoba, Ontario, Saskatchewan, and the Northwest Territories.<sup>412</sup>

However, similar to what occurred under colonial government rule in other nations, indigenous Canadians were denied the benefits promised in these treaties. According to Stonechild, the statistical data showed a considerable disparity between Aboriginals and other Canadian citizens' access to education, including the continued dominance of non-Aboriginals over program development and educational leadership since the signing of the Numbered Treaties.<sup>413</sup>

In 2012, the *Idle No More* movement and a subsequent hunger strike by Attawapiskat First Nation Chief, Theresa Spence, brought back to the public attention the failure of the Numbered Treaties to provide the promised educational benefits to Canada's indigenous peoples.<sup>414</sup> Recent activism by indigenous peoples in Canada has resulted in proposals for increased access to opportunities for post-secondary education. The implication is that that First Nations' students should have equal and unrestricted access to any training for which they qualify. As a result, some Canadian indigenous communities have

---

<sup>412</sup> *Numbered Treaty Overview*, [http://www.canadiana.ca/citm/specifique/numtreatyoverview\\_e.html](http://www.canadiana.ca/citm/specifique/numtreatyoverview_e.html), Canadiana.Org (Formerly Canadian Institute for Historical Microreproductions) - Canada in the Making.

<sup>413</sup> Blair Stonechild, *The New Buffalo: The Struggle for Aboriginal Post-Secondary Education* (Winnipeg: University of Manitoba Press, 2006).

<sup>414</sup> Fyre Jean Graveline, 'IDLE NO MORE: Enough is enough!', *Canadian Social Work Review / Revue Canadienne De Service Social*, 29 (2012), pp. 293-300, <http://www.jstor.org/stable/43486286>.

been granted the right to establish and control post-secondary institutions as a means of ensuring culturally appropriate and effective programs.<sup>415</sup>

The majority of Canada's First Nations, Inuit and Métis peoples have not been allowed to use their cultural pedagogies or heritage languages in public schools for several generations. Thousands of testimonies have been collected describing the suffering of First Nations parents and children as a result of enforced residential schooling, child welfare practices and other services deemed by the Canadian government and educational organizations to be in the best interests of these peoples.

For over a century (1890-1996), the stated aim of Canada's state-funded Anglican and Catholic church-run residential school system was to assimilate Aboriginal children into Euro-Canadian culture.<sup>416</sup> Initially, about 1,100 students attended 69 schools across the country. In total, about 130 schools for Aboriginal students in every territory and province except Newfoundland, Prince Edward Island, and New Brunswick were established. In all, about 150,000 First Nation, Inuit and Métis children were removed from their communities and forced to attend these schools. The school system was characterized by poor health conditions and widespread physical and sexual abuse of the students.<sup>417</sup>

---

<sup>415</sup> Steven J. Crum, 'A History of the First Nations College Movement of Canada, 1969-2000', *Tribal College Journal of American Indian Higher Education*, 26 (2015), pp. 38-41.

<sup>416</sup> Facing History and Ourselves, *Stolen Lives: The Indigenous Peoples of Canada and the Indian Residential Schools/The Indian Act and the Indian Residential Schools* (website) <https://www.facinghistory.org/stolen-lives-indigenous-peoples-canada-and-indian-residential-schools/chapter-3/role-churches>.

<sup>417</sup> Ibid.

The abuse that took place in these schools has been the object of the most successful struggle for redress in Canadian history in recent years. As a result, the Canadian Government offered a formal public apology and made reparation payments of over C\$1.9 billion to the abused First Nations survivors and family members in 2007.<sup>418</sup> Woods suggested that this extreme situation may have persisted over a long period because the meaning and purpose of the school system was considered “a sacred enterprise,” and was thus off-limits to public scrutiny and criticism.<sup>419</sup>

Although the long era of enforced residential schooling for indigenous children is now over, the influence of these policies continues to adversely affect the self-concept, parenting, social cohesion and the intergenerational transmission of language and culture for many aboriginal Canadians. Like many indigenous peoples around the world, First Nations peoples in Canada today are seeking to strengthen the capacity of their community members to plan, operate and monitor programs for children and youth that are consistent with cultural values and that enhance positive cultural and community identity. First Nations leaders have linked the improvement of developmental conditions for children to the reconstruction of their cultural identity, the revitalization of intergenerational transmission of culture, language and the reproduction of culturally distinctive values and practices. The Canadian federal government signed a self-governance agreement with 23 Ontario First Nations groups in 2017. This

---

<sup>418</sup> CBC News, A History of Residential Schools in Canada (2016)  
<https://www.cbc.ca/news/canada/a-history-of-residential-schools-in-canada-1.702280>.

<sup>419</sup> Eric Taylor Woods, 'A Cultural Approach to a Canadian Tragedy: The Indian Residential Schools as a Sacred Enterprise', *International Journal of Politics, Culture, and Society*, (2013), 173. <https://doi.org/10.1007/s10767-013-9132-0>.

agreement with the Anishinabek Nation First Nations, culminated by more than 20 years of negotiations, granted these communities greater control over education from kindergarten to Grade 12. This pact also allowed First Nations more administrative control of funding for post-secondary education.<sup>420</sup>

The issue of jurisdiction over First Nations post-secondary education in Canada today is particularly complex and controversial. This issue, named “*The New Buffalo*” by First Nations educational leaders, has become a focal point for new legislation and the growth of many new First Nations controlled post-secondary schools. The Canadian government’s stated goal is to bring First Nations post-secondary participation rates to a level comparable to the rest of society.

However, First Nations leaders claim that the government’s current policy of granting funding support to their institutions under social program legislation only, rather than the standard laws governing higher education, restricts their expansion. The difficulty with such a policy is that it does not deal directly with the notion of First Nations’ equal and sovereign rights. Until this is accomplished, the perception will likely persist among Aboriginal leaders and educators that the government can arbitrarily cut funding at any time. Today, Aboriginal peoples in Canada are demanding the right to establish and control post-secondary institutions as a means of ensuring culturally appropriate and effective programs. So far, commensurate funding has not been delivered in a balanced scenario.<sup>421</sup> It would seem that similar to the situation in Australia, the majority of Canadian citizens, who are predominantly of European descent, as

---

<sup>420</sup> 'Ottawa, First Nations Education Pact Will Give Communities Greater Control', *The Spectator*, August 17, 2017, Canada/World, p. A8.

<sup>421</sup> Stonechild.



well as federal and provincial government entities have not yet entirely accepted the notion that First Nations peoples should be an equal partner in the national educational landscape.

### **Conclusion**

This overview of the historical development of the educational methods of indigenous students in Australia, New Zealand and Canada has revealed significant differences as well as commonalities with that which has occurred in the United States.

In New Zealand, where the percentage of Māori in the nation's schools has reached a much larger demographic in comparison to Australia, Canada and the continental United States, the systemic integration of CBE teaching and learning approaches for Māori learners has yielded superior results. The New Zealand Ministry of Education's persistent twenty-year program that provided CBR/CRE training to every teacher at every level has resulted in a fundamental change in the national educational system benefiting Māori students.

The New Zealand situation parallels the parallel positive systemic transformation that has taken place in the State of Hawaii. Analogous to Hawaii, New Zealand has dealt with a demographically significant, homogeneous indigenous student sub-population. It can be argued that a higher level of systemic change has resulted over time in both New Zealand and Hawaii because indigenous and non-indigenous educators on all levels have collaborated in an atmosphere of mutual acceptance, respect and coordination.

Moreover, in the case of both New Zealand and Hawaii, indigenous students' progress improved when indigenous community cultural strengths were valued and allowed to contribute to the development of curriculum and pedagogy. Despite these measured improvements, educators and community leaders in both the State of Hawaii and New Zealand concurred that the performance gaps between indigenous and non-indigenous students are far from acceptable. Thus, there is still significant room for improvement.<sup>422</sup>

Educational policy shifts have taken place in all four countries since the 1960s with varying levels of success and implementation. The systems of education for Aboriginal students in both Australia and Canada, while declaring policies to move in a similar direction as New Zealand and Hawaii, have not undergone a similar transformation. This may be a result of the smaller demographic, composed of a more culturally diverse and significantly numerous sub-populations of indigenous peoples in these countries.

In the continental United States, the cultural, linguistic and educational contexts are far too complex and diverse to make any realistic assumptions about what is working or not working in terms of CBE/CRE pedagogies. In addition, the wide-spread geographic distribution of AI/AN students, who attend schools in rural and urban locations in over 35 states, each of which has its unique set of educational policies and standards, renders a comprehensive, in-depth research effort daunting at best.

---

<sup>422</sup> Ka Hikitia – Accelerating Success (2013-2017).

*Ka Huaka'i: 2014 Native Hawaiian Educational Assessment.*

In consideration of the size of the Native Hawaiian student population, their linguistic and cultural homogeneity, and the fact that there is only one school system in the state of Hawaii, this context is more favorable for further in-depth analysis. Another decisive factor influencing the selection of Hawaii was the comprehensive, longitudinal, empirical approach scholars have taken to integrate CBE pedagogies across the curriculum to positively impact NH student achievement levels. Lastly, the overall volume of studies produced by indigenous and non-indigenous scholars alike in Hawaii over the last two decades, including their continued use of the CREDE framework and other locally developed rubrics, provided a strong focus and foundation for further research.

## CHAPTER 5

### Native Hawaiian Cultural, Epistemological and Ontological Traditions

#### Introduction

This chapter intends to provide a basic understanding of the historical traditions and cultural underpinnings of the Native Hawaiian worldview. Analysis of the contrasts between the Hawaiian and Western worldviews will also be covered briefly in this chapter. It is not within the scope of this thesis to provide an in-depth treatment of the Hawaiian epistemological and ontological systems nor a comprehensive analysis of the origins of their cultural traditions. This can be a difficult subject to approach without significant reference to the extensive works of historians and cultural experts who have documented these traditions. In this field, ancient Hawaiian scholars such as David Malo,<sup>423</sup> Zepheran Kepelino,<sup>424</sup> Samuel Kamakau,<sup>425</sup> Abraham Fornander,<sup>426</sup> E.S.C. Handy,<sup>427</sup> and David Kalakaua,<sup>428</sup> come first to mind as the most prominent references. The modern

---

<sup>423</sup> David D. Malo, *Hawaiian Antiquities (Moololo Hawaii)*, trans. by Nathaniel B. Emerson (Honolulu, HI: Hawaiian Gazette Col, Ltd.; Bishop Museum Press, 1898, Reprinted 1971).

<sup>424</sup> Z. Kepelino, *Kepelino's Traditions of Hawaii*, trans. by Martha Warren Beckwith (Honolulu, HI: The Bernice P. Bishop Museum Bulletin, Millwood Kraus, 1932, Reprinted 1978).

<sup>425</sup> Samuel Manaiakalani Kamakau, *Ruling Chiefs of Hawaii*, Revised edn (Honolulu, HI: Kamehameha Schools Press, 1992).

<sup>426</sup> Abraham Fornander, *an Account of the Polynesian Race: Its Origins and Migrations and the Ancient History of the Hawaiian People to the Times of Kamehameha I*, Vol. 1-4 vols (Honolulu: Bishop Museum Press, 1882-1904).

<sup>427</sup> E. S. C. Handy and others, *Ancient Hawaiian Civilization*, ed. by Lahilahi Webb and others, (Honolulu: Mutual Publishing, 1999).

<sup>428</sup> David Kalakaua, *Legends and Myths of Hawaii: The Fables and Folklore of a Strange People*, ed. by Rollin Mallory Daggett, Reprinted from An anthology of myths collected by King Kalakaua in the 1880s in an effort to preserve Hawaii's oral tradition (New York; Honolulu, HI: Charles L. Webster & Company; Mutual, 1888, Reprinted 1990).

works of other Native Hawaiian scholars such as Mary Pukui,<sup>429</sup> Martha Beckwith,<sup>430</sup> Winona Beamer<sup>431</sup> and others can also be invaluable in helping to crystalize the most significant Hawaiian cultural beliefs.

However, understanding how the traditions and epistemological and ontological underpinnings of the indigenous Hawaiian peoples influence their actions and philosophies is imperative in demonstrating how those same cultural influences are significant components of what will be described later on as the Native Hawaiian model of Culture-Based Education.

What is more, becoming aware of the Native Hawaiian worldview, at least in the rudimentary sense, is necessary for one to understand some of the barriers that still present themselves in educating individuals of Native Hawaiian heritage. In anthropological studies, a correct understanding of the target population's worldview is imperative to avoid inaccurate perceptions or interpretations.

Throughout this thesis narrative, the terms "Native Hawaiian" and "Hawaiian," will be used interchangeably to designate all persons originating from these ancient Hawaiian (*kānaka maoli*) settlers. In addition, frequent reference to the Hawaiian language terms with English translations will also be used to provide linguistic and cultural relevance.

---

<sup>429</sup> Mary Kawena Pukui, 'Songs (Meles) of Old Ka'u, Hawaii', *The Journal of American Folklore*, (1949), p. 247.

<sup>430</sup> Martha Beckwith, *Hawaiian Mythology*, Second Edition (Honolulu: University of Hawaii Press, 1970).

<sup>431</sup> Winona (Nona) Beamer, *Na Mele Hula: A Collection of Hawaiian Hula Chants* (Honolulu, Hawai'i: Institute for Polynesian Studies, Brigham Young University-Hawaii Campus, 1987).

### **Native Hawaiian Epistemological and Ontological Underpinnings**

The first settlers of the Hawaiian archipelago, the *kānaka maoli* (Native Hawaiians), created a society based on a social structure with distinct classes, each differentiated by the *mana* (spiritual power) of an individual's genealogy. Using a system of communal land ownership, the *ali'i* (the noble class of chiefs and their family members) allocated land to the *maka'dinana* (commoners) to cultivate.<sup>432</sup>

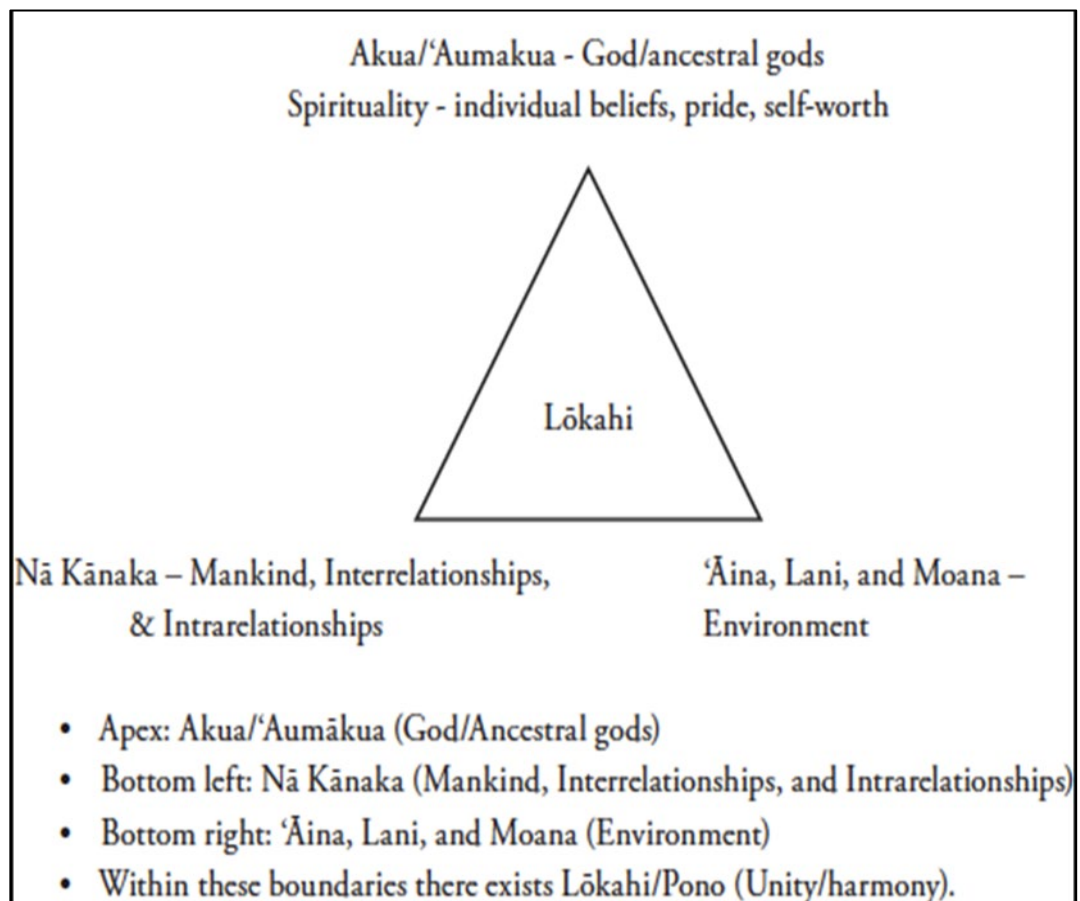
The Native Hawaiian worldview incorporates strong connections to spirituality, relationships, and balance. These connections are best described by the symbiotic relationship between the Hawaiian values known as *pilina* (relationships) and *lōkahi* (or harmony).

Picture, if you will, an equilateral triangle (see figure on the next page). At each point of the triangle is a crucial component that, when balanced, allows for a productive, abundant, and meaningful life. At the top of the equilateral triangle is the concept of spirituality—the idea that there exists something/someone greater than ourselves. For Native Hawaiians, this includes the concepts of *Ke Akua* (Supreme God or Source) and *'Aumākua* (ancestral gods). At the bottom left stands Nā *kānaka: mankind*. At the bottom right is the environment, *'āina*, loosely translated as land, but the Hawaiian language literal translation means "that which feeds"—the idea that the land is an integral part of the health and wellbeing of every person.

---

<sup>432</sup> George H. S. Kanahale, *Ku Kanaka: Stand Tall: A Search for Hawaiian Values* (Honolulu, HI: University of Hawaii Press, 1986).

**Figure 5.1: Hawaiian Worldview – Macro Level – Collective**



Source: Kai Duponte and others, 'Ike Hawai'i – A Training Program for Working with Native Hawaiians', *Journal of Indigenous Voices in Social Work*, 1 (2010), pp. 9-11.  
<http://hdl.handle.net/10125/15115>.

Included among the relationships of every *kānaka* are the *‘ohana* (family/extended family or the community) and *ka lāhui* (the Hawaiian Nation), *moana* (ocean), and *lani* (the heavens). If one side of the triangle is either lengthened or shortened, the corners will feel the stress or slack, resulting in dissonance and unevenness in the center.

The development of this unique worldview can perhaps be attributed to Hawaii's long history of isolation. This same isolation might also have contributed to modern Native Hawaiians' continued belief that they need to remain *pa'a* (firm) in their subscription to the importance of the value of *lōkahi* (balance, harmony)

amongst all things.

McCubbin and Marsella capture well the essence and importance of these symbiotic concepts in the following statement: “Thus, the Native Hawaiian worldview encompasses a complex system that is rooted in the interaction of body, mind, and spirit, and is directly tied to pro-social human relations and pro-spiritual relations.”<sup>433</sup>

An understanding of the Hawaiian concept of these intra-relationships and well-being begins with the knowledge about the *‘ohana*. Everything related to the Native Hawaiian worldview originates within the matrix of *‘ohana* or the extended family. Considering an individual as a single entity is unthinkable in the concept of Hawaiian relationships.

For Native Hawaiians, the principles underlying *‘ohana* represents a sense of unity, shared involvement and shared responsibility. Craighill-Handy, Hawaiian historian, and Pukui, revered Hawaiian *kupuna* (elder/grandparent), defined the core concepts and components of *‘ohana* in their scholarly works about the Hawaiian familial system.<sup>434</sup> For Pukui, the concepts of mutual interdependence and help are central to *‘ohana*—the notion of giving and receiving emotional support—of solidarity and cohesiveness. It is characterized by both love and loyalty, joined by links of blood relationships.<sup>435</sup> Thus, the concept of *‘ohana* in

---

<sup>433</sup> Laurie D. McCubbin and Anthony Marsella, 'Native Hawaiians and Psychology: The Cultural and Historical Context of Indigenous Ways of Knowing', *Cultural Diversity and Ethnic Minority Psychology*, 15 (2009), pp. 374-387, 377.

<sup>434</sup> E. S. Craighill Handy and Mary Kawena Puku, 'The Hawaiian Family System', *The Journal of the Polynesian Society*, 59 (1950), p. 170.

<sup>435</sup> Ibid.



the Hawaiian context extends beyond the immediate family to include extended family, distant cousins and even *keiki hānai* (adopted children).

This deep sense of inter-relatedness is at the core of Native Hawaiian values, beliefs, ways of knowing and being, as well as Hawaiians' relationships with the *'āina* (land). According to McGregor et al., to understand the basis of Native Hawaiian well-being, one must begin with understanding the nature of the relationships, values, beliefs, interactions, processes, and traditions that form the foundation of a harmonious *'ohana* life.<sup>436</sup>

*Pilina* (relationships) are an integral part of the Native Hawaiian psyche. Relationships determine many outcomes, from success in *mahi'ai* (farming) and *lawai'a* (fishing) to cultural practices such as *ho'oponopono* (to make right) and *lā'au lapa'au* (traditional Hawaiian healing practices). In the Native Hawaiian culture, to give significance to *pilina*, the reestablishment of the individual's connection to his/herself, the *'āina* and their *'ohana* is paramount.

According to Cook, Withy & Tarallo-Jensen, ancient Hawaiian society had concrete and highly developed structures, protocols, systems, and relationships between each other, the environment and their spirituality. These foundations brought forward a way of life calculated to protect and perpetuate the physical and metaphysical health of all beings.<sup>437</sup>

All life – all elements within that life, all ritual and prayer, all  
ancestral dogma, all the mundane and spiritual disciplines –

---

<sup>436</sup> Davianna Pomaika'i McGregor and others, 'An Ecological Model of Native Hawaiian Well-Being', *Pacific Health Dialog*, 10 (2003), pp. 106-128.

<sup>437</sup> Bud Pomaika'i Cook, Kelley Withy and Lucia Tarallo-Jensen, 'Cultural Trauma, Hawaiian Spirituality, and Contemporary Health Status', *Californian Journal of Health Promotion*, 1 (2003), p. 10.

everything relevant to body and soul was ruled by an awareness of this *Maoli* (native, indigenous, real) philosophical truth...After 225 years, the Hawaiian people are still trapped in the quagmire of cultural confusion. As relates to the concerns of trauma, the Hawaiians will first need to relearn their unique song of origin, once more live within that sacred space first enlivened by their ancestors.<sup>438</sup>

Traditional Native Hawaiian spirituality encompassed many intricate belief systems and legal structures, including but not limited to the *'Ihi Kapu* (sacred law), and *Huikala* (ceremonial cleansing, forgive all faults, to cleanse and purify morally). These cultural belief systems and structures were crucial to understanding one's sense of self, both individually and socially. The success of these systems was highly dependent upon the strength of the individual's connection to culture. According to Cook, Withy and Jensen, the *'Ihi Kapu*, "was a system of consecrated law that enabled a people to live in harmony with one another, with nature and the spiritual realm. The word *ihi* emphasizes the most elevated value in the system of consecrated law."<sup>439</sup> The term *kapu* brings with it an understanding that each human is 'bound' to a divine prospect. This is a necessary element in surrendering oneself to the sacred law.

The *'āina* and the concept of place play a central role in the health and well-being of Native Hawaiians. This can be seen in the following traditional saying, *He ali'i ka 'āina; he kauwa ke kānaka*, meaning "the land is a chief; humans are its servants." In short, the ancient Hawaiians believed that the land did not need humans, but humans need the land and work upon it for livelihood.

---

<sup>438</sup> Ibid., p. 12

<sup>439</sup> 'Cultural Trauma, Hawaiian Spirituality, and Contemporary Health Status', p. 13

Strong linkages to specific ancestral lands have long provided Native Hawaiians a rationale to connect to place—where each *‘ohana* could feel a sense of origin and identity. For Hawaiians, the *āina* is alive. It is thus to be respected, treasured, praised and even worshipped.

Kana’i’aupuni and Malone examine in detail the significance of place to Native Hawaiian identity and the physical, spiritual, genealogical, and sociopolitical/historical ties to the *āina* and sea that continue to influence their overall sense of well-being and are evident in their epistemologies today. They argue that place is a crucial element in the interplay of internal and external influences on Native Hawaiians’ contemporary identity and their striving for self-determination.<sup>440</sup>

During the period between 1820 and 1850, the ruling class of the Kingdom of Hawaii was heavily influenced by foreign Christian missionaries. At that time, they affected a change in ancestral religious practices. In the opinion of Cook et al., this change removed Native Hawaiians from their former ways of balancing their relationships with the environment around them and disrupted their ability to achieve *lōkahi*:

[The] balance of the physical with the metaphysical, the celestial with the terrestrial, the divine with the mundane...understanding this key social change even leads to the identification of core cultural healings that must occur in the present – the need for Hawaiians to rectify their humanity, to regain essential selfhood, or

---

<sup>440</sup> Shawn Malia Kana'iaupuni and Nolan Malone, 'This Land is My Land: The Role of Place in Native Hawaiian Identity', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 3 (2006), pp. 281-307 [https://www.academia.edu/6347427/This\\_Land\\_is\\_My\\_Land\\_The\\_Role\\_of\\_Place\\_in\\_Native\\_Hawaiian\\_Identity](https://www.academia.edu/6347427/This_Land_is_My_Land_The_Role_of_Place_in_Native_Hawaiian_Identity).

and within themselves, a self in concert with the concept of *'Ihi Kapu*.<sup>441</sup>

Today, a large number of Hawaiians are seeking to restore these time-honored traditions and reinstitute them in their modern circumstances.<sup>442</sup> One aspect of that restoration would be regaining sovereignty over the *āina*, because of what they view as the unchecked commercial and urban development taking place on the Hawaiian Islands.<sup>443</sup> The loss of ancestral lands to immigration and building construction opposes much of what Native Hawaiians consider to be consistent with man's correct relationship with the island environment. This can also be seen as manifest in other controversial issues, such as the lack of access to fishing sites, desecration of burial grounds, and increasing homelessness. Duponte et al. commented that this loss of land was a significant issue for Native Hawaiians because of the central role that the *āina* played in Hawaiian culture and the creation of a sustainable livelihood. The historical concept of *ahupua'a* (land division from the mountain to the ocean), whereby Native Hawaiians traditionally gathered resources from the mountains to the sea and functioned independently, was disrupted when parcels of land were sold to foreigners.<sup>444</sup>

---

<sup>441</sup> Cook, Withy and Tarallo-Jensen, 'Cultural Trauma, Hawaiian Spirituality, and Contemporary Health Status', pp. 12-13

<sup>442</sup> Kehaulani Vaughn and Noelani Goodyear-Ka'opua, 'A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty', *American Indian Culture and Research Journal*, 39 (2015), pp. 151-153.

<sup>443</sup> Haunani-Kay Trask, 'Lovely Hula Lands: Corporate Tourism and the Prostitution of Hawaiian Culture', *Border/Lines*, (Winter 1991/1992), pp. 22-34.  
<https://journals.lib.unb.ca/index.php/bl/article/view/24958>

<sup>444</sup> Duponte, Kai and others, p. 12

Ancient Hawaiians, subject to the ever-changing weather, seasons and moons, developed a partnership with the land to know when to heal their minds, bodies, or even know when to plant or where to fish.

The land was not viewed as a commodity but rather a connection to their cultural and spiritual identity. Therefore, Native Hawaiians, even today, trace their lineage to a place or location originally settled by their first ancestors. They cared for these ancestral lands as they would family members, considering them part of their genealogy.

*Aloha ‘āina*, which means love of the land, is another important concept that forms the basis of the Hawaiian worldview. This phrase frequently occurs in various ancient chants.<sup>445</sup> Hawaiians’ love for the land is typified in such terms as *kama-‘āina* (child of the land). *Aloha ‘āina* includes the concept of stewardship for the entire environment around us. Alegado, an oceanography professor and researcher at the University of Hawaii, personifies the concept of *aloha ‘āina* when she says – “It is difficult to say that I integrate the Native Hawaiian culture with my lab work. It is easier to say; I fight for *aloha ‘āina* from the perspective of an oceanographer, an oceanographer who cares for the community, which includes both people and the environment.”<sup>446</sup>

---

<sup>445</sup> Nathaniel B. Emerson, *Pele and Hiiaka a Myth from Hawaii* (Honolulu, HI: Star Bulletin Press, 1915) p, 199.

<sup>446</sup> Kelsea Hosoda, 'Native Hawaiian Culture is Science: As with Other Indigenous Cultures, Hawaiian Knowledge Adds a Vital Element to Science', *Hawaii Business Magazine: Arts & Culture, Education*, (2018), p. 21. <https://www.hawaiibusiness.com/native-hawaiian-culture-is-science/> .

Pukui, who made a life-long study of the songs, sayings, and proverbs expressed in the Hawaiian language, indicated that many of these sayings employ the use of place names.<sup>447</sup> Handy and Handy, in *Native Planters of Old Hawaii*, also portrayed this importance:

A mystical or spiritual identification of the population with the land existed from the very early times between the Hawaiian people—be they chiefs or commoners—and their homeland. This is abundantly exemplified in traditional *mele* (songs) or *pule* (prayer chants), and in genealogical records which associate the ancestors, primordial or more recent, with their individual homelands, celebrating always the outstanding qualities and features of those lands.<sup>448</sup>

Many Native Hawaiians today strive to reconnect to their culture and to reclaim their ancestral lands. The restoration of these traditional ways as well as a reconnection to the land will complete for them the restructuring of the worldview triangle illustrated in the diagram above. Such a restoration brings *lōkahi* back to the individual and promotes a more balanced and meaningful life.

The concept of *pono* is another critical term to understand in the context of Hawaiian cultural traditions. *Pono* is the goodness or well-being that comes about when all existence is in balance. Western scholars frequently translate it as meaning rightness or virtue; however, it includes some other vital concepts as well. For example, anciently, the Hawaiian chief was charged with keeping his entire community in harmony with the powerful forces of life. The Chief gave direction to these forces, nurturing both nature and man according to the holistic principles undergirding *pono*. His guiding influence might include the forces of

---

<sup>447</sup> 'Songs (Meles) of Old Ka'u, Hawaii', p. 247

<sup>448</sup> Elizabeth Green Handy and E. S. C. Handy, 'Native Planters in Old Hawaii: Their Life, Lore and Environment', in *Bernice P. Bishop Museum Bulletin 233* (Honolulu, HI: Bishop Museum Press, 1972), pp. 42-43.

nature, human relationships, and even the *'aumakua* (ancestral gods). Today, one might often hear Native Hawaiians refer to the disrespect for the *āina* or the values of the *'ohana* as not being “*pono*.”<sup>449</sup>

The concept of “*mana*” (spiritual power) is a term having an overarching influence on the Native Hawaiian worldview. McCubbin & Marsella refer to *mana* as “the energy of life that is found in all things, animate and inanimate.”<sup>450</sup> Rezentes describes *mana* as a source of divine or spiritual power.<sup>451</sup> According to Oneha, the *mana* that emanates from the elements and other forces of nature has the power to calm, energize, relax and heal.<sup>452</sup>

In ancient Hawaiian belief, the spiritual distinction between the common *akua* and those that were granted divine characteristics was in the degree of *mana* they possessed. This distinction further accounts for the ancient belief that Hawaiian kings and chiefs could claim divinity during their lifetime or reign. While these nobles were viewed as human with strengths and weaknesses, it was said to be their possession of more *mana* that differentiated them from the commoner. Kepelino describes *mana* as this distinguishing factor whereby the ruling chiefs were put into the class of gods and often worshipped because of

---

<sup>449</sup> Samuel H. Elbert, 'The Chief in Hawaiian Mythology', *The Journal of American Folklore*, 70 (1957), p. 306.

<sup>450</sup> McCubbin and Marsella, 'Native Hawaiians and Psychology: The Cultural and Historical Context of Indigenous Ways of Knowing', p. 376.

<sup>451</sup> William C. Rezentes III, *Ka Lama Kukui - Hawaiian Psychology: An Introduction*, 1st edn (Honolulu, HI: A'ali'i Books, 1996).

<sup>452</sup> M. F. Oneha, 'Ka Maui O Ka 'Oina a He Maui Kanaka: An Ethnographic Study from an Hawaiian Sense of Place', *Pacific Health Dialog*, 8 (2001), pp. 299-311.

the great power (mana) they had. The chiefs were called “gods that could be seen.”<sup>453</sup>

In Hawaii today, the term *mana* is commonly used in a broader sense to express the amount of talent or ability one has, the aura or charisma they possess, their perceived influence on others, and even their ability to learn and progress. McCubbin and Marsella describe well the vital influence that *mana* and *lōkahi* conceptually have upon the Native Hawaiian psyche when they state: “*Mana* is reflected in the felt or experienced connection between the psyche and the many life forms around it (i.e., gods, nature, family) thus creating a sense of relationship—perhaps even obligation—to act or to behave in such a way that the *mana* is increased, enhanced, and sustained and brought into harmony or *lōkai*.”<sup>454</sup> For McCubbin and Marsella, the interrelationship between the concepts of *mana* and *lōkahi* creates for Native Hawaiians an inherent basis for the epistemological, ontological and praxeological construction of their reality, including their cultural axioms, spiritual beliefs and morals.<sup>455</sup> These authors incorporate much concerning how Native Hawaiians operate and perceive their world in the figure below. This diagram-illustrates that the person is located within a series of interdependent and interactive forces that extend from the ‘ohana, to the ‘āina and to the ‘akua.

---

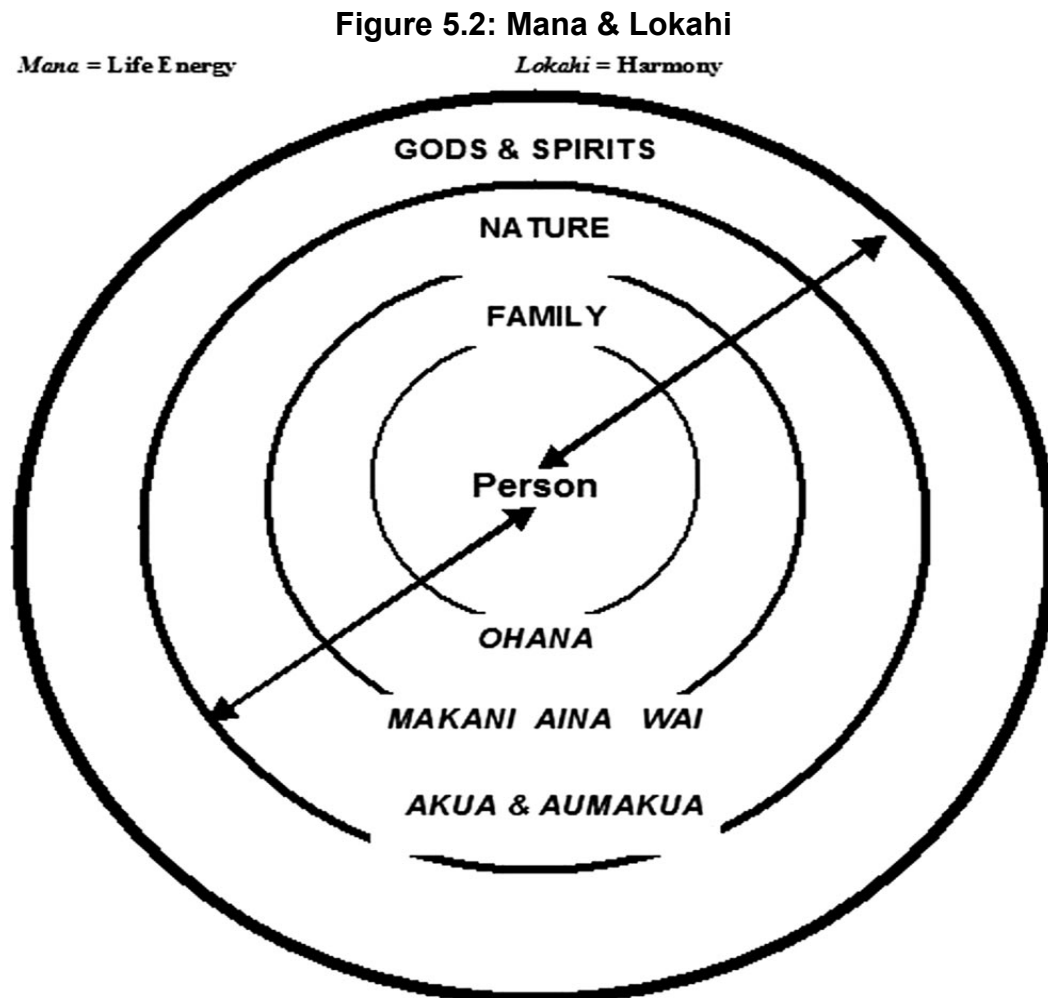
<sup>453</sup> Kepelino, p. 12.

<sup>454</sup> McCubbin and Marsella, p. 376.

<sup>455</sup> Ibid.



The force that holds these three elements together is *mana*. When these elements are in balance, then all things are viewed as *lōkahi* or in harmony.<sup>456</sup>



Source: McCubbin and Marsella, 'Native Hawaiians and Psychology: The Cultural and Historical Context of Indigenous Ways of Knowing', p. 376.

### **Hierarchical Order and the Importance of the Chief in Hawaiian Society**

The ancient Hawaiians saw the natural universe and their political and societal order as one seamless whole. The *Kumulipo* chant, for instance, presents the process of evolution through a hierarchy of beings who had creative and environmental influence over the land, sky and sea. Plants, animals and

---

<sup>456</sup> Ibid.

humans were in ascending order with humans on top. Within the level of humans, the high chief (*ali'i nui*) was at the top, with other chiefs, priests, then men, women and outcasts in descending order below.

Starting from the time of the reign of Kamehameha I onward (1810-1819), the *ali'i nui* (highest chief) was also designated as the king. Before the unification of the Hawaiian Islands under Kamehameha's rule, each island had its own *ali'i nui*. The *ali'i nui* held a paramount position of influence in ancient Hawaiian society. It was the *ali'i nui*'s responsibility to maintain the hierarchal structure of society for the whole of nature to survive and flourish.

Moreover, the ancient Hawaiian chiefs were believed to have a special relationship with the land. The people of other Polynesian island groups, including Hawaii, believed that the chief's relationship with the land could cause crops to grow and animals to reproduce.<sup>457</sup> The presence of this concept among the earliest settlers of the islands of Polynesia (e.g., Easter Island, Tahiti, Samoa), indicates that it might have been brought to Hawaii with the first migrations from those other locations.<sup>458</sup> The removal of the *ali'i nui* disrupted the whole order of nature, resulting in a situation where the land would not bring forth its fruits, the ocean would not yield up its fish, and the people could not prosper. Conversely, when the *ali'i nui* was functioning in his proper role at the

---

<sup>457</sup> E. S. C. Handy, 'Polynesian Religion', *Bishop Museum Bulletin*, No. 34 (1927, Reprinted 1971), 138-143.

<sup>458</sup> Alfred Maitreux, *Ethnology of Easter Island* (Honolulu, HI: Bernice P. Bishop Museum Bulletin 160; Bishop Museum Reprints, 1940 Reprinted 1971) 133.

top of society, all of nature and the external environment would serve man in the same manner as the commoner served the chief.

Hawaiian chiefs were convinced that they had exceptional control and influence over nature and frequently were not shy in demonstrating it. Even after the arrival of Westerners, there were reports of *aliʻnui* halting lava flows through the influence of their *mana*. For example, Kamehameha I reportedly saved the destruction of his fishponds by standing before an approaching lava flow while making offerings to appease the goddess Pele.<sup>459</sup>

These ancient Hawaiian kings were believed to continue in their kingly positions after their death. This form of deification in ancient Hawaii while still living differed from the practice of other Polynesian cultures which ascribed deity only to deceased leaders and ancestors.<sup>460</sup> Thus, it is accurate to say that the ancient Hawaiians established their own gods who were deified humans.

*Hoʻomanamana*, the word meaning the imparting of *mana*, was the core element of this ritual deification practice. The way to elevate a living or deceased spirit to divine status was to give it greater *mana*.<sup>461</sup>

### **Ancient Hawaiian Religious Practices and the Kapu System**

The traditional Hawaiian religion is a polytheistic animistic religion. Hawaiians believe that there are spirits in many objects such as the waves and the sky.

---

<sup>459</sup> Beckwith, *Hawaiian Mythology*, p. 555

<sup>460</sup> M. K. Dudley, *A Hawaiian Nation I: Man, Gods and Nature* (Honolulu, HI: Na Kane o Ka Malo Press, 1990).

<sup>461</sup> Ibid.

The Hawaiian religion believes in four gods of creation – Kū, Kāne, Lono, and Kanaloa.<sup>462</sup>

*Kapu* (meaning sacred or forbidden) was the ancient Hawaiian religious code of conduct. Believed to have been brought to Hawaii by Pā'ao, a priest or chief from Tahiti who arrived in Hawaii sometime around 1200 A.D.,<sup>463</sup> the *kapu* system imposed a series of rigid restrictions on daily life. The system had a universal application in lifestyle, gender roles, politics, religious practices, and ceremonies. Breaking one *kapu*, even unintentionally, often meant immediate death. This concept of *kapu* is similar to tabu (taboo)<sup>464</sup> found in other Polynesian cultures.

The ancient *kapu* system included thousands of rules that identified what people could and could not do. *Kapu* offenses were strictly enforced by the *ali'i* and the *kahuna* (high priests). The term *kahuna* refers to a designated spiritual leader who specialized in a particular area or craft.

The *kapu* laws associated closely with interpersonal relationships were designed and instituted to separate the spiritually pure (those who had *mana*)

---

<sup>462</sup> J. Gutmanis, *Na Pule Kahiko: Ancient Hawaiian Prayers*, 1st edn (Honolulu, HI: Editions Limited, 1983).

<sup>463</sup> Mary Kawena Pukui, E. W. Haertig and Catherine A. Lee, *Nānā i Ke Kumu (Look to the Source). Vol. II* (Honolulu, HI: Hui Hanai, 1972) 296.

<sup>464</sup> British navigator and explorer Captain James Cook (1728–1779) is credited with introducing the word tabu to the English language. During a voyage in the South Pacific in the early 1770s, Cook encountered the Polynesian people known as the Tonga. The Tonga had a number of rules called tapu (or tabu). Tapu had several meanings. It could refer to something sacred or something that belonged to a god. It could refer to something that was forbidden because it was considered profane. Tapu also applied to both the thing that was prohibited and to the prohibition itself. In other words, a forbidden act would be called tabu and performing the act would be said to be a tabu behavior.

from the spiritually unclean. Consequently, an offense against *kapu* often denoted a threat to spiritual power, or loss of *mana*, especially from the ruling chiefs or *kahuna*. Although many offenses were punishable by death, one could escape to a *pu'uhonua* (a place of refuge) where safety from punishment was afforded and where the offender could be redeemed through a period of penance and restitution.<sup>465</sup>

Restrictions on looking at, touching, or being near chiefs and individuals of known spiritual power, e.g., *kahuna*, were strictly imposed. Another *kapu* enforced in times of war was that the first two men killed were offered to the gods as sacrifices.<sup>466</sup>

The *kahuna nui* (chief high priest) served as the ruling chief's spiritual advisor. Because words held a great deal of *mana*, chants and invocations had to be precisely memorized by the *kahuna* and performed flawlessly to be efficacious. The *kahuna* performed rituals in the appropriate temple (*heiau*) in order to invoke blessings or gain guidance from their patron spirits.

A *heiau*, a Hawaiian temple or shrine, was customarily made with black lava rock walls and structures. Ancient Hawaii had *heiau* to treat the sick, offer first fruits, offer first catch, start rain, stop the rain, increase the population, ensure the health of the nation, achieve success in distant voyaging, reach peace, and achieve success in war. In ancient times, only chiefs and priests were allowed

---

<sup>465</sup> Hawaii Guide, Past and Present, Religion, 'With its Diverse Population, the People of Hawaii Practice Many Different Religions: Got Religion?'  
<http://hawaii-guide.info/past.and.present/religion/>

<sup>466</sup> Malo.

into some of the *heiaus*. Today, however, a few of these restored ancient places of worship operate as historical sites or public attractions.<sup>467</sup>

The *kapu* system was maintained in Hawaii until shortly after the death of Kamehameha the Great in 1819. At that time, the two most influential people in the kingdom, Ka'ahumanu and Keōpūolani, two of the former king's wives, conferred with the Kingdom's main *kahuna nui*, Hewahewa. They convinced the young twelve-year-old Liholiho (Kamehameha II), to overthrow the *kapu* system. The system was abolished symbolically by the act of sharing a meal of forbidden foods with the women of Liholiho's court. The king and other *ali'i* then ordered the people to burn the wooden statues and tear down the rock temples. Without the hierarchical system of religion in place, some abandoned the old gods, while others continued with cultural traditions of worshipping them, especially their family *'aumākua*.

After the arrival of foreign missionaries in 1820, most of the *ali'i* converted to Christianity, including Ka'ahumanu and Keōpūolani. However, it wasn't until eleven years later that Ka'ahumanu finally proclaimed laws against the *kapu*.<sup>468</sup> A few of these ancient Hawaiian religious practices continue to influence the views of the more traditional Hawaiian *'ohana* and on their children's adaptation and conduct in school. Mālama 'āina, meaning "caring of the land," is one of the terms that was once part of the *kapu* system. A number of these *kapu* rituals have survived and continue to be practiced in hiding or rural communities today.

---

<sup>467</sup> Wikipedia, 'Heiau' Retrieved from <https://en.wikipedia.org/wiki/Heiau>

<sup>468</sup> Samuel Manaiakalani Kamakau, *Tales and Traditions of the People of Old: Na Moololo a Ka Poe Kahiko*, ed. by Dorothy B. Barrere, trans. by Mary Kawena Pukui (Booklines Hawaii Ltd, 1993) 298-301.

These surviving traditions include the worship of family ancestral *‘aumāku*, veneration of *iwi* (bones), prayers to the fire goddess Pele, and preservation of sacred places (*wahi pana*). Some modern Hawaiians practice forms of syncretism or Christianized versions of these old religious traditions.

The *hula* (dance) was outlawed at one time as a religious practice, but it is frequently performed today in both spiritual and secular contexts. Because ancient Hawaii had no written language, the *hula* was used as a way to preserve Hawaiian traditions and the stories of the people and the acts of their past rulers.<sup>469</sup>

The principles of *mana*, *lōkahi*, and respect for the *āina*, together with the practice of *hula*, are perhaps the most enduring and influential today among those concepts, traditions and practices discussed above.

### **The Principle of Dualism in the Native Hawaiian Worldview**

Ancient Hawaiians developed to an advanced degree the core concept that things in the universe present themselves as “paired opposites.” This tradition still permeates the thinking of a majority of Native Hawaiians today. The notion that opposites are found paired throughout the observable universe is manifest in several ways in the classic *Kumulipo chant*. Beckwith, in her translation of the *Kumulipo*, addresses this concept of dualism in the following way:

Another philosophic concept comes out in his [the Hawaiian’s] way of accommodating himself as an individual to the physical universe in which he finds himself placed. He arrives at an organized conception of form through the pairing of opposites, one depending on the other to complete the whole. So, ideas of night and day, light and darkness, male and female, land and water,

---

<sup>469</sup> Lala Hajibayova and Wayne Buente, 'Representation of Indigenous Cultures: Considering the Hawaiian Hula', *Journal of Documentation*, 73 (2017), 1137-1148.

rising and setting (of the sun), small and large, little and big, hard and light (of force), upright and prostrate (of position), upward and downward, toward and away (from a speaker), appear in repeated reiteration as a stylistic element in the composition of chants, and function in everyday language, where one pair lies implicit whenever its opposite is used in reference to the speaker.<sup>470</sup>

An excellent example of dualism in the Hawaiian worldview can be found in two common Hawaiian words “*po*” and “*ao*.” While these two words typically mean darkness (*po*) and light (*ao*), they can also be translated as nothingness (*po*) and existence (*ao*).

Hawaiian philosophical traditions portray this principle of dualism as something typical of both the contrary and the reciprocal characteristics that are observable in nature. The ancient Hawaiians believed that complementary dualistic relationships existed between such things as the rising and setting sun, the east and the west directions, male and female species of animals or the narrow waters of the rivers and streams compared to the open waters of the sea. Things paired in this manner were felt to be connected as a family to the *‘ohana*, and, because of their “familial” connections, these pairs would work together to achieve desired outcomes.

Ancient Hawaiians did not necessarily look for in-depth explanations as to why things worked together. It seemed only natural to them that *‘ohana* members would work together to achieve common goals and that other pairings would work in the same way. These relationships were viewed as inherent to each pairing and not something that came about due to external forces.

---

<sup>470</sup> Beckwith, *Hawaiian Mythology*.



Ancient Hawaiian dualism postulated that when one discovered which pairs were linked together and then discerned the purpose of this pairing, the result was increased insight and learning. Humankind could then work with and not against nature to attain an environmental harmony by observing and knowing how these dual pairings in nature worked.

### **Environmental Ethics and Its Place in Hawaiian Philosophy**

Now that we have examined the ancient Hawaiian worldview, we are more able to see how these continue to influence the worldview of modern-day Hawaiians.

In ancient Hawaiian thought, all of nature was understood to serve man in the same way that a commoner served the chief. Thus, ancient Hawaiian commoners had the right to a good and peaceful life under a benevolent chief. In the same way, the environment would then serve man. Therefore, the *āina* too, deserved the same respect and caring exhibited in these societal relationships. The core tenets of the modern Native Hawaiian worldview align with these historical principles. This might be epitomized by the concept that we exist as a cosmic community in which all conscious entities have individual rights and obligations to each other, including the responsibility to protect and care for one another.

The continued cultural practice of certain Hawaiian rituals, including *pule* (*prayer*), can be seen as part of humankind's ethical obligations to help preserve the positive communal relationship between himself and nature. An example of this notion that is generally observed by Native Hawaiians today is the practice of one never taking something from the environment without first asking. Even if the thing were inorganic, like a rock, it would bring upon the

person the displeasure of that object or the place in which it resides.

Consequently, many Native Hawaiians today still practice *pule*, by asking permission before picking a flower or before selecting anything to be eaten.

Other indigenous cultures have similar philosophical constructs about man's obligation to respect the natural environment. Overholt and Callicott, in their study of the American Indian Ojibwe culture, write that "Ethics is beyond any even system of trade. It involves obligations to other community members over and above those dictated by self-interest." They argue that "no ethical relation.... can exist without love, respect and admiration."<sup>471</sup> These are core principles of the Hawaiian worldview, although some might see them as cumbersome and unnecessary.

### **The Modern Native Hawaiian Quest for Restoration and Wholeness**

When working with people of indigenous cultures, it is vital to consider and understand how they have been impacted by the collective loss of their traditional worldview. Furthermore, when attempting to educate or change the direction of a group of people who have experienced historically collective trauma, it is essential to identify the recurring signs and symptoms of such a loss.

In the post-colonial era (circa 1959 to the present), Native Hawaiians have frequently sought for more sovereignty as a means of restoring their preferred forms of governance. As a consequence, the organizational and leadership

---

<sup>471</sup> Thomas W. Overholt and Baird J. Callicott, *Clothed-in-Fur and Other Tales: An Introduction to an Ojibwa World View*, A Selection of Twenty-Two Narratives Reprinted from William Jones' *Ojibwa Texts* (Washington, D.C.: University Press of America, 1982) 155.

styles adopted by Hawaiians have tended to clash with the more competitive and individualistic ways of the U.S. majority. As a result of this ongoing clash, a significant number of the Native Hawaiian CBE initiatives could perhaps be viewed as attempts to restore the traditional ways and reconcile the differences between the individualist and collectivist worldviews.

In this context, a discussion of the Hawaiian restorative concept of *pu'uhonua* is perhaps warranted. It represents just one modern example of an attempt to bring about the desired reconciliation. The meaning of the Hawaiian language term of *pu'uhonua*, meaning literally, *pu'u* (hill); *honua* (earth) and figuratively, *pu'u*, a pregnant woman's belly; *honua*, the placenta, was a traditional Hawaiian cultural practice used for the following purposes:

- A place of refuge, asylum, place of peace, safety, and healing.
- A place to go to escape and be saved from being taken prisoner or from being put to death under the *kapu* laws.
- It is used to designate caves of refuge.
- The position of a chief and its accompanying powers were inherited from his ancestors, and it was within his power to spare the life of or extend mercy to any subject, regardless of guilt. This power of high chiefs occasioned the term *pu'uhonua* to be applied to them.
- Pu'u'honuas were places of sanctuary for women, children, old or ailing men in time of war, for vanquished warriors fleeing from warring tribes, and for lawbreakers fleeing from punishment.
- These sanctuaries offered protection to the guilty as well as the innocent.

The figurative translation of *pu'uhonua* speaks to its intricate connection to the

Native Hawaiian worldview. The reference to a pregnant woman's belly and the placenta suggests that by entering a *pu'uhonua*, a person is figuratively re-entering the womb of “the creator” to be realigned and eventually reborn as a healed and reconnected person of worth.

Several Native Hawaiian community-serving organizations are using the cultural principles and protocols of *pu'uhonua* to help rehabilitate formerly incarcerated individuals in a program they call *E Ho'okanaka*—becoming a person of worth.<sup>472</sup> In this attempt, these entities anticipate that the ancient practices of *pu'uhonua* can be revitalized as a CRE system to restore *pa'ahao* (incarcerated individuals) and former *pa'ahao* who have made wrong decisions in their lives. Native Hawaiians continue to be over-represented demographically in the jail and prison populations in the State of Hawaii. Through such a restoration, Hawaiian leaders, educators and *kupuna* (elders/teachers) are seeking a form of *lōkahi* in their attempts to use these ancient customs and protocols. The Hawaiian social workers and leaders in these organizations firmly believe that the idea of a place to heal or become whole again might have a systemic impact on the overall health and wellness of Native Hawaiian communities at large. The expectation held by these community-serving organizations is that this attempt to reestablish concepts of *pu'uhonua* will also have a positive influence on addressing the historical trauma that continues to express itself in the lives of many Native Hawaiians living today.

In 2015, a local Hawaiian indigenous council entitled *Holomua Pu'uhonua*

---

<sup>472</sup> Going Home Hawaii ([www.goinghomehawaii.org](http://www.goinghomehawaii.org))

Blueprint for Change ([www.blueprintforchange.org](http://www.blueprintforchange.org))

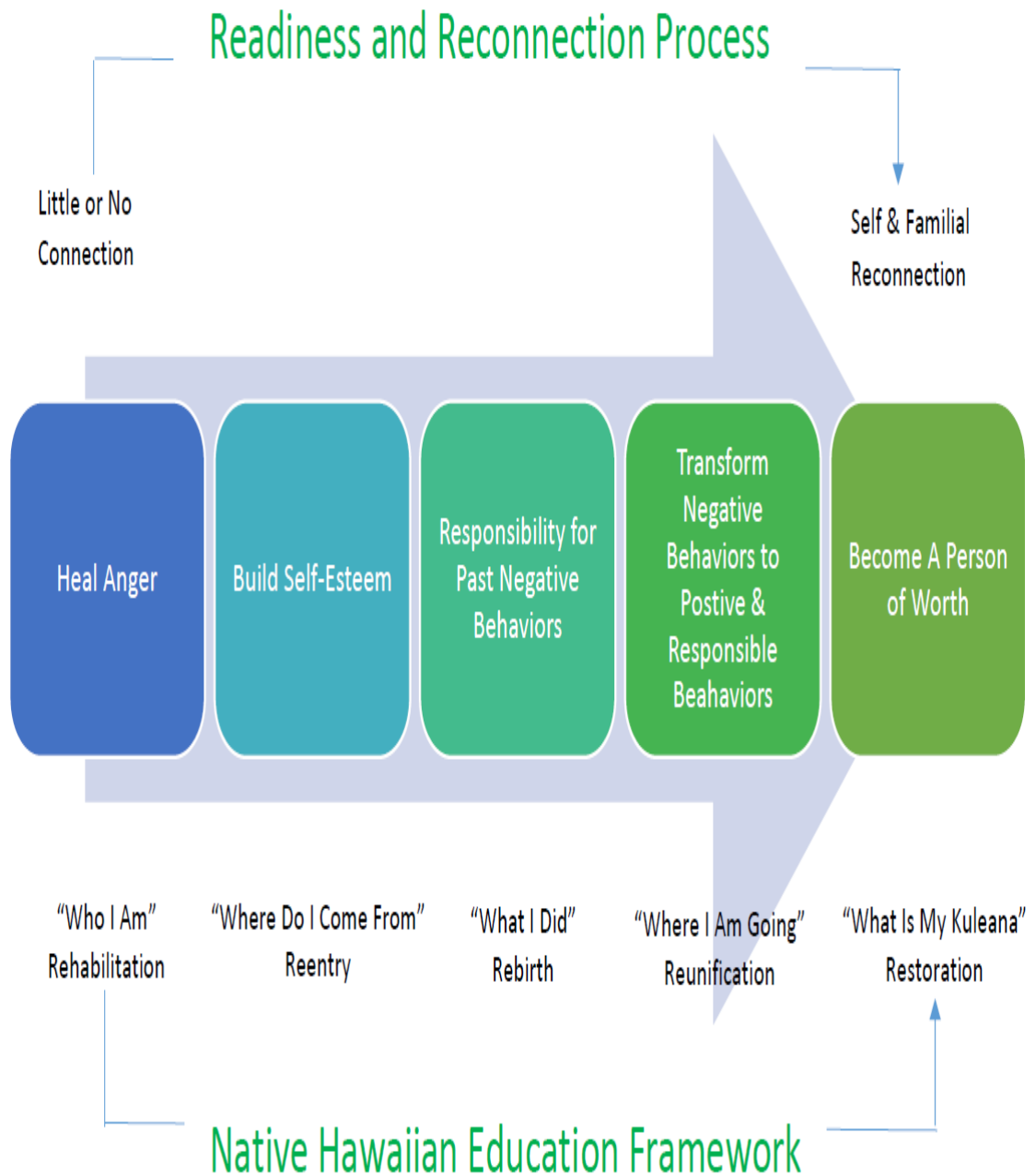
established a framework for working with at-risk members of the Native Hawaiian community. This model framework represents an excellent example of a Native Hawaiian CRE pedagogy that incorporates the traditional principles of *pu'uhonua* to rehabilitate *pa'ahoa* back into society after incarceration. The diagram on the next page summarizes the reconnection pathway used by the *E Ho`okanaka* program.

The table on the following page, also developed by *Holomua Pu'uhonua*, compares and contrasts *pu'uhonua* as a Native Hawaiian wellness education framework to the current trends in correctional education used in the Criminal Justice System in the State of Hawaii. This comparison illustrates well the differences between traditional Anglophone methods and Native Hawaiian methods of instruction.

Both of these programs are representative of attempts by present-day Native Hawaiians to restore cultural protocols that proved to be effective in times past and improve the overall health and well-being of their community. As will be noted in subsequent chapters, many of the cultural concepts outlined above such as *pono*, *mana*, *lōkahi*, *kuleana*, *māama*, *pu'uhonua* and respect for the *āina*, have integrated into modern Hawaiian educators guidelines and rubrics for improving CBE/CRE and the teaching and learning for NH students in Hawaii's schools today.

**Figure 5.3: E Ho’okanaka Training Program**

## Readiness and Reconnection Process in a Native Hawaiian Education Framework



**Source:** Used with permission from Blueprint for Change. PO Box 4560, Honolulu, HI 96812 -- <https://www.blueprintforchange.org/>. The E Ho’okanaka Project (Be A Person of Worth) Retrieved March 18, 2018 from company records and program information Refer also to: <https://www.ehookanaka.org/>

**Table 5.1: Comparing Correctional Education Framework to Native Hawaiian Education Framework**

<b>Training Goal</b>	Desistance	<b>Training Goal</b>	Restoration
<b>Training Objective</b>	Reduce Probability to Recidivate	<b>Training Objective</b>	Individual & Collective Realignment
<b>Training Strategies</b>	Incapacitation, Specific Deterrence & Rehabilitation	<b>Training Strategies</b>	Values, Culture and Place based education programs.
<b>Program 1</b>	Substance Abuse Treatment (Addiction, Dual Diagnosis, Recovery)	<b>Intervention:</b> Healing (Values Based) Emphasis: World View ALOHA	Curriculum Premise: <i>Who I am.</i> (Art and science of giving and receiving; in the presence/face of Divine Breath)
<b>Program 2</b>	Behavior Management (Cognitive, Prosocial)	<b>Intervention:</b> Rebirth (Values Based) Emphasis: Problem Identification 'OIA'I'O	Curriculum Premise: <i>What I did.</i> (Place, philosophy, principle and practice)
<b>Program 3</b>	Transition Planning (Prescriptive)	<b>Prevention:</b> Reunification (Values-Based) Emphasis: Relationships KAIAULU & 'OHANA	Curriculum Premise: <i>Where do I come from?</i> (Family, community).
<b>Program 4</b>	Employment Readiness (Work Inventory, SKA, Resume, Interviewing)	<b>Diversion:</b> Resynchronization (Values Based) Emphasis: Philosophy, principle and practice AHUPUA'A & KULEANA	Curriculum Premise: <i>Where am I going?</i> (Village, relationships between people and place)
<b>Program 5</b>	Correctional Education (Secondary, Post-Secondary, CTE, SPED)	<b>Diversion:</b> Restoration (Values Based) Emphasis: Vision & Plan (OWP) LŌKAHI & LAULIMA	Curriculum Premise: <i>What is my kuleana?</i> (Obligations, Responsibilities, Rights & Privileges)

Source: Used with permission from Going Home Hawaii (<https://www.goinghomehawaii.org/>) and Blueprint for Change, table was taken from pp 11-12 of grant proposal written for this organization by the author during 2018 as part of a grant application to the U.S. Department of Education - CFDA 84.259A – Native Hawaiian Career and Technical Education Program (NHCTEP) - Applicant: Blueprint for Change (BFC) –Title: The Pu'uhonua Wellness CTE Pathway Network (PWCPN)

## **Contrasting the Native Hawaiian and Western Worldviews**

How Native Hawaiian philosophy and perceptions of reality are both different and similar to the Western worldview are contrasted in the ensuing paragraphs. It is a formidable challenge to translate the Native Hawaiian worldview into an analytical framework – a process which more characterizes the Western approach. Our comparison will not be exhaustive. It will, however, as Kim, Yang and Hwang describe, embrace the tradition of the anthropological sciences of incorporating meaning and context through the examination of the knowledge, skills and cultural values that a population might have about themselves.<sup>473</sup>

In contrast to the Western worldview, which only attributes consciousness to humans, Hawaiians believe all things in nature possess consciousness. In this context, Native Hawaiian *kupuna* (elders/grandparents) often describe all things in nature as having a spirit essence, a soul, or a mind. According to the Hawaiian worldview, nature is sentient—meaning, it can know and act on the information it receives. For Hawaiians, the earth has a spirit essence that is also viewed as both conscious and intelligent. We will use interchangeably, as Native Hawaiians do, the words “conscious,” “sentient,” and “cognitive” to describe this concept.

Ancient Hawaiians made a clear distinction between spirit and matter, but ontologically, they viewed all matter as conscious or awake and thus capable of thinking and having a will. They further viewed man’s material body as being

---

<sup>473</sup> *Indigenous and Cultural Psychology: Understanding People in Context*, ed. by Uichol Kim, Kuo-Shu Yang and Kwang-Kuo Hwang, International and Cultural Psychology (New York, NY: Springer, 2006).



conscious in the same sense. Spirits were defined as such things as the souls of men, gods, ghosts and the spiritual essences within material living things.

Matter comprised everything else—things that were hard and could be hefted and felt by the touch and things that had some type or corporeal existence.

In the Western worldview, shaped significantly by both Christianity and modern scientific concepts, spirit and matter are viewed as separate and distinguishable and inorganic matter is viewed as incapable of thinking or knowing anything.<sup>474</sup>

Hawaiians, both ancient and modern, share the view that the world—composed of both physical matter and spiritual essences—must be dealt with respectfully. The dominant Western philosophical perspective might treat nature and its resources more distinct and separate from humans, or as a set of measurable external forces. In contrast, the Hawaiian worldview sees all of nature (living and non-living) primarily as an interconnected and interrelated tapestry.

For example, the Hawaiian worldview, frequently expressed through the language, describes water in its many forms—sea, rain, mist, clouds, streams, waterfalls, etc., as the *wai ola*, which interpreted means “living water” or “the water of life.” The term *wai ola*, as used in the ancient chants, depicts water as the wellspring of the creation of both nature and humankind. What is more, *wai ola*, is believed to have the power to nourish all living things. Although originating from different sources, the Hawaiian belief regarding water’s role in

---

<sup>474</sup> *Encyclopedia of the Scientific Revolution: From Copernicus to Newton*, ed. by Wilbur Applebaum, Garland Reference Library of the Humanities, 1800 vols (New York, NY: Garland Publishing, Inc., 2000).

Edwin A. Burt, *Metaphysical Foundations of Modern Physical Science* (Mineola, NY: Dover Publications, Inc., 2003).

the creation and sustaining of life is similar to that of Western science. Present-day astronomer's search the universe to locate planets where water might be present, considering it essential to the formation of biological life.

In both the ancient and prevailing ontological belief of the more traditional Native Hawaiians living today, the gods, who dwell somewhere in the heavens, are, in fact, ancestors of man.<sup>475</sup> These gods collectively act as a source of power that can be drawn upon to benefit one's own existence. In short, humankind is the benefactor of two great creative forces—*wai ola* and the *'aumākua*. These are the two eternal binding threads which ultimately connect all existence in the Hawaiian cultural tradition.<sup>476</sup> In all of the above-mentioned ways, the spirit world continues to be a source of valuable guidance for the Native Hawaiian people.

From the earliest recorded histories of humankind, many cultures have viewed encounters with things that could not be seen with the naked eye, or over which there was little control, as coming from a spiritual realm or outside of the physical dimensions of time and space. Examples of such things could be unexplainable natural phenomena, dreams or fantasies.

---

<sup>475</sup> Carlos Andrade, *Ha'ena: Through the Eyes of the Ancestors* (Honolulu: Latitude 20, 2008).

Joseph E. Ciotti, *Historical Views on Mauna Kea: From the Vantage Points of Hawaiian Culture and Astronomical Research*. 45 vols (US: Hawaiian Historical Society, 2011), p. 147.

Kamana'opono M. Crabbe, 'Kupa'a I Ke Kahua O Hawaii: Stand Firmly Behind the Foundations of Hawaii', *Journal of Pacific Rim Psychology*, 1 (2007), 25-30.  
<https://doi.org/10.1375/prp.1.2.25>

<sup>476</sup> M. K. Dudley, 'Introduction: Preface by John D.Holt', in *A Hawaiian Nation I: Man, Gods and Nature* (Honolulu, HI: Na Kane o Ka Malo Press, 1990), pp. vii-viii.

Cook, Withy and Jensen indicate that the understanding and acknowledgment of a higher power was an integral component of the ancient Hawaiian's self-identity.<sup>477</sup> In this respect, similar to the European Christian worldview prevailing during the same period, the ancient Hawaiians believed that the absence of the principle of a higher power would result in the human and natural systems both losing their fixed foundations.

It is also important to remember that the Hawaiians think of all forms of *akua* as sentient spirits that possess the knowledge, free will and independent capacities. Dudley refers to this issue of independent action frequently in his writings and indicates that this is a belief that continues to be held generally in Native Hawaiian society today.<sup>478</sup> For instance, when Europeans first arrived, the locals applied the term *akua* to objects that they did not understand—such as the movement of a watch or compass.<sup>479</sup> Examining the differences between traditional Western thought and historical Hawaiian perceptions of reality helps us understand not only the nuances of the word “akua,” but how differently the Hawaiians think of spirits and matter at the ontological level.

The intent of the illustrations described above is not to establish the sentience of nature. Such a concept is subject to serious scrutiny and debate. It is included because of the general comparison it offers contrasting the

---

<sup>477</sup> Cook, Withy and Tarallo-Jensen, 'Cultural Trauma, Hawaiian Spirituality, and Contemporary Health Status', 18.

<sup>478</sup> *A Hawaiian Nation I: Man, Gods and Nature*

<sup>479</sup> Lorrin Andrews, 'Entry for Akua', in *A Dictionary of the Hawaiian Language* (Honolulu, HI; Rutland: The Board of Commissioners of Public Archives of the Territory of Hawaii; Tuttle, 1865 Reprinted 1974), pp. 44.

foundational worldviews underpinning the traditional Anglophone and Native Hawaiian educational traditions.

The *Kumulipo* chant represents an attempt by the ancient Hawaiians to present a systematic interpretation of the underlying organizational structure of the cosmos and all beings living in it. Its theory of evolution contains many close parallels to mainstream Western evolutionary theory. The *Kumulipo* describes a material universe that, from the beginning, was conscious and self-acting. In short, as Malo states, “In the genealogy called Kumulipo, it is said that land grew up of itself, not that it was begotten, nor that it was made by hand.”<sup>480</sup>

The *Kumulipo* traces evolution through a series of higher species until it finally reaches man. From thereon, it ascribes the genealogy of the ancient Hawaiian chiefs from the first man down to *Lono-i-ka-makahiki*, a reigning chief on the island of Hawaii in the 17<sup>th</sup> Century. The *Kumulipo* and other Hawaiian chants told the *kānaka maoli* that they had descended from the cosmos itself along with many other plant and animal species. In this regard, they were then related as a family to all the forms of nature from which they descended. This historical belief manifests itself in the worldview that present-day Native Hawaiians have and the substantial importance they place on man’s close relationship to the *āina* and responsibility to steward and protect the natural environment around us.<sup>481</sup>

---

<sup>480</sup> Malo, p. 3.

<sup>481</sup> Jonathan Osorio, *I Ulu I Ka ‘Aina: Land* (Honolulu: University of Hawaii Press, 2014).

The idea that man was an active participant in the ongoing creation and evolution of the cosmos was common to several ancient peoples. Cornford points out that this “participatory philosophy” of humankind working to co-create with nature can be traced to the time of the earliest Greek philosophers from Thales to Plato.<sup>482</sup> Barfield traces the history and development of this same cosmic view through Thomas Aquinas and other Middle Age philosophers down to Descartes.<sup>483</sup> He states:

This experience (of participation) so foreign to our habit, is one which we positively must acquire and apply before we can hope to understand the thought of any philosopher earlier than the scientific revolution.<sup>484</sup>

Descartes altered these philosophical views with his interpretation of the nature of man’s body and the soul—declaring that it is man’s soul (spirit, ego or mind)—that alone is sentient and can think.<sup>485</sup> Descartes theorized that man’s body was incapable of thinking, knowing or sensing. As time progressed, his interpretation became the dominant philosophical notion in Western ideology and, by extension, through other Western thinkers and scientists. Hillman posits that Marin Mersenne influenced many of the intellectuals of the seventeenth-century towards Cartesian thought in favor of earlier philosophical views of the existence of consciousness in nature resulting in a near-total eclipse of this

---

<sup>482</sup> Frances M. Cornford, *From Religion to Philosophy: A Study in the Origins of Western Speculation* (Trinity College, Cambridge, 1912) 19-53.

<sup>483</sup> Owen Barfield, *Saving the Appearances: A Study in Idolatry* (London; New York: Faber & Faber Publishers; Harcourt Brace Jovanovich, 1957 Reprinted 1965).

<sup>484</sup> Ibid.

<sup>485</sup> Descartes and Cottingham, *René Descartes: Meditations on First Philosophy: With Selections from the Objections and Replies*

concept in Western thinking.<sup>486</sup> The preceding comparative explanation of the directional change initiated by Descartes is integral to this paper because it represents a significant difference between the Western scientific worldview and the traditional indigenous Hawaiian worldview.

For the most part, since the time of Descartes, Western philosophers have not embraced the general notion of nature as having conscious intelligence.

However, influential Western thinkers such as Hegel, Schopenhauer, Bergson, Whitehead and Teilhard de Chardin are representative of others who theorized and made significant contributions to the discussion of metaphysics, concepts of reality, the nature of matter, consciousness and man's processes of learning.<sup>487</sup>

Western philosophers are not alone in offering opinions on the sentience or insentience of nature. In classical Hindu thought, for example, all observable matter is underlain by Brahman, the one central thinking, animating and acting

---

<sup>486</sup> J. Hillman, *Re-Visioning Psychology* (New York, NY: Harper & Row, 1975) 3-8.

<sup>487</sup> Henri Bergson, *Creative Evolution*, trans. by Arthur Mitchell (Henry Holt and Company; Dover Publications, 1911 Reprinted 1998).

Ursula King, 'Teilhard De Chardin's Vision of Science, Religion and Planetary Humanity: A Challenge to the Contemporary World', *Journal for the Study of Religion*, 31 (2018), 135-158.

Arthur Schopenhauer and others, *Schopenhauer: 'The World as Will and Representation': Volume 1*, The Cambridge Edition of the Works of Schopenhaur (Cambridge: Cambridge University Press, 2010).

Ludwig Siep, *Hegel's Phenomenology of Spirit* (New York: Cambridge University Press, 2014).

Pierre Teilhard de Chardin, *The Phenomenon of Man*, trans. by Bernard Wall (Harper & Row; Harper Perennial; Harper Perennial, 1959 Reprinted 1976 2008).

Alfred North Whitehead, *Process and Reality. an Essay in Cosmology. Gifford Lectures Delivered in the University of Edinburgh during the Session 1927–1928* (New York, NY; Cambridge, UK: Macmillan; Cambridge University Press, 1929).

Divine Reality.<sup>488</sup> Thus, since all of nature is Brahman, then it follows that, as a part of Brahman, all observable existence is conscious.

In a similar vein, the classical literature and traditions of China frequently address metaphysical concepts and the relationship and interaction of man with nature. The *Tao Te Ching* speaks of the *Tao* (the Way) as that from which all things originate. Consequently, since all things in the universe are of the same nature, the *Tao* is also the ultimate source from which one's actions and man's true nature stems. Dissimilar from the Hindu worldview, but more similar to the Hawaiian worldview, Lao Tse, Mencius and other Taoist philosophers do not attribute actual consciousness to the *Tao*, but believe it was the "consciousness" *underlying* all of nature and creation.<sup>489</sup>

### Conclusion

It might be stated generally, that while the majority of Native Hawaiians today are not aware of their traditional teachings at the conscious level, they often intrinsically approach the world according to a classical Hawaiian worldview. These cultural constructs then influence their thinking and, to some extent, their subconscious processes at the feeling level, both of which are involved in the processing of information and its retention (i.e., learning). It can be argued that these thinking and feeling constructs influence their epistemology in such a way that Western pedagogies have proven to be less effective.

---

<sup>488</sup> Theos Bernard, *Hindu Philosophy* (Greenwood Press, 1968).

<sup>489</sup> Laozi, *Tao Te Ching: On the Art of Harmony: The New Illustrated Edition of the Chinese Philosophical Masterpiece*, 1st edn, trans. by Chad Hansen (London: Duncan Baird Publishers, 2009), p. 272.

For Native Hawaiians, colonization, which imposed Western acculturation and assimilation on them, resulted in a loss of their language, traditions, beliefs, values, esteem, vision, and general well-being formerly held together within the traditional Hawaiian worldview.

The Hawaiian Renaissance movement, which has been ongoing over the last five decades, has brought about a renewed interest in traditional language, music (mele), dance (hula), arts, crafts and pedagogies as well as the restoration of Native Hawaiians' ancestral homelands.<sup>490</sup> For many native Hawaiians, this movement has brought about new insights that have confirmed for them the importance of past practices and beliefs.

In their book *Culture, Behavior and Education: A Study of Hawaiian Americans*, Gallimore, Boggs, and Jordan assess the behavior of Native Hawaiians as a product of a "coherent cultural system" rather than as a deficit or an innate pathology of these indigenous people.<sup>491</sup> The data that they collected over a 5-year period in a rural Hawaiian community involved standardized interviews and questionnaires. They investigated the overall community, including the family system, infants and school-age children, as well as socialization processes and experiences of the youth. Their research observations led them to conclude that the students' lower educational outcomes were mostly due to several factors: (a) the conflict between two cultures (majority culture and

---

<sup>490</sup> Ronald Gallimore, Joan Whitehorn Boggs and Cathie Jordan, *Culture, Behavior, and Education: A Study of Hawaiian-Americans*, 11 vols (Beverly Hills, Calif.: Sage Publications, 1974).

<sup>491</sup> Judith Schachter, *The Legacies of a Hawaiian Generation: From Territorial Subject to American Citizen* (New York: Berghahn Books, 2013).



Hawaiian) and (b) the failure of researchers and teachers to interpret the students' behavior in a culturally relevant context.<sup>492</sup>

These authors drew several other conclusions worthy of note that tie back to the topic of this thesis. Their conclusions have relevance to the importance of understanding the Native Hawaiian epistemological and ontological systems as necessary components of good teaching practice. Gallimore, Boggs and Jordan derived the following significant conclusions in their study and suggested that they explained several of the gaps in student achievement:

(1) Success was defined in their indigenous culture in terms of contribution to the family and the needs of others, rather than a raw test score imposed upon them by the Anglophone educational system.

(2) School conflicts may have occurred due to cultural conflicts, such as Hawaiians' emphasis on sharing as a group rather than the school's focus on individual evaluation.

(3) Conflict or contrast of a youth's vital role as a potential contributor to the family as compared to their "status as underachieving students in school."<sup>493</sup>

(4) Issues with differences in how the Hawaiian students dealt with conflict.

---

<sup>492</sup> Gallimore, Boggs and Jordan, *Culture, Behavior, and Education: A Study of Hawaiian-Americans*

<sup>493</sup> Ibid.

(5) The misinterpretation by teachers of peer interactions in the classroom as negative rather than the children supporting one another as a group.<sup>494</sup>

This chapter has examined some of the most significant epistemological and ontological traditions of Hawaii to establish a foundation for the subsequent analysis of the history of education in Hawaii, both ancient and modern. An understanding of these epistemological and ontological traditions is also vital because it underpins the theory and development of most of the Hawaiian CBE/CRE pedagogies used by educators in Hawaii today.

Entirely new ways of teaching and learning have begun to emerge in the *Fourth Industrial Revolution* era, pointing the way toward challenges that will be encountered by public education in the immediate future. The last chapter of this thesis will examine options for the educational community, including stakeholders in Hawaii (i.e., students, teachers, parents, *kupuna* and indigenous scholars) to collaborate and accelerate CBE/CRE teaching and learning advancements facilitated by emerging TEL systems.

---

<sup>494</sup> Gallimore, Boggs, and Jordan as referenced in McCubbin and Marsella, p. 384.

## CHAPTER 6

### The History and Heritage of Native Hawaiian Education

The purpose of this chapter is to provide a chronological overview of the purposes, structure, composition and methodologies used to provide education to the Native Hawaiian people from pre-colonial times to the present day. This historical background will be integral to a better understanding of the Native Hawaiian worldview examined in the previous chapter. This chapter will argue that while the establishment of indigenous-led CBE initiatives in the State of Hawaii is a step in the right direction, in order to improve the academic achievement of Native Hawaiian students attending public schools there today, many obstacles remain that need to be overcome.

#### Education in the Pre-Colonial Period

Historians consider “Ancient Hawaii” to be that period immediately preceding the unification of the Hawaiian Islands by Kamehameha the Great in 1810, which resulted in the establishment of the Kingdom of Hawaii.<sup>495</sup> Standard Hawaiian history texts estimate that the first settlers from Tahiti and the Samoan Islands arrived sporadically between 300 and 800 AD.<sup>496</sup> However, in 2010, a more advanced radiocarbon analysis suggested that the islands might

---

<sup>495</sup> Ralph S. Kuykendall and A. Grove Day, *Hawaii: A History, from Polynesian Kingdom to American State* (Englewood Cliffs, NJ: Prentice-Hall, 1961).

<sup>496</sup> Charles E. M. Pearce and Frances M. Pearce, 'Oceanic Migration: Paths, Sequence, Timing and Range of Prehistoric Migration in the Pacific and Indian Oceans', in (Dordrecht Heidelberg London New York: Springer Science & Business Media, 2010), pp. 167.

have been settled much later, in the relatively short time between A.D. 1219 and 1266.<sup>497</sup>

Education in this ancient Hawaiian society reflected the needs and functions of the people in the community. The principal educational methodology was apprentice-style learning by observation of one's *kumu* (teacher). The adult caregivers of the Hawaiian *'ohana* (extended family) and older siblings were the teachers of the younger children. This ancient Hawaiian approach to education enabled every child to be both a student and a teacher, given his or her skills and talent level. When a child showed particular interest in and a propensity for a skill, that specialized knowledge was passed along, thus preserving this occupation in families over the generations. The younger children learned primarily through listening, observing, and assisting in tasks performed day-to-day both in and outside of the household. Other artisans, recognized as masters in their respective occupations, were employed to teach the older youth and adults in the more advanced skills. Thus, youth were prepared to contribute to society in this way, apart from any form of modern public schooling.<sup>498</sup>

Both commoners and the elite valued education that was practical and skills-based. The “open classroom” found in the natural settings and seas surrounding the islands was a significant component of the ancient Hawaiian form of community-centered education. Benham and Heck point out that this

---

<sup>497</sup> Janet M. Wilmshurst and others, 'High-Precision Radiocarbon Dating shows Recent and Rapid Initial Human Colonization of East Polynesia', *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, (2010).  
<https://doi.org/10.1073/pnas.1015876108> [accessed 05/15/2018].

<sup>498</sup> Malo.

method helped learners to develop not only tangible skills but also valuable socialization and spiritual fulfillment.<sup>499</sup>

Before their first exposure to Western culture, incident to the arrival of Captain James Cook in 1778, the ancient Hawaiians (kānaka maoli), engaged in sophisticated uses of language and oral traditions for educational purposes. The value of oral tradition was firmly rooted in the belief that their indigenous language not only influenced daily life but also allowed them to communicate with their deceased ancestors.

This ancient indigenous language was not written, and so knowledge was passed on through various methods of 'ōlelo (oral language). The primary language forms were mo'ōlelo (history, legends, and stories) and 'ōlelo no'ēau (proverbs and poetical sayings), each of which was essential to the development of their cultural traditions and pedagogies.<sup>500</sup> This tradition of oratory generated a collection of chants and stories that ensured the perpetuation of their history, beliefs, and genealogies as well as technical information. As a result, the ancient Hawaiians achieved considerable mastery in several functional areas, including but not limited to, aquaculture, ocean navigation, island agricultural techniques, canoe construction, woodcarving, and

---

<sup>499</sup> Maenette K. P. Benham and Ronald H. Heck, *Culture and Educational Policy in Hawaii: The Silencing of Native Voices*, ed. by Joel Spring, Sociocultural, Political, and Historical Studies in Education (Mahwah, NJ: Erlbaum Press, 1998).

<sup>500</sup> Malo.

natural healing.<sup>501</sup> These occupational pedagogies were intended for the education of the lower classes of society.

Formal scholarly education was only available to the *ali'i* (noble class—chiefs and their families), and the *ali'i* children only were allowed to become candidates for the priesthood or be trained as *haku mele* (chant masters).

Training to become a chant master required strict adherence to the precise rules for memorization of large amounts of cultural information contained in the chants.<sup>502</sup> Those who showed superior intellect among the older *ali'i* children were carefully selected for this disciplinary track and placed under the direct tutelage of an acknowledged *haku mele* master until they attained mastery.<sup>503</sup>

Once mastery was attained, the *haku mele* recited the chants from memory to the people. They also composed new chants. In this way, cultural history and knowledge were passed on to the next generation. The most influential members of this scholarly class were the *kākā 'ōlelo*. Kepelino describes the role and work of the *kākā 'ōlelo* as follows:

The *kākā 'ōlelo*, who might be one person or a group of people, judged the nature of this and that oral tradition. They corrected things according to their decisions, and occasionally discarded things of this or that tradition, which were not correct. These

---

<sup>501</sup> R. K. Blaisdell, 'The Kanaka Maoli World', in *The Hawaiian Odyssey*, ed. by E. Herter (Bishop Museum Press, 1993), pp. 47-76.

<sup>502</sup> John Charlot, *Classical Hawaiian Education: Generations of Hawaiian Culture* (La'ie, HI: The Pacific Institute BYU Hawaii, 2005).  
<http://www2.hawaii.edu/~charlot/BOOKS/CHE%20post/che.pdf>

M. Kelly, 'Some Thoughts on Education in Traditional Hawaiian Society', in *To Teach the Children: Historical Aspects of Education in Hawaii*. A Publication Accompanying the Exhibition Commemorating the 50th Anniversary of the College of Education and the 75th Anniversary of the University of Hawaii., ed. by A. Kali (Honolulu, HI: University of Hawaii - Manoa, Bernice Pauahi Bishop Museum, 1982, Reprinted 1991), pp. 4-14.

<sup>503</sup> Ibid.

people chanted as their occupation. And they became a family, a family of *kākā ‘ōlelo*.<sup>504</sup>

In ancient Hawaii, the closest thing to a modern-day public school classroom was the *nio* house, where these chant masters met. The *nio* house was a place where cultural traditions were formalized through ongoing debates where new and old ideas were presented, argued, defended or revised.<sup>505</sup>

The nature and breadth of the cultural information conveyed through these oral chants required them to be deliberate and concise but also capable of incorporating multiple meanings in the words selected. The actual material that might be passed on was also limited by the number of *haku mele* willing to commit to memorize, teach and share it. Consequently, many chants tended to have a finite lifespan, and those surviving today are relatively few. However, the chants that retained and conveyed the genealogies of the ruling classes, which were referred to as “name chants,” were the most important because they verified the hereditary right to rule.<sup>506</sup>

A well-known example of a name chant is the *Kumulipo*. *The Kumulipo*, composed in the 17<sup>th</sup> century, totals over 2000 lines, including a story of creation in its modern English language version.<sup>507</sup> The *Kumulipo* is the hereditary chant for the line of *ali‘i* tied to the monarchs of the Kingdom of Hawaii and the Kamehameha and Kālakaua dynasties. For the ancient Hawaiians, one’s ability

---

<sup>504</sup> Kepelino, pp. 131-132.

<sup>505</sup> Ibid.

<sup>506</sup> Fornander.

<sup>507</sup> *The Kumulipo: A Hawaiian Creation Chant*, ed. by Martha Warren Beckwith, Second edn, trans. by Martha Warren Beckwith (Honolulu, HI: Univeristy of Hawaii Press, 1951, Reprinted 1972).

to trace such ancestral origins was central to their understanding of evolution and man's relationship to all other things in the world.<sup>508</sup>

### **Native Hawaiian Education – Western Contact to the Present**

Western contact, which first took place with the arrival of the English Captain James Cook in 1778,<sup>509</sup> marked a fundamental shift in the course of Hawaiian history. Upon sighting of the Island of Oahu, Cook named the archipelago the “Sandwich Islands” after the Earl of Sandwich. After that, word of Hawaii's discovery, its people, and natural resources spread rapidly throughout the Americas and Europe as Western whaling and merchant vessels began to frequent the islands.

Starting in 1790, Kamehameha the Great (Kamehameha I) united the Hawaiian Islands under his reign through a series of battles establishing the Kingdom of Hawaii in 1810. Liholiho, son of Kamehameha I, is best remembered for the *'Ai Noa*, the breaking of the ancient *kapu* system of religious laws six months into his reign in 1819. What followed was the rapid disbanding of the priestly class, the destruction of temples and images and other changes in the social order, including the traditional forms of education in Hawaiian society.

In 1820, not long after the abolition of the *kapu* laws, the *American Board of Commissioners for Foreign Missions* (ABCFM), an interdenominational Protestant religious body, sent their first company of missionaries to Hawaii. Reports from whalers and traders and the presence of several Hawaiian youths

---

<sup>508</sup> *A Hawaiian Nation I: Man, Gods and Nature*.

<sup>509</sup> Helen Wong and Ann Rayson, 'Chapter 6: Captain Cook in Hawaii, A.D. 1778-1779.', in *Hawaii's Royal History* (US: Bess Press, Inc, 1997), pp. 40-49.



in New England, where the ABCFM was headquartered, directed their attention toward the Kingdom of Hawaii as a fertile field for proselyting.<sup>510</sup> These early Christian missionaries learned of the downfall of the ancient Hawaiian religious system upon their arrival in the Hawaiian Kingdom on March 30, 1820. As a result, they were convinced that they had received a mandate from God to alter Hawaiian religion and culture through their religious work.

Incident to the influence of foreign missionaries, education in Hawaii was transformed from the traditional occupation-based training provided by members of the family to the Anglophone tradition, which included classroom instruction and Western acculturation. This new form of education, with the concurrent goals of civilizing the “heathen indigenous population” and converting them to Christianity, has also been viewed as a fundamental instrument of colonization. The first missionary-led schools were established primarily for Hawaiian adults, because, as recorded in one of the missionary journals, “the children are not yet tamed.”<sup>511</sup>

After ten years of failed attempts to convert Native Hawaiian adults to Christianity through literacy programs, the missionaries transitioned to a three-tiered educational system for Hawaiian children instead.<sup>512</sup> After that, Native

---

<sup>510</sup> Fred Field Goodsell, *You Shall be My Witnesses*. (Boston: American Board of Commissioners for Foreign Missions, 1960).  
<https://babel.hathitrust.org/cgi/pt?id=wu.89066429689;view=1up;seq=28>

<sup>511</sup> Malcolm Nāea Chun, *No Na Mamo; Traditional and Contemporary Hawaiian Beliefs and Practices* (Honolulu, HI: University of Hawai'i Press, 2011),  
<http://www.jstor.org/stable/j.ctt6wqfb6> [accessed June 4,2018].

<sup>512</sup> *Annual Report and Minutes of the American Board of Commissioners for Foreign Missions. 1832*. Boston, MA: American Board of Commissioners for Foreign Missions as referenced in Beyer, 'Comparing Native Hawaiian Education with Native American and African American Education during the Nineteenth Century', pp. 59-75.

Hawaiian children were incrementally exposed to a curriculum and pedagogies far removed from their traditional education.

At the top of this tiered system was the Lahainaluna High School (later converted to a Seminary to prepare preachers) that was created primarily to train the new governing elite of the Kingdom of Hawaii. In the middle were schools set apart to educate male teachers for service in the common schools and the wives of the Seminary graduates. At the bottom were the schools established for Hawaiian commoners.

The Lahainaluna High School was established in 1831. Its students were the children of either chiefs or white fathers. A school providing a secondary education was not only a new phenomenon in Hawaii but also in the rest of the continental United States. At the time Lahainaluna was started, there were only a handful of high schools in the entire United States. It pre-dated the establishment of the first United States normal school by eight years, and for forty years (1831-1871), was the premier educational institution for Hawaiian *ali'i* males.<sup>513</sup> The curriculum was primarily academic, as it was the expectation that its graduates would become the future lawyers, doctors, ministers, and schoolteachers in the Kingdom. However, to a lesser extent, manual labor training was also instituted during the 1860s to help cover a portion of Lahainaluna's operational expenses.

---

<sup>513</sup> Benjamin Othello Wist, *A Century of Public Education in Hawaii: October 15, 1840-October 15, 1940* (Honolulu, HI: Hawaii Educational Review, 1940), p. 221.

Formal female education began in Hawaii with the establishment of boarding schools designed primarily to provide suitable wives for the graduates of the male schools then employed as teachers. The first such school, the Wailuku Female Seminary, was established on the island of Maui in 1837. In 1838, the Hilo School for Girls began on the Island of Hawaii.<sup>514</sup>

During the 1830s and 1840s, the missionaries continued to foster the middle tier schools for the general population of male and female students alike, but added four more seminaries to train female converts to become teachers. At that time, it had become increasingly apparent to them that to establish and maintain the Western Christian value of chastity, female students required seminary training and acculturation.<sup>515</sup>

In 1840, King Kamehameha III (born Kauikeaouli) legally formalized public education in the Kingdom of Hawaii. David Malo, an early graduate of the Lahainaluna Seminary, was selected as the first Superintendent of Public Education. During this same year, the *Hawaiian Chiefs' Children's School* (also known as the Royal School) was established for training the young children of Hawaii's highest chiefs in the Western and Christian educational tradition. The Royal School opened on May 5, 1840 under the direction of newly arrived American Congregationalist missionaries, Amos Starr Cooke and his wife Juliette Montague Cooke, with eleven royal children ages two to eleven entering

---

<sup>514</sup> T. Coan (1840). *Progress. Hilo Girls' School*. Boston, MA: American Board of Commissioners for Foreign Missions as referenced in Beyer, pp. 59-75.

<sup>515</sup> Nathaniel B. Emerson, 'The Education of Hawaiian Girls', in (Honolulu, HI: Hawaiian Mission Children's Society, 1884), pp. 24-27.

as boarders.<sup>516</sup> Over the next decade, sixteen royal pupils would take residence at the school, including the kingdom's heir apparent, Alexander Liholiho, as well as the next four monarchs of the Hawaiian Kingdom.<sup>517</sup> Despite the establishment of this Royal School, whose sole purpose was to prepare children to one day ascend the throne and rule the kingdom, an unanticipated crisis emerged when several successive heirs died at relatively young ages shortly after graduation.<sup>518</sup>

One of the highlights of Kamehameha III's 30-year reign was the establishment of the *General School Laws* in 1840.<sup>519</sup> Before this, foreign missionaries had directed schooling throughout the kingdom, exclusively at all levels for 20 years. Under these new laws, the Kingdom's government assumed responsibility for supporting the common schools. With the support of the Hawaiian monarchy, public education expanded rapidly to more than one-thousand Hawaiian-language medium schools. The common schools gave priority to educating adults first and then later the children. According to the *General School Law*, every community with 15 or more school-aged children was required to establish a school and support a teacher. Mandatory attendance was required

---

<sup>516</sup> Ralph S. Kuykendall, *Hawaiian Kingdom 1778-1854: Foundation and Transformation* (Honolulu, HI: University of Hawaii Press, 1965). <http://www.ulukau.org/elib/cgi-bin/library?e=d-0kingdom1-000Sec--11en-50-20-frameset-book--1-010escapewin&a=d&p2=book>

<sup>517</sup> *Education for Elimination in Nineteenth-Century Hawai'i*, p. 123

<sup>518</sup> Ibid.

<sup>519</sup> Kingdom of Hawai'i, *Constitutional Laws of Hawai'i*, (1842).

for both girls and boys. After that, schools for commoners rapidly emerged, alongside the schools for young *ali'i*, taught and staffed by missionaries.<sup>520</sup>

By 1822, the Protestant missionaries had created a written form of the Hawaiian language for three reasons—to create a vehicle for the spread of Christianity, to train local converts to become teachers and to establish literacy for the indigenous population.

Early missionary efforts also focused on giving believers direct access to the recently translated Bible. Hawaiian literacy was seen as a more effective means for conversion than English. This also had practical implications, considering the sheer number of Native Hawaiians in comparison to a relatively small group of foreign missionaries. The missionaries reasoned that the conversion process would be lengthy and uncertain if it required training an adequate number of Native Hawaiians to teach reading and writing in English.

Importantly, the establishment of the common schools enabled Native Hawaiian teachers to spread Hawaiian language literacy more broadly throughout the Kingdom. Thus, from the time the Kingdom-directed school system was established in 1840 until its closing in 1893 with the ending of the monarchy, all common schoolteachers were Native Hawaiian and taught in the written Hawaiian language.

---

<sup>520</sup> R. Stueber, 'An Informal History of Schooling in Hawaii', in *To Teach the Children: Historical Aspects of Education in Hawaii*, ed. by A. Kali (Honolulu, HI: University of Hawaii - Manoa and the Bernice Bishop Museum, 1982, Reprinted 1991), pp. 16-36.

Hawaiian language literacy flourished among a people who prized language deeply and had held oratory skills as among the highest cultural priorities. Because of the common schools, Native Hawaiians became one of the most literate populations in the world at that time. By 1854, the minister of public instruction estimated that three-fourths of Native Hawaiians over the age of 16 could read and write in their native language.<sup>521</sup> Subsequently, from 1890-1910, the Native Hawaiian literacy rates ranged between 79.8 and 98.6%.<sup>522</sup> These exceptionally high literacy rates were, in large part, due to the proliferation of the common schools with trained Native Hawaiian teachers.

According to Kaomera, Hawaiian literacy in the nineteenth century was a “two-edged sword.”<sup>523</sup> For nearly 40 years (1822 to 1861), the foreign missionaries and other Westerners controlled all publications in the Hawaiian language. During this same period, Western interpreters also used the press to demean Hawaiian culture, including the language. However, Native Hawaiians gradually learned to use their native language literacy to present their points of view. In 1861, backed by the future king, David Kalākaua, foreign control over publishing in Hawaii began to diminish with the appearance of *Ka Hoku o ka Pakipika (The Star of the Pacific)*, a Hawaiian-language newspaper with an indigenous point of view.<sup>524</sup>

---

<sup>521</sup> *Hawaiian Kingdom 1778-1854*, p. 369

<sup>522</sup> A. W. Lind, *Hawaii's People*, 4th edn (Honolulu, HI: University of Hawaii Press, 1980).

<sup>523</sup> Kathryn H. Au and Julie Kaomea, 'Reading Comprehension and Diversity in Historical Perspective: Literacy, Power, and Native Hawaiians', in *Handbook of Research on Reading Comprehension*, ed. by S. Isreal and G. Duffy (New York, NY: Routledge, 2009), pp. 571-586.

<sup>524</sup> Au and Kaomea.

The warm reception of this newspaper by Native Hawaiian readers encouraged the publication of approximately 60 other newspapers providing a Hawaiian cultural perspective on a wide range of topics. Some articles addressed political issues, arguing against such things as laws restricting Hawaiian cultural practices like the *hula* (dance). All told, from 1861 to 1948, more than 135 different Hawaiian language newspapers were in circulation in Hawaii. Some newspapers stayed in circulation for over sixty years, providing religious content, historical writings, local and international news, as well as translations of classic Western literature into Hawaiian.<sup>525</sup> In a practical sense, the Hawaiian language newspapers represented an informal means of education for the Native Hawaiian community during the era when English was the mandatory language of instruction. The newspapers were also a way to preserve the language and native culture.

For this reason, Hawaiian historians today are actively working on archiving the records and information contained in these publications.<sup>526</sup>

An example of Native Hawaiians attempting to use literacy to publicize their views was the 1897 petitions protesting the removal of the Hawaiian monarchy, and the pending legal annexation of Hawaii by the United States. The *Kū'ē Petitions*, as they are collectively known today, were three separate petitions that contained the signatures of over 38,000 Native Hawaiian adults and

---

<sup>525</sup> S. Dawrs, 'A Massive Archiving Initiative Aims to make Millions of Pages of Historic Hawaiian Language Writing Available to the Public', *Hana Hou!*, 6(1) (2003).

<sup>526</sup> For information on the archiving and preservation of the Hawaiian Language Newspapers refer to the following websites: <http://nupepa.org/gsd/2.5/cgi-bin/nupepa?l=en>  
<https://guides.library.manoa.hawaii.edu/c.php?g=105804&p=685333>  
<https://www.papakilodatabase.com/pdnupepa/cgi-bin/pdnupepa?a=p&p=home>.

sympathizers, indicating their open disapproval of annexation. At the time, the Hawaiian language *Kū‘ē Petitions* were ignored by Hawaii’s Western political establishment and later faded into obscurity.

During the 20<sup>th</sup> century, Western historians, working exclusively from English language sources, remained unaware of these petitions and thus concluded that the local indigenous population had offered little resistance to annexation. Modern Native Hawaiian historian, Noenoe Silva, called attention to these petitions when she criticized historians for disregarding these Hawaiian language sources and misrepresenting Native Hawaiians’ anti-annexation sentiments.<sup>527</sup>

During the decades of the 1880s and 90s, foreigners advocated for the change of language instruction from Hawaiian to English in all schools. In 1896, three years after the end of the Hawaiian monarchy and before annexation by the United States, the *Laws of the Republic of Hawaii* were enacted. These laws stated that only those schools whose “medium and basis of instruction was English” would be officially supported by the new government.<sup>528</sup> This brought an abrupt end to the use of the Hawaiian language in schools. As a direct consequence, the high levels of literacy by Native Hawaiians in their native language began to erode as students now struggled to learn English.

---

<sup>527</sup> Noenoe K. Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham, NC: Duke University Press, 2004).

<sup>528</sup> Laws of the Republic of Hawaii, passed by the legislature at this session. (1896), Honolulu, HI: Hawaiian Gazette Company. Note: The law cited as banning the Hawaiian language is identified as Act 57, sec. 30 of the 1896 Laws of the Republic of Hawaii:



During the latter two decades of the 19th Century, the foreign missionaries incorporated manual labor training into all the schools under their supervision. This change in their educational approach was aimed to prepare Hawaiians for jobs in the United States-style industrial economy.

In the 1850s, well before the foreign missionaries began their manual labor training movement, a separate form of this type of training had already been instituted in the Hawaiian Islands. The individual most responsible for this was David Belden Lyman, a missionary schoolmaster living near Hilo, Hawaii. Using experiences from his agricultural background, Lyman developed a project-based learning methodology of designing tools to complete a task. Under his tutelage and direction, they were prepared to take jobs on the sugar and pineapple plantations and other businesses where these types of skills were needed.<sup>529</sup>

In the late 1880s, the Kamehameha School for Boys and the Kauai Industrial School were established. Directed by missionaries, these two new male manual labor training schools were independent of the Hawaiian Kingdom-controlled public schooling system. This new type of school proliferated throughout the islands so that, by the beginning of the twentieth century, this had become the preferred means of educating Native Hawaiians.

It is important to interject here that the Kamehameha School for Boys was the forerunner of the Kamehameha Schools system, a private charitable, educational trust endowed by the will of Hawaiian Princess Bernice Pauahi

---

<sup>529</sup> F. S. Lyman, 'The Hilo Boys Boarding School', *The Friend LIX*, December (1902), p. 25.

Bishop (1831-1884), the great-granddaughter and last direct descendant of King Kamehameha the Great.<sup>530</sup> Today, her endowment supports an educational system that provides thousands of Native Hawaiian learners with a quality education in both the Hawaiian and English languages. The significance of the Kamehameha Schools will become apparent when the modern CBE programs being developed in Hawaii today are further examined.

The Republic of Hawaii was a transitional government entity that functioned between July 4, 1894, and August 12, 1898, after which, the Hawaiian Islands were annexed as a newly incorporated territory of the United States. Both the Republic of Hawaii and the U.S. Territorial Government educational systems focused on the “Americanization” of a growing heterogeneous population that increasingly included immigrant laborers needed for the sugar and other plantation industries.<sup>531</sup> Foreign immigration had a significant influence on the literacy and use of English in Hawaii. From 1898 to 1920, “Pidgin” or Hawaii Creole English developed organically as Native Hawaiians tried to communicate with these other ethnic populations.<sup>532</sup> Even today, “Pidgin” continues to be commonly used by many Native Hawaiians, although it inhibits their ability to learn and use proper English grammar.

During the 1920s, Hawaii’s public education system became more segregated with the establishment of the *English Standard Schools*. Predominantly White

---

<sup>530</sup> W. D. Alexander, 'The Development of Education in Hawaii', *The Friend* LIX, December (1902), pp. 22-24.

<sup>531</sup> Tennant S. McWilliams, 'James H. Blount, the South, and Hawaiian Annexation', *Pacific Historical Review*, 57 (1988), pp. 25-46, <http://www.jstor.org/stable/3639673>.

<sup>532</sup> Haliniak.

children attended these *English Standard Schools*, while the children of other races continued to attend the other public institutions.<sup>533</sup> A growing number of private and religious schools also flourished during this same decade.<sup>534</sup>

By 1930, public education in Hawaii had expanded to include the full curriculum then offered throughout the United States secondary school system. During the 1930s Depression Era, consistent with U.S. educational policies at that time, Hawaii's educational system provided equal access for all children regardless of their English language ability. These policies persisted until after World War II. After Hawaii's statehood in 1959, and with the subsequent revitalization of Hawaiian culture in the 1960s, the use of the Hawaiian language and other curricular options for Native Hawaiians in the public schools began to increase.<sup>535</sup>

The table on the following page, adapted from a 2017 report by the *Office of Hawaiian Affairs* (OHA) on the history and status of Native Hawaiian education, outlines the major trends in legislation, policy and the foci of Native Hawaiian education from 1959 until the present day.

---

<sup>533</sup> Stueber, 'An Informal History of Schooling in Hawaii', in *To Teach the Children: Historical Aspects of Education in Hawaii*, ed. Kali, pp. 16-36.

<sup>534</sup> Ibid.

<sup>535</sup> Ibid.

**Table 6.1 – Modern History and Status of Native Hawaiian Education in the State of Hawaii – 1959 to the Present**

**1959-1970**

**1959:** Hawaii became the 50th state of the United States of America.

**1960's:** Hawaiian cultural renaissance encouraged support of language, music, and practices and led to the push for Hawaiian-based education throughout the public school and post-secondary system.

**1970's**

**1978:** Article XV, Sec. 4 of the State Constitution reinstated Hawaiian as an official language of the State.

**1978:** The State of Hawaii Constitution was amended, mandating the promotion of “the study of Hawaiian culture, history, and language” through education programs and community experts. The introduction of native Hawaiian-speaking kūpuna (grandparents) and the *Kūpuna Component* was formed as a means of re-establishing Hawaiian culture, language, and values for public school grades K-6 in order to meet the terms of this legislation.

**1980-1999**

**1980:** The Hawaiian Studies Program was established within the Office of Instructional Support at the State of Hawaii Department of Education (DOE)

**1984:** *Pūnana Leo O Kauai*, the first Hawaiian-medium pre-school, was established. Over the next two years, more sites across the state were started. State of Hawaii legislation requesting the support of these Hawaiian-medium pre-schools was introduced but did not pass. Teachers in these schools communicated only in Hawaiian. More books and teaching materials were created or translated into the Hawaiian language.

**1986:** Hawaii Revised Statutes (HRS) 302H-1 established the Hawaiian language medium education program allowing the Hawaiian language as an instruction medium in all public schools.

**1986:** Hawaiian Language Immersion Programs (HLIP) became available as a pilot program within the Office of Instructional Support of the DOE.

**1990:** *Ka Papahana Kaiapuni*, the Hawaiian Language Immersion Program, approved by the Hawaii Board of Education (BOE), began as a permanent K-12 program.

**2000 - 2015**

**2000:** *Kanu o ka Āina*, located at Waimea on the Island of Hawaii, was established as the first Hawaiian culture-based public charter school.

**2001:** Hawaii BOE Policy 2104 advances Article XV, Section 4 of the State Constitution to create the Hawaiian Studies and Language Program, establishing organizational structures to allocate resources relating to the curricula, assessments, and study of Hawaiian culture, history, and language. This policy was subsequently amended in 2009 and again in 2014

**2006:** Hawaii BOE Policy 2105 advances Article XV, Section 4 of the State Constitution. The BOE acknowledges the Hawaiian Immersion Program and offers students a public school education the Hawaiian language in grades K-12. It was amended in 2014.

**2015:** The Office of Hawaiian Education (OHE) was officially established under the Office of the Superintendent through Policies 2104 and 2105.

Source - Haliniak, C.L. (2017). A Native Hawaiian Focus on the Hawai'i Public School System, SY2015. (Ho'ona'auao (Education) Fact Sheet, Vol. 2017, No.1). Honolulu, HI: Office of Hawaiian Affairs, Research Division, Special Projects.

### **The Characteristics of Native Hawaiian Education Today**

In 2017, the *Hawaii Board of Education* reported that it provided education for over 180,000 children. The *Hawaii State Department of Education* (HIDOE) operates under the Board of Education and is the only statewide public school district in the United States. It operates through two parallel organizational divisions. The largest is the *Department of Education* (DOE), providing education for over 170,000 students. It supervises 40 school complexes, grouped into 15 regional areas, encompassing 256 elementary, middle, and high schools. The second division is *The Hawaii State Public Charter School Commission* that manages 34 elementary, middle, and high and public charter schools across six of the eight major Hawaiian Islands for over 10,000 students.<sup>536</sup>

Hawaii's island geography and HIDOE's one large school district organizational structure creates some significant administrative challenges. The demographic mix of students attending HIDOE's public schools today also presents other problems related to curriculum development and effective pedagogy.

The racial/ethnic composition of Hawaii's public school population varies significantly from the continental United States, except the State of Alaska, which is predominantly White, Black, and Hispanic.<sup>537</sup> The latest statistics taken from HIDOE's online database illustrates this, as shown in the following table:

---

<sup>536</sup> Hawaii State and Department of Education, *2015 Superintendent's Annual Report*, (2016) <http://www.hawaiipublicschools.org/Reports/SuptReport2015.pdf>.

<sup>537</sup> G. Kena and others, *The Condition of Education 2016*, NCES 2016-144 vols (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2016). <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2016144> [accessed December 1, 2016]

<b>Table 6.2 – Race-Ethnicity of Students in Public Schools in Hawai'i (2016) (Shown in percentages in descending order)</b>					
Native Hawaiian	27.7%	Japanese	9.2%	Chinese	3.3%
Filipino	21.9%	Hispanic	3.7%	African-American	2.8%
Caucasian	15.0%	Samoan	3.5%	Korean	1.2%

Source: Hawaii Department of Education website, Race-Ethnicity of Students in Public Schools in Hawai'i: Sy 2011-2012, <https://dashboard.hawaii.gov/Formal-Education/Race-Ethnicity-of-Students-in-Public-Schools-in-Ha/2xhc-wbnw/data>

As exhibited seen in the table above, the largest ethnic group is the Native Hawaiians. For this and other reasons, the leaders at HIDOE are placing a significant amount of resources toward the success of this student population. This includes the implementation of several new Hawaiian culture-based educational initiatives, which will be described in the paragraphs below and analyzed in a subsequent chapter.

Numerous studies have suggested that teachers are the most significant factor contributing to a student's academic success in school—estimated at two to three times that of any other school factors (e.g., leadership, facilities, and services).<sup>538</sup> Other research indicates that the ethnicity of the teacher, in comparison with the ethnic composition of the student demographic, can also be a significant factor contributing to student progress. These studies assert that increased success can be tied to students and teachers sharing the same racial or ethnic background, at least in part, because such teachers find it easier

---

<sup>538</sup> *Teachers Matter: Understanding Teachers' Impact on Student Achievement*, (RAND Education and Labor, 2012). <https://www.rand.org/education-and-labor/projects/measuring-teacher-effectiveness/teachers-matter.html>

or more natural to serve as role models, mentors, advocates, or cultural translators.<sup>539</sup>

In 2016, the percentage of Native Hawaiian teachers in HIDOE was only 9.9% compared to 27.7% of students of the same ethnicity.<sup>540</sup> In contrast, the percentage of Native Hawaiian teachers in the Kingdom of Hawaii (before 1893) was 41.1%.<sup>541</sup> According to Laimana, the steady decline of Native Hawaiian teachers in Hawaii's public school system throughout the 20th century can be attributed to the following: the mandate establishing English over Hawaiian as the official and institutional language, uneven pay schedules favoring non-Hawaiian teachers, and the intentional recruitment of those teachers in favor of natives.<sup>542</sup>

For example, Dee found evidence that students who had a teacher of the same racial/ethnic origins scored between .6 and 6 percent higher in both reading and math compared to those who did not. Furthermore, Dee's study revealed that shared teacher/student ethnicity also had a neutralizing effect on negative stereotypes.<sup>543</sup> A survey conducted by Egalite, Kisida, & Winters produced similar results, with additional correlations to attendance and ethical

---

<sup>539</sup> Anna J. Egalite, Brian Kisida and Marcus A. Winters, 'Representation in the Classroom: The Effect of Own-Race Teachers on Student Achievement', *Economics of Education Review*, 45 (2015), pp. 44-52. <http://doi.org/10.1016/j.econedurev.2015.01.007> .

<sup>540</sup> 2015 Superintendent's Annual Report.

<sup>541</sup> John Kalei Laimana Jr., *The Phenomenal Rise to Literacy in Hawai'i: Hawaiian Society in the Early Nineteenth Century (Master's Thesis)* (2011). <http://hdl.handle.net/10125/101531> .

<sup>542</sup> Ibid.

<sup>543</sup> Thomas S. Dee, *The Race Connection*, (Education Next, 2004). [https://cepa.stanford.edu/sites/default/files/ednext20042\\_52.pdf](https://cepa.stanford.edu/sites/default/files/ednext20042_52.pdf)

behavior.<sup>544</sup> Ledward, Takayama and Elia's 2009 analysis of Native Hawaiian teachers who were trained in Hawaiian culture-based educational pedagogies supports this same observation.<sup>545</sup>

### **Hawaiian Language Immersion Programs**

Recent scholarship suggests that helping indigenous students learn their native language has academic as well as social benefits.<sup>546</sup> Incident to the English language mandate discussed above, many native Hawaiian students today are learning Hawaiian as their second language. Bilingual and language immersion studies reveal that English-speaking indigenous students who are taught their native language tend to have higher rates of retention, attendance, a stronger sense of well-being and self-confidence.<sup>547</sup> In addition, students in these bilingual or language immersion settings score higher on verbal English standardized tests. They have also demonstrated improved planning skills and the ability to solve more complex math problems.<sup>548</sup>

Between 1890-1950, two initiatives seriously threatened the preservation of the Hawaiian language: the repression of Hawaiian culture and the mandate to replace Hawaiian with English in the public schools. However, during the

---

<sup>544</sup> Egalite, Kisida and Winters, pp. 44-52.

<sup>545</sup> Ledward, Takayama and Elia.

<sup>546</sup> Au and Jordan, pp. 139-152.

Ramsey.

<sup>547</sup> May, 'Bilingual/Immersion Education: What the Research Tells Us', in *Encyclopedia of Language and Education*, ed. by Cummins and Hornberger, pp. 19-34.

<sup>548</sup> J. Jansen, L. Marean and J. Underriner, *Benefits of Indigenous Language Learning*, (No date). [http://pages.uoregon.edu/nwili/wp-content/uploads/2012/07/forwebpageBenefitsL2\\_ECE10\\_17\\_14.pdf](http://pages.uoregon.edu/nwili/wp-content/uploads/2012/07/forwebpageBenefitsL2_ECE10_17_14.pdf) .



“Hawaiian Renaissance”—a language and cultural revitalization effort that began in the 1960s and accelerated during the 1970s—the Hawaii State Legislature passed two new Hawaiian-language based programs. The first, established in 1980, was *The Hawaiian Studies Program* (HPS). HPS began with the *kupuna* (elder/teacher) component developed by the Lili’uokalani Trust. This educational initiative, staffed by native community experts, fulfilled the 1978 State constitutional mandate calling for the increased promotion of Hawaiian culture, history, and language. A second initiative was the Pūnana Leo Hawaiian pre-schools established in 1984. Its purpose was to provide Hawaiian culture and language-based curriculum to children ages 3-5. Later in the 1980s, when pre-schools were included in the Hawaiian public school system, Native Hawaiian parents and community supporters sought to integrate these Pūnana Leo preschools into HODOE as well.

In 1987, relevant legislation approved the use of the Hawaiian language in public schools. This legislation also provided for the establishment of *Ka Papahana Kaiapuni*, a new Hawaiian Language Immersion School Program. Since that time, the *Ka Papahana Kaiapuni* schools, which are grounded in local indigenous community-driven priorities, remain an integral part of the Hawaiian public school system. Currently, these schools are administered under the recently established (in 2014) *Office of Hawaiian Education* (OHE). The OHE operates under the DOE Superintendent’s office and is responsible for overseeing the Kaiapuni Educational program's implementation.<sup>549</sup>

---

<sup>549</sup> Hawaii State, Department of Education, and Office of Education, *The Foundational & Administrative Framework for Kaiapuni Education - Hawaiian Language Immersion Program*, (2015). <https://www.hawaiipublicschools.org/DOE%20Forms/KaiapuniFrameworkFinal.pdf>

Today, the Kaiapuni Hawaiian immersion programs are available in the grades K-12 across five of the seven major islands. Seventeen of these programs are administered within the DOE system and six within the public charter school system. In an effort to focus on Hawaiian culture and epistemology, instruction in these schools is entirely in the Hawaiian language until fifth grade, when English is gradually introduced. These Kaiapuni programs either operate on an English-speaking school campus or in an independent school setting.<sup>550</sup> During the 2015 school year, over 2,300 (4.5%) of Hawaii's public and charter school students were enrolled in a Kaiapuni program.<sup>551</sup>

### **Hawaiian Public Charter Schools**

The Hawaii Public Charter Schools (HPCS) are privately managed and semi-autonomous within the Hawaiian public school system. The HPCS schools were established to provide innovative educational options while still being accountable for student academic achievement. No tuition is required and enrollment into these charter schools is based on family choice rather than by place of residence linked to the nearest local school district. These charter schools can still receive state and federal funding as long as they comply with the accountability and assessment requirements of the DOE even though their standard curriculum differs.<sup>552</sup>

---

<sup>550</sup> Hawaii State and Department of Education, *Hawaiian Language Immersion Program*, (n.d.). <http://www.hawaiipublicschools.org/TeachingAndLearning/StudentLearning/HawaiianEducation/Pages/translation.aspx> [accessed April 4, 2017].

<sup>551</sup> 2015 *Superintendent's Annual Report*.

<sup>552</sup> Hawaii State, State Public Charter School Commission, *2014-2015 Annual Report*, (2015). <http://bit.ly/AnnRpt-2015>

In 2000, the first CBE public charter school in Hawaii, *Kanu o ka 'Āina*, was established on the Island of Hawaii. In the same year, *Nā Lei Na'auao* (NLN), the Native Hawaiian Charter School Alliance was created. This alliance supports and develops CBE pedagogies aimed at the preservation of the Hawaiian language and the cultural values and practices in select local Native Hawaiian communities.<sup>553</sup> By 2015, the HPCS system educated over 10,000 students in 34 schools across five of the eight major Hawaiian Islands with Native Hawaiian students representing 40.4% (4,211) of the total public charter school population.<sup>554</sup>

In 2017, the *Nā Lei Na'auao school alliance* was comprised of 17 schools providing education for over 4,000 Native Hawaiian and non-Hawaiian students.

### **Conclusion**

For centuries, indigenous Hawaiians have valued the transmission of knowledge through various forms of education. For Native Hawaiians, verbal language fluency has always played a vital role in their culture because of the high priority they historically placed on oratory skills. For example, “let’s talk story” is the most commonly heard phrase among Native Hawaiians who gather to converse and exchange knowledge or information today.

During the colonial period of the Kingdom of Hawaii (1810-1893), and later during the period when the United States controlled the Republic and Territory

---

<sup>553</sup> *Kanu O Ka Āina: Nā Lei Na'auao*, 2017 vols.  
[https://www.kalo.org/apps/pages/index.jsp?uREC\\_ID=209524&type=d&pREC\\_ID=465138](https://www.kalo.org/apps/pages/index.jsp?uREC_ID=209524&type=d&pREC_ID=465138)  
[accessed April 4, 2017]

<sup>554</sup> Hawaii State, State Public Charter School Commission

of Hawaii (1893-1959), Native Hawaiians experienced both the positive and negative effects of being educated within the Anglophone tradition.

The education of Native Hawaiians in the State of Hawaii has undergone a gradual systemic transformation since the cultural renaissance that began in the early 1960s. Today, the Hawaiian language, cultural values and the use of traditional pedagogies have blossomed, primarily due to the establishment of new indigenous-led Hawaiian CBE initiatives and scholarship. In addition, the creation of a growing number of Hawaiian Language Immersion and Public Charter Schools has elevated Native Hawaiian teaching methods to a new level of importance within the public education system of Hawaii.

Significant progress and scholarship are still needed to analyze how CBE and CRE pedagogies combined with Western technology-enriched curriculum and teaching methods might give indigenous students transformational experiences and better prepare them for careers in the critical science, technology, engineering and math (STEM) fields. Students from underrepresented groups particularly need exposure to the authentic use of emerging technologies and contact with industry, as they may not otherwise have had these opportunities.<sup>555</sup>

The increased use of artificial intelligence (AI), deep machine learning and other new digital, platform-based systems are rapidly transforming many global

---

<sup>555</sup> J. M. Anderson, 'The Second Digital Divide: The Effects of Ethnicity and Socioeconomic Status on Student Technology Access and use Outside the School Day' (Doctoral, Baker University, 2014).

industries emerging in the context of the Fourth Industrial Revolution.<sup>556</sup>

Schwab argues that this era of rapid technological change will challenge the world to find new ways to educate the world's children.<sup>557</sup>

This and other chapters have highlighted the notion that the Native Hawaiian worldview incorporates more holistic epistemologies. As a result, similar to the research completed by CREDE scholars tied to other Native American cultures, Native Hawaiians have demonstrated a natural proclivity toward observational and group-based learning as well as a preference for the use of place-based pedagogies linked to their āina and their natural surroundings. While these Hawaiian cultural learning preferences and strengths seemingly align well with an acumen for peer-to-peer problem-solving and the working in groups, more research is needed to analyze the potential use of modern digital systems in conjunction with indigenous learning methods. The potential that such a combination might have to help accelerate indigenous student progress and prepare them to succeed in the future will be examined in a subsequent chapter. Because of the consistent past and present use by educators in Hawaii of the CREDE universal standards, this same teaching and learning framework will also be incorporated as a component of the MSL model integrating emerging TEL systems (e.g., DLTs and edge computing) described later in Chapter 9 of this thesis.

---

<sup>556</sup> Kai-Fu Lee, *AI Superpowers: China, Silicon Valley, and the New World Order* (Houghton Mifflin Harcourt, 2018).

<sup>557</sup> *The Fourth Industrial Revolution*.

## CHAPTER 7

### The Successes and Challenges of Hawaiian CBE in the Modern Era

*I lāhui na‘auao Hawai‘i pono, I lāhui Hawai‘i pono na‘auao.*  
English Translation: *There will be a culturally enlightened Hawaiian nation.*  
*There will be a Hawaiian nation enlightened.*<sup>558</sup>

#### Introduction

This chapter will examine the various efforts made by educators and other community stakeholders in the State of Hawaii to build and implement effective CBE/CRE programs. The timeframe covered will be from the 1970s to the present. The design of these Hawaiian CBE pedagogies, their implementation and overall effectiveness will be analyzed. The continuing challenges faced by the Hawaiian educational community to improve the educational outcomes for Native Hawaiian learners will also be carefully evaluated.

#### The Hawaiian Renaissance and Early Legislation

Established in 1841 by King Kamehameha III, Hawaii’s public educational system is the oldest in the United States west of the Mississippi River, and the only system established by a sovereign monarch. It is also the first and oldest system that employed the use of the Hawaiian language.

After the United States annexed Hawaii in 1898, and throughout the territorial period (1900-1959), and even after Hawaii became a state (1959-1986), the use of Hawaiian as a language of instruction in education was declared unlawful. This declaration caused significant harm to a culture that placed a

---

<sup>558</sup> Native Hawaiian Education Council, *Vision Statement of the Native Hawaiian Education Council*. <http://www.nhec.org/about-nhec/the-native-hawaiian-education-act> [accessed June 22, 2018].

very high value on the power of oral communication, as exemplified in the traditional saying: "*I ka `ō'lelo nā ke ola; I ka `ō'lelo nā ka make* – "In the language rests life; In the language rests death."

In the late 1960s and early 1970s, a resurgence in cultural pride and identity led to a significant increase of interest in and the embracing of Hawaiian culture. During these two decades, a strong grassroots movement encouraging native music, dance (*hula*), and language activities in the greater Hawaiian community emerged. This renaissance in Hawaiian culture then led to a significant increase in the demand for more Hawaiian-oriented courses of study in schools and colleges. At this time, a heightened concern of the Native Hawaiian community and many educators was that the language would be lost with the passing of the existing native speakers. A consensus held by these community and educational leaders was that a basic competency in the Hawaiian language was the key to more fully maintaining and understanding the Native Hawaiian culture. Subsequently, significant efforts to revitalize the use of the Hawaiian language surged during these two decades.

In 1974, Congressional efforts to develop new Federal initiatives to redress historical inequalities resulted in the official recognition of Native Hawaiians as Native Americans. In the political arena, the State of Hawaii Constitutional Convention established the *Office of Hawaiian Affairs* (OHA) as a state agency in 1978. As a direct result, the Hawaii State Constitution was amended to include Article X, Section 4, which mandated that the State promote "the study of Hawaiian culture, history, and language by providing a Hawaiian education program and using community expertise as a suitable and essential means in

furtherance of Hawaiian education." Moreover, Article XV, Section 4, of the revised constitution recognized Hawaiian as an official language of the State. These constitutional amendments led to numerous changes in the State of Hawaii's educational system.<sup>559</sup>

At the same time, the U.S. Congress passed the Native Hawaiian Education Act, the purpose of which was to ensure that Native Hawaiians received the same educational benefits guaranteed to American Indians and Alaskan Natives. The first outcome of this Federal legislation was the creation of an Advisory Council on Hawaiian Education, which was charged to conduct an extensive study of educational needs. In the early 1980s, the entire United States economy was undergoing a severe recession resulting in the slashing of many educational budgets. As a result, funding for the Hawaiian study was cut by the Budget Reconciliation Act of 1981. The Kamehameha Schools, funded by an endowment from the Bernice Pauahi Bishop Estate, then stepped in and offered to underwrite the costs of conducting the study as a contractor at no public expense.

Since that earlier era, the Kamehameha Schools have directed the completion of four comprehensive assessments of the state of Native Hawaiian education—in 1983, 1993, 2005 and 2014, respectively. Completed by the Kamehameha Schools with the help of many others, this series of *Native Hawaiian Educational Assessments (NHEA)* have proven to be seminal and critical research aids in the preparation of this thesis. Because of its significant

---

<sup>559</sup> Refer to *Office of Hawaiian Affairs: History* <https://www.oha.org/about/abouthistory/>.



influence, it is essential to summarize the achievements and significant findings and recommendations of each of these reports in order to establish a research foundation for the evaluation of the replicability of the Hawaiian CBE model as well as the challenges still facing educational improvement for Native Hawaiian students today.

### **The Native Hawaiian Educational Assessment (NHEA) of 1983**

In 1983, the first NHEA volume was published with two stated aims: (1) To identify the unique needs and challenges facing Native Hawaiians in education, and (2) To identify program models that might apply to improve outcomes for Native Hawaiian children attending schools in Hawaii.<sup>560</sup>

The NHEA 1983 report showed outcomes for Native Hawaiians and other ethnic groups in the State of Hawaii utilizing various educational indicators. The theoretical underpinnings of the project were based on a “systems theory approach,” promulgated under principles established by Urie Bronfenbrenner. The Bronfenbrenner approach adopts an “ecological model” that encourages researchers to look at the interrelationships between variables at all levels of influence in a child's world. Beyond the living systems in which the child is a part, such as parent/child and teacher/child systems, there are higher-order systems that interrelate to these. For example, events at the state or even national level have a definite interrelationship with the microsystem of the classroom.<sup>561</sup>

---

<sup>560</sup> *Native Hawaiian Educational Assessment Project. Final Report.*

<sup>561</sup> Urie Bronfenbrenner, *The Ecology of Human Development* (Cambridge, MA: Harvard University Press, 1979).

The *NHEA 1983 Report* briefly touched on promising practices that could support improvements in culturally relevant teaching and learning for Native Hawaiian children. This *NHEA Report*<sup>562</sup> was instrumental in passing the *Native Hawaiian Education Act* into law. Congress enacted Title IV of the *Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988* (102 Stat.130)<sup>563</sup> to authorize and develop supplemental educational programs and to address the unique conditions of Native Hawaiians. The core findings and recommendations that laid the foundation for the passing of the *Native Hawaiian Education Act*,<sup>564</sup> and subsequently, the creation of many other Native Hawaiian educational improvement programs are summarized in the table on the following pages.

---

<sup>562</sup> *Native Hawaiian Educational Assessment Project. Final Report.*

<sup>563</sup> Augustus F. Hawkins and Robert T. Stafford, *Summary of the Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988*, trans. by U.S. House of Representatives, H.R.5 vols (102 Stat. 130, 1988).  
<https://www.congress.gov/bill/100th-congress/house-bill/5>

<sup>564</sup> *Native Hawaiian Education Act*, (U.S. Department of Education).  
<https://www2.ed.gov/policy/elsec/leg/esea02/pg104.html>

<b>Table 7.1 Native Hawaiian Educational Assessment (NHEA) – 1983</b>	
<b>Summary of Major Research Findings</b>	
<b>Major Finding I</b>	
I.	<i>Overall, Hawaiian students <u>do score below parity</u> with national norms on standardized achievement tests.</i>
<b>I. Summary of Detailed Findings from the Report</b>	
<p>The Final Report presents 91 subtest score curves from the Hawai'i DOE showing Hawaiian student performance compared to the national norming distribution on the Stanford Achievement Test series. Only five of these—four at the second-grade level and one at the fourth-grade level—come close to parity with the normal distribution with all other students. All the other curves show a disproportionately high percentage of Hawaiian students in the lower stanines or below average achievement and a disproportionately low percentage of Hawaiian students in the upper stanines or the above-average achievement level.</p>	
<b>Major Finding II</b>	
II.	Hawaiians are disproportionately represented in many negative social and physical statistics, indicative of special educational needs.
<b>II. Summary of Detailed Findings from the Report</b>	
<p>a.) Lower educational achievement among Hawaiians has been found to relate to lower socio-economic outcomes.</p> <p>b.) Hawaiians are beset with multiple health problems.</p> <p>c.) Hawaiian children are disproportionately victimized by child abuse and neglect, a signal of family stress.</p> <p>d.) Hawaiian students are over-represented among those qualifying for special education, e.g., learning disabled, mentally retarded educable, handicapped, etc.</p> <p>e.) Hawaiian students are disproportionately absent.</p> <p>f.) There are and will continue to be geographically rural, isolated areas with a high Hawaiian population density.</p> <p><i>Exceptionally Noted: Hawaiian students face a plethora of special educational needs which are not measurable by standardized tests. Absenteeism is the clearest signal that schools are not meeting some basic needs of these students.</i></p>	
<b>Major Finding III</b>	
III.	Hawaiian students do have educational needs that are related to their unique cultural situation.
<b>III. Summary of Detailed Findings from the Report</b>	
<p>This area of the Final Report looked at those documentable conditions which were peculiar to the culture of modern Hawaiians. Included were: Observed or reported elements of socially transmitted values, beliefs, attitudes or forms such as language,</p>	

art, music, sport, games, and play, which affect or are affected by the educational process.

- a.) Hawaiian students have a different learning style, emphasizing peer orientation, affiliation, and an active experience preference than is usually expected in a classroom.
- b.) Hawaiian students tend to have a low self-image.
- c.) Curriculum in the Hawai'i Department of Education (HIDOE) tends not to be culturally relevant to Hawaiian children.
- d.) A so-called "Hawaiian cultural renaissance," or renewed community interest in things Hawaiian, seems to be developing a new sense of pride among Hawaiian children.

**Major Finding IV**

IV. *Existing Native American educational programs did not provide a ready match for Native Hawaiian needs within the scope of this study.*

**IV. Summary of Detailed Findings from the Report**

The Final Report described the process by which the attempt was made to link up identified needs with existing specific programs. The primary source of information about Native American programs was the Office of Indian Education.

**Major Finding V**

V. *Educational research and development projects in Hawai'i and on the mainland have identified principals of effective schooling, which can be applied to the unique needs of Native Hawaiian students.*

**V. Summary of Detailed Findings from the Report**

A primary research and development effort specifically targeting Hawaiian students has been conducted by The Kamehameha Schools/Bernice Pauahi Bishop Estate in Honolulu. Called the *Kamehameha Early Education Program (KEEP)*, it has identified teaching procedures, curriculum structure, and learning activities, which are both consonant with observed Hawaiian cultural patterns and effective at promoting achievement in reading comprehension. Summative program evaluation data, as well as independent validation in a study by the Ford Foundation, have provided support for the effectiveness of the KEEP approach.

National research has been conducted on "effective schools." The concept was to identify schools that were successful despite factors associated with failure elsewhere. If even some schools were successfully educating poor, urban minority students, the principles which these schools espouse should prove effective elsewhere; it was argued. This research was found to result in several sets of principles. One set is:

1. The more time spent on instruction, the greater the achievement gain.
2. The greater the amount of parental involvement, the greater the achievement.
3. High expectations on the part of the principal are associated with greater achievement.
4. High teacher expectations are associated with high achievement.

5. Higher achievement gains are more likely to occur in classrooms characterized by a high degree of structure, with supportive teachers.
6. The use of positive feedback or reinforcement by teachers is associated with greater achievement.
7. The use of tutoring is related to achievement.
8. Recitation promotes greater achievement gains.

<b>Summary of Major Recommendations for Action and Improvement</b>
<b>Major Recommendation I</b>
I. Continue to emphasize Basic Skills; build upon success with lower-achieving students; build success for potential higher achieving students.
<b>Recommendation for Action and Improvement</b>
<ol style="list-style-type: none"> <li>a.) Curriculum development in areas requiring attention such as Vocabulary and Math Applications in lower grades.</li> <li>b.) Intensive Basic Skills for High School students with very low scores.</li> <li>c.) Programs to locate and individually assist high-potential Hawaiian students.</li> <li>d.) High-impact educational aid for individual most-in-need schools with high Hawaiian populations.</li> <li>e.) Teacher training and dissemination of culturally compatible basic skills curricula developed locally.</li> </ol>
<b>Major Recommendation II</b>
II. Develop interagency programs aimed at individualizing support for Hawaiian students and families with special needs.
<b>Recommendation for Action and Improvement</b>
<ol style="list-style-type: none"> <li>a.) Parent-child health and developmental support programs are needed.</li> <li>b.) Pre-parenting; Teen pregnancy and parenting programs; Family and community stress reduction programs.</li> <li>c.) Culturally-valid screening and individual program development for Hawaiian students with developmental disabilities as well as for gifted and talented students.</li> <li>d.) Job skills and occupational awareness training; forward-looking emphasis on fields such as computer and electronic technology.</li> <li>e.) Scholarship programs and more encouragement of higher education</li> <li>f.) Stay-in-school and return-to-school programs; effective alternatives in school to increase time-on-task and re-duce absenteeism</li> <li>g.) Use of available television and tele- communication technology to reduce the effects of rural isolation.</li> </ol>

<b>Major Recommendation III</b>
III. Support Hawaiian and Multi-cultural Studies.
<b>Recommendations for Action and Improvement</b>
<p>a.) Programs emphasizing breaking of cultural stereotypes, creative use of children's television.</p> <p>b.) Development of more culturally relevant curriculum materials.</p> <p>c.) Hawaiian Studies programs.</p> <p>d.) Programs exploring values for the individual multi-cultural Hawaiian child</p>
<b>Major Recommendation IV</b>
IV. Conduct further research into educational needs related to the unique cultural situation of Native Hawaiian students.
<b>Recommendation for Action and Improvement</b>
<p>Conduct more in-depth SAT subtest analyses. What are the common elements among subtests which continue to show a depressed profile across grade levels? What are the specific instructional objectives which are the stumbling blocks for Hawaiian students?</p> <p>b.) Discover what kind of continuing Needs Assessment data collection should be set up for the future.</p> <p>c.) Find out what the perceptions of the Hawaiian community are regarding the importance and form of Hawaiian cultural studies as recommended in the DOE and private schools.</p> <p>d.) Conduct studies investigating the relationship between culture, culture loss, stress, mental health, and academic performance, and epidemiological studies of mental health problems of Hawaiian students.</p> <p>e.) Investigate interagency working models. What are the most effective forms of public/private agency working relationships; human services/educational agencies; research/direct educational services?</p> <p>f.) Investigate further the complex inter- relationship between culture, socio-economic status, and academic performance.</p> <p>g.) Conduct effective schools research. Find schools in Hawai'i where Hawaiian students are performing at a higher level than expected. Ask why.</p> <p>h.) Research what elements of Hawaiian culture are compatible with the DOE environment. What more can be learned about the basic Hawaiian cultural forms?</p> <p>i.) Investigate community stress reduction. Develop educational programs to use in communities with severe social stress indicators.</p>
<p><b>Source:</b> Kamehameha Schools/Bernice Pauahi Bishop Estate. (1983) Native Hawaiian Educational Assessment Project: Final Report. Honolulu, HI: Kamehameha Schools/Bernice Pauahi Bishop Estate, pp. i-xi.</p>

### **Native Hawaiian Educational Assessment (NHEA) –1993**

In 1993, the Kamehameha Schools and Bishop Estate released a second 10-year update of their findings under the *Native Hawaiian Educational Assessment Project*,<sup>565</sup> which determined that despite the successes of the programs established under Title IV, many of the same educational needs remained unresolved for Native Hawaiians. Subsequent reports by the Kamehameha Schools, Bishop Estate and other organizations generally confirmed those same findings. For example:

(A) Educational risk factors continued to start even before birth for many Native Hawaiian children, including—(i) late or no prenatal care; (ii) high rates of births by Native Hawaiian women who are unmarried; and (iii) high rates of births to teenage parents.

(B) Native Hawaiian students continued to begin their school experience lagging behind other students regarding readiness factors such as vocabulary test scores and the demonstration of rudimentary math skills.

(C) Native Hawaiian students continued to score below national norms on standardized education achievement tests at all grade levels.

(D) Both public and private schools continued to show a pattern of lower percentages of Native Hawaiian students in the uppermost achievement levels and gifted and talented programs.

(E) Native Hawaiian students continued to be statistically overrepresented among students qualifying for special education

---

<sup>565</sup> Kamehameha Schools/Bernice Pauahi Bishop Estate-Office of Program Evaluation and Planning, *Native Hawaiian Educational Assessment Project: Final Report*, (Honolulu, HI: Kamehameha Schools/Bernice Pauahi Bishop Estate-Office of Program Evaluation and Planning; 1993). [http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA\\_1993.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA_1993.pdf).

programs provided to students with learning disabilities, mild mental retardation, emotional impairment, and other such disabilities.

(F) Native Hawaiians continued to be under-represented in institutions of higher education and among adults who have completed four or more years of college.

Moreover, the 1993 NHEA reported that Native Hawaiians were still disproportionately represented in many negative social and physical statistics indicative of special educational needs. The facts from this study found that:

- (i) Native Hawaiian students were more likely to be retained in grade level and to be excessively absent in secondary school;
- (ii) Native Hawaiian students had the highest rates of drug and alcohol use in the State of Hawaii, and
- (iii) Native Hawaiian children continued to be disproportionately victimized by child abuse and neglect.

Today, Native Hawaiian students comprise 27 percent of the students served by the State of Hawaii Department of Education.<sup>566</sup> There are, and will continue to be, some rural and geographically isolated areas with an even higher indigenous population density in Hawaii.

In the 1998 *U.S. National Assessment of Educational Progress*, Native Hawaiian fourth-graders ranked last nationally among groups of students tested from thirty-nine states in reading.<sup>567</sup> This data instigated a renewed emphasis in

---

<sup>566</sup> 2015 *Superintendent's Annual Report*.

<sup>567</sup> Patricia L. Donahue and others, *NAEP 1998 Reading Report Card for the Nation and the States*, NCES 1999-500 vols (U.S. Department of Education. Office of Educational Research and Improvement. National Center for Education Statistics, 1999).  
<https://nces.ed.gov/nationsreportcard//pubs/main1998/1999500.asp> [accessed June 22, 2018].



the U.S. Department of Education and the Hawaii Department of Education to apply a more significant focus on beginning reading, early education, and literacy support for Native Hawaiian pre-school and elementary school students.

It should be reiterated here that these test results were inconsistent with the high rates of literacy historically achieved by Native Hawaiians through a Hawaiian language-based public school system prevailing during the 1840-1893 historical period.

In the opinion of the researchers at the Kamehameha Schools, these first two NHEA studies in 1983 and 1993 established “a theoretical and empirical case with supporting data that the disparities in educational outcomes were rooted fundamentally in the historical trauma and cultural marginalization of the Native Hawaiian population.”<sup>568</sup> *The final report of the NHEA 1993 recommended that the greatest hope for progress and improvement would come with a more positive response by schools to the home culture of Native Hawaiian learners as well as a fundamental return to Hawaiian cultural foundations.*<sup>569</sup>

Responding to this, Hawaiian scholars and educators decided to use data from empirical research to demonstrate the viability of using ancestral wisdom and other cultural traditions to answer these educational challenges. Maenette Ah Nee-Benham, Chancellor at the University of Hawaii, Oahu West-Campus, reflected the position of many Native Hawaiian educators and scholars when

---

<sup>568</sup> *Ka Huaka'i: 2014 Native Hawaiian Educational Assessment*, Introduction Section, p.1.

<sup>569</sup> *Ibid.*, Executive Summary.

she said, “Where is the native voice? We have a charge, a calling to voice the native perspective that will define the future progress of the native people.”<sup>570</sup>

### ***Ka Huaka’i – the 2005 NHEA Report***

The Kamehameha Schools research team and other Hawaiian educators drew on the historical data and adopted new approaches and tools for their 2005 NHEA research and analysis. The 2005 study, entitled *Ka Huaka’i* (meaning the journey), was intended as a metaphor to represent the Native Hawaiian community’s journey toward a more balanced, native strengths-based versus deficits-based understanding of both the needs and the successes achieved during the previous two decades.

The *Ka Huaka’i 2005* research team adopted a holistic approach aimed at achieving a comprehensive assessment of academic progress as well as Native Hawaiian students’ economic, social, physical and emotional well-being. Moreover, they chose to position their research evaluation within a Native Hawaiian strengths-based theoretical framework.

The leading Kamehameha Schools researchers, Kana’iapuni, Malone and Ishibashi, contributed significantly to this study by devoting more attention to emerging approaches centered on Hawaiian cultural practices and assets. In

---

<sup>570</sup> *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice, Volume II*, ed. by Ah Nee-Benham.

*Indigenous Educational Models for Contemporary Practice: In our Mother's Voice - Volume I*, ed. by Maenette K. P. Ah Nee-Benham and Joanne Elizabeth Cooper (Mahwah, New Jersey: Lawrence Erlbaum Associates, 2000).

Maenette K. P. Ah Nee-Benham, 'Where can we Collectively be that is Greater than Where we are Now?', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 1 (2004), pp. 35-48.

the 2005 study, historical deficits-based indicators from the previous NHEA assessments were mixed with the cultural strengths-based perspectives and data. This methodology resulted in a much more complete picture of what it might mean to achieve overall well-being within the Native Hawaiian community context.

It would be useful here to summarize some of the more significant search findings in order to offer added perspective on how to improve educational outcomes for Native Hawaiian and other indigenous students attending U.S schools today. A quantifiable strength that emerged from the 2005 study was the very high level of familial support reported by Native Hawaiian students and adult learners. According to the study, the unique character of the Native Hawaiian *'ohana* surfaced as an opportunity to help counter persistent academic and social challenges.<sup>571</sup> This influence was particularly revealing in the positive trends relative to the youngest learners is in the following data:

- (1) Native Hawaiian preschool enrollment has increased significantly since 1990, and
- (2) The majority of Native Hawaiian parents surveyed reported to engage in stimulating learning activities with their young children, such as reading, storytelling and singing songs contributing to better preparation for age 3-5 *keiki* (children) to begin school with a firmer footing.<sup>572</sup>

---

<sup>571</sup> Kana'iaupuni, Malone and Ishibashi, pp. 4-81.

<sup>572</sup> Ibid., p. 189-204.

In the first decade of the 21<sup>st</sup> century, the Hawaiian language-focused immersion and charter schools began to demonstrate an empirically verifiable influence upon NH Hawaiian students' educational progress compared to their ethnic peers attending mainstream public schools. Some of the more significant positive improvements included the following:

(1) Culture-based initiatives within charter schools exhibited definite success in actively incorporating more parental involvement and community support. Native Hawaiian parental activism had begun to yield results and help shape the future directions of Native Hawaiian education in these schools.<sup>573</sup>

(2) The Hawaiian-focused charter and language immersion schools' promotion of Native Hawaiian traditions, values and ancestral wisdom had made a measurable difference in student academic participation levels and performance. CBE instruction was also combined and incorporated in these schools' academic rigor and the use of technology-assisted pedagogies. As a result, the Native Hawaiian start-up charter school students *scored higher in math as well as better in reading compared with their counterparts in mainstream public schools.*<sup>574</sup>

(3) Native Hawaiian students in start-up charter schools were shown to be more engaged in learning on average, and just 4.1 % were excessively truant or absent compared with 17.3 % of their age-group cohorts in Hawaii's other public schools.<sup>575</sup>

---

<sup>573</sup> Ka Huaka'i: 2005 Native Hawaiian Educational Assessment, p. 10-14.

<sup>574</sup> Ibid., p. 12.

<sup>575</sup> Ibid., p. 293.

(4) The momentum that had been built-up in Hawaiian language education via the immersion schools over the last decade had increased enrollments in such programs. The consequence was that culture-based charter school enrollments increased as did the number of students entering post-secondary Hawaiian Studies programs compared to the historical averages.<sup>576</sup>

(5) NH students' college enrollments were shown to have incrementally marginally increased from 22.2 percent in 1990 to 26.5 in 2005, and, based on surveys, most NH parents (86.4 percent) now expected their children to pursue some form of post-secondary education. This trend was a fundamental paradigm shift for Native Hawaiian parents compared to historical surveys.<sup>577</sup>

A model of the *pua* flower was used as a symbol, aimed at reflecting the contemporary Native Hawaiian worldview. This model, illustrated in the graphic below, was based on a considerable body of cultural and comparative social research.<sup>578</sup> The *pua* flower model depicts the dynamic, interrelated relationships and aspects of the Native Hawaiian concepts of well-being.

---

<sup>576</sup> Ibid., p. 12 and pp. 356-363.

<sup>577</sup> Ibid., p. 13.

<sup>578</sup> Ibid., p.19.

**Figure 7.1: Conceptual Framework Depicting the Dynamic and Interrelated Aspects of Well-Being**



Source: Shawn Malia Kana’iaupuni, N. Malone and K. Ishibashi, *Ka Huaka’i: 2005 Native Hawaiian Educational Assessment*, (Honolulu, HI: Kamehameha Schools, Pauahi Publications, 2005).

### ***Ka Huaka’i 2014 - Major Findings and Challenges***

In the period between 2005 and 2014, Native Hawaiian students attending the State of Hawaii educational system exhibited more positive gains in a comparative sense with their peers. For example, among the K-12 student population in Hawaii, the reading and math proficiency rates for Native Hawaiian students taking the Hawaii State Assessment tests (conducted in the 3<sup>rd</sup>, 5<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> grades) increased steadily over this decade. Significantly,

the proficiency gaps between Native Hawaiian and non-Hawaiian students narrowed in certain grade levels.<sup>579</sup> The table below outlines these statistical improvements:

<b>Table 7.2: Relative Strengths Progress Native Hawaiian Cognitive Well-Being (2006-14)</b>		
<b>Description or Progress Indicator</b>	<b>2006-08</b>	<b>2011-12</b>
• Reading proficiency of Native Hawaiian Elementary and Middle School Students	50.8%	61.6%
• Math proficiency among Native Hawaiian Elementary and Middle School Students	33.4%	55.9%
• Reading proficiency gap of assessments scores between Native Hawaiian and non-Native Hawaiian students (Elementary School)	15.3%	11.6%
• Reading proficiency gap of assessments scores between Native Hawaiian and non-Native Hawaiian students (Middle School)	17.4%	11.5%
• Math proficiency gap between assessments scores between Native Hawaiian and Non- Native Hawaiian students (Elementary School)	15.8%	11.8%
Source: Kamehameha Schools. <i>Ka Huaka'i: 2014 Native Hawaiian Educational Assessment</i> . Honolulu, HI: Kamehameha Publishing. Retrieved from <a href="http://www.ksbe.edu/assets/spi/pdfs/kh/Ka_Huakai_2014.pdf">http://www.ksbe.edu/assets/spi/pdfs/kh/Ka_Huakai_2014.pdf</a> .		

As part of its ongoing research during this decade, The Kamehameha Schools completed a longitudinal analysis of a single cohort of Native Hawaiian students who attended Hawaiian-focused charter schools. These students showed proficiency rates that were as strong as or even stronger than that of Native Hawaiian students in the traditional public schools. For example, the proportion of Native Hawaiian charter school students who were proficient in reading increased from 32.9% in grade 4 to 57.7% in grade 8. *These improvements by the 8<sup>th</sup> grade completely closed the gap with Native Hawaiian students*

<sup>579</sup> *Ka Huaka'i: 2014 Native Hawaiian Educational Assessment*, p. 158.

*attending conventional public schools.*<sup>580</sup> In mathematics, the results were analogous.

While there were many indications of relative progress by Native Hawaiian students over the 2005-14 decade, the issue of parity with other non-Hawaiian ethnic students within Hawaii's public education system remained of concern to educators. Native Hawaiian students continued to lag behind their non-Hawaiian peers on most critical indicators of cognitive well-being, including reading and math grade levels, achievement, high school graduation rates, and post-secondary enrollment and persistence.<sup>581</sup> Some quantitative examples of this lack of parity discovered by the 2014 study were:

- (1) Compared with the other major ethnic groups in Hawaii (Filipino, Chinese, Japanese, and Caucasian), Native Hawaiian students were less likely to be enrolled in college. The Hawaii statewide average of young adults enrolled in post-secondary education in 2012-14 was 35.7%. The Native Hawaiian attendance rate for the same period was 25.7%.
- (2) The gains in bachelor degree attainment made between 1990-2000 plateaued during the 2000-2015 years.
- (3) Native Hawaiians had the lowest rate of timely High School graduation compared to the other major ethnic groups in Hawaii. Fewer than three in every four Native Hawaiian students completed

---

<sup>580</sup> Ka Huaka'i: 2014 Native Hawaiian Educational Assessment, p.158.

<sup>581</sup> Ibid., p. 159.



High School within the standard of four years, compared to four in five for all other students.<sup>582</sup>

- (4) In reading, proficiency for Native Hawaiian K-12 students ranged between a low of 53.4% in Grade 5 to a high of 58.6% in Grade 10. Statewide averages were consistently 10% higher at between 63.1% and 69.7%.
- (5) Math grade-level proficiency ranges showed even a more substantial disparity. Native Hawaiian students' rates ranged from a low of only 23.4% in Grade 10 compared to a previous high of 49.1% in Grade 3—declining as the student moved through higher grade levels and causing the gap to increase from 8.6% in Grade 3 to 14.3% by Grade 10 when compared with the performance of other ethnic peers.<sup>583</sup>

One of the critical concerns raised by the 2014 *Ka Huaka'i* study was the rapidly increasing Native Hawaiian population, especially the tremendous growth occurring among preschool-and school-age children.<sup>584</sup>

If recent population growth trends continue, the Native Hawaiian population in the United States is projected to exceed 1.2 million by the year 2060. In Hawaii, the population is projected to grow to 677,356 by 2060 from 370,000 estimated today.<sup>585</sup>

---

<sup>582</sup> *Ka Huaka'i*: 2014 Native Hawaiian Educational Assessment, p. 159.

<sup>583</sup> *Ibid.*

<sup>584</sup> *Ibid.*, Executive Summary, p. 4-6.

<sup>585</sup> *Ibid.*, Executive Summary, p. 5.

Based on the 2010 Hawaii Department of Education data, 10.6 percent of Native Hawaiians were preschool age (Age 0–4), compared with 6.4 percent of the total Hawaii population in the State of Hawaii. Moreover, 25.0 percent of Native Hawaiians were school age (5–17), compared with 6.4 percent throughout the state. These statistics indicate that there will be an ever-growing need for educational programs and services and that the percentage of Native Hawaiian students attending Hawaii’s schools will continue to increase in the future.<sup>586</sup>

The Native Hawaiian diaspora also is a factor to consider in the future of education for this indigenous population. Based on 2010 U.S. Census data, the percentage of Native Hawaiians who reside outside Hawaii nearly matched those living in Hawaii: Over 45 percent of Native Hawaiians lived in the Continental United States or Alaska. Despite this phenomenon, Kana’iaupuni and Malone indicate that studies show that Native Hawaiians put a high value on having access to their traditional homelands, cultural practices and their community, all central to overall well-being, regardless of their place of residence.<sup>587</sup>

### **Successful Pedagogies and Teacher Strategies for Native Hawaiian Students in the State of Hawaii**

As examined in Chapter 6, the United States government’s colonialism and value-based Anglophone educational system in schools transformed how Native Hawaiians viewed themselves, their indigenous culture, and,

---

<sup>586</sup> Ibid.

<sup>587</sup> Kana’iaupuni and Malone, 'This Land is My Land: The Role of Place in Native Hawaiian Identity', pp. 281-307.

subsequently, their place in the world. Benham points out, however, that although public schooling has been a culturally alienating experience for most native peoples, there exists among those same indigenous populations a genuine concern for preparing the next generation well through adequate education.<sup>588</sup>

During the first two decades of this century, studies have increased in number and scope that were focused on identifying factors that might positively influence indigenous Hawaiian students' academic performance. According to Coryn, Schröter and McCowen, there has been a growing consensus in the corpus of research recently conducted in Hawaii acknowledging the complexity that interactions between school administrators, teachers and students have on the overall learning environment.<sup>589</sup> Kana'iaupuni and Kawai'ae'a asserted that these relationship-related variables offer more significant potential for understanding differences in school effectiveness.<sup>590</sup>

Coryn et al., for instance, used a mixed-methods design in their study, giving equal priority to both quantitative and qualitative research methods to investigate some of the significant factors that might reasonably influence the academic achievement of Native Hawaiian students attending public schools. School-level instructional strategies, curricula, and policies which distinguished between the more successful from the less successful schools were the focus

---

<sup>588</sup> Maenette K. P. Benham, 'A Challenge to Native Hawaiian and Pacific Islander Scholars: What the Research Literature Teaches Us about our Work.', *Race, Ethnicity and Education*, 9 (2006), pp. 29-50.

<sup>589</sup> Coryn, Schröter and McCowen, pp. 377-395.

<sup>590</sup> Kana'iaupuni and Kawai'ae'a.

of this study. A summation of their findings revealed that those variables shown to have the most positive affect were found in those schools that: (1) exhibited a collaborative school governance vs. autocratic structure; (2) had a well-established and dedicated teaching corp with high morale as compared with schools where there is a high turnover rate among teachers, which might be an indication of low morale; (3) shared accountability and commitment to continuous learning; (4) promoted the use of focused learning communities; and (5) had supplementary after school programs that were of high quality and also provided support options for students.<sup>591</sup>

Hattie, in his correlative study and meta-analysis relating to factors influencing student achievement in school, divided the factors that had the most significant impact on teaching and learning into six parts: (1) Students (approximately 50% of the variance); (2) Principals (about 5-10% of the variance); (3) School environment (5-10%), (4) Peers (5-10%), (5) Home (5-10%) and finally, 6) Teachers, between 25-30% of the variance.<sup>592</sup>

### **The Native Hawaiian Culture-Based, Place-Based Educational Movement**

Research momentum appeared to accelerate starting in 2005 among Hawaiian educators and others who were in favor of these kinds of changes. Their objective was to begin to redefine education through CBE pedagogies built upon the framework of Hawaiian culture. This included realigning educational goals, adapting classroom strategies by incorporating pedagogies more in line

---

<sup>591</sup> Coryn, Schröter and McCowen, pp. 377-395.

<sup>592</sup> John A. C. Hattie, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (New York, NY: Routledge, 2009).

with the indigenous culture, and, in some cases, making substantial transformations in school ideologies. These collaborative efforts have been viewed as a journey of rediscovery for those organizations leading these changes, such as the members of the *Native Hawaiian Education Council*—an adventure in reclaiming a sense of overall wholeness and well-being by reintroducing the Native Hawaiian, culture, values, and traditions back into the curriculum.<sup>593</sup>

In their research, Kana'iaupuni and Kawai'ae'a documented the groundbreaking efforts of a large-scale, community-based project which had the goal of understanding how the use of culture-based teaching strategies would influence educational outcomes for Hawaiian students in grades 7-10. This scholar's study examined the initial theoretical and planning phases of the project that resulted in the creation of *Hawaiian Indigenous Education Rubric* (HIER), a new CBE teaching framework.<sup>594</sup> The HIER tool provided a building block for greater understanding concerning the use of CBE in a teaching environment.

The overall objective of the project was to understand and describe CBE and its impact on students to inform the development and advancement of meaningful educational strategies and future research. Based on this broad objective and definition, an indigenous framework was needed to operationalize culture-based teaching within the specific context of Hawaiian culture and community.

---

<sup>593</sup> *Na Honua Mauli Ola*.

<sup>594</sup> Kana'iaupuni and Kawai'ae'a.

During 2005, the Kamehameha Schools initiated the *Hawaiian Cultural Influences in Education* (HCIE) project, which involved a broad collaboration between the Hawaii Department of Education, several Hawaiian community-serving organizations and Native Hawaiian and other charter schools located throughout the state of Hawaii. Refer to the in-depth analysis of the HCIE project beginning on page 279.

The HCIE collaborating scholars determined that their first step would be the articulation of a useful definition of CBE in the context of the Native Hawaiian educational milieu. They concluded on a definition whereby effective culture-based instruction and student learning would be grounded in the “values, norms, knowledge, beliefs, practices, experiences, places, and language that are the foundation of a [e.g., Hawaiian] culture,” and that CBE must use this same cultural lens to teach the skills, knowledge, content, and values that students need to have in today’s global society.<sup>595</sup>

Demmert and colleagues composed another broad definition of culture-based education as a result of their evaluation of several native language school programs involving Native Hawaiian, Navajo, Blackfeet, Y’upik, and Ojibwe elementary and secondary students. Their research combined the elements traditional language, pedagogy, curriculum and the use of strong native community leadership and assessment into an indigenous culture-based rubric:<sup>596</sup>

---

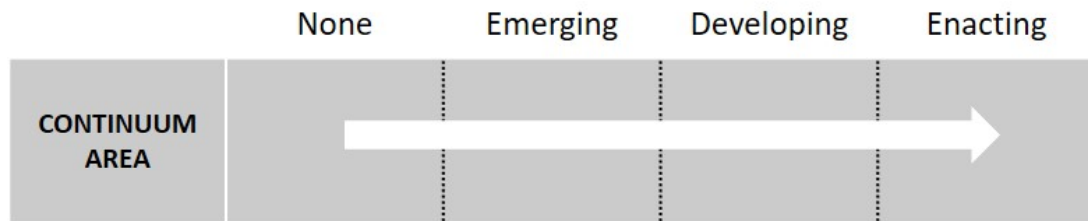
<sup>595</sup> Ibid.

<sup>596</sup> William Demmert, S. Hilberg and N. Rawlins, *Indigenous Culture-Based Education Rubric Training Manual* (Bellingham, WA: Western Washington University, 2008).

A core research workgroup at Kamehameha Schools created a first draft of the rubric dimensions after conducting an extensive literature review; however, the honoring of broad community involvement in the construction of the rubric was central to the creation of a useful and effective tool. Subsequently, after many months of consultation and review, the Hawaiian research consortium members settled on the structure of the indigenous Hawaiian rubric. HIER was organized into the five CBE components (defined in Table 7.3 below), each of which contained a set of critical indicators that tied directly to the CBE teaching strategies of faculty working in Hawaiian schools. These indicators were then attached to a series of descriptors of increasing intensity—categorized as *none*, *emerging*, *developing*, and *enacting* (see Figure 7.2). Both the critical indicators and corresponding descriptors focused on teacher behaviors in order to illustrate a continuum of Hawaiian indigenous teaching strategies at different school grade levels.

<b>Table 7.3 Key Components of Culture-Based Education</b>	
Language	Recognizing and using native or heritage language
Family and Community	Actively involving family and community in the development of curricula, everyday learning, and leadership
Content	Making learning meaningful and relevant through culturally grounded content and assessment.
Context	Structuring school, classroom, and other learning interactions in culturally appropriate ways
Assessment and Accountability	Gathering and maintaining data using various methods to ensure student progress in culturally responsible ways
Source: Shawn M. Kana'iaupuni, and Keiki K. C. Kawai'ae'a, 'E Lauhoe Mai Na Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework,' <i>Hūlili: Multidisciplinary Research on Hawaiian Well-being - Online Submission</i> , 5 (2008) <a href="https://files.eric.ed.gov/fulltext/ED523184.pdf">https://files.eric.ed.gov/fulltext/ED523184.pdf</a> [accessed September 26, 2018]	

**Figure 7.2: Developing a Framework:  
the Hawaiian Indigenous Education Rubric (HIER)**



Source: Shawn M. Kana'iaupuni, and Keiki K. C. Kawai'ae'a, 'E Lauhoe Mai Na Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework', *Hūlili: Multidisciplinary Research on Hawaiian Well-being - Online Submission*, 5 (2008)  
<https://files.eric.ed.gov/fulltext/ED523184.pdf> [accessed September 26, 2018]

For full details of the *Hawaiian Indigenous Education Rubric (HIER)*, refer to Appendix A.

Since its creation, HIER has been used in a variety of ways to align classroom practices, assess changes in culture-based practice and as a model for teacher preparation and professional development activities in Hawaiian schools.

A significant corpus of research completed under the HCIE umbrella over the past decade in Hawaii corroborates the fact that Native Hawaiian learners thrive under CBE strategies and methods.<sup>597</sup> In particular, when teachers actively used CBE/CRE pedagogies, indigenous students consistently demonstrated more positive socioemotional and academic outcomes.

The Hawaiian educators innovatively acted on prior research showing the positive influence that an indigenous strengths-based pedagogical approach had upon students' cultural knowledge and academic progress. Kana'iaupuni, Ledward, and Malone stated that they purposely worked to “flip the narratives” in the HCIE studies from the more common deficits-based (i.e., what is missing)

<sup>597</sup> *A Brief Overview of Culture-Based Education and Annotated Bibliography.*



to a Native Hawaiian cultural strengths-based orientation. In this respect, their studies reversed the lens and challenged conventional approaches relative to the assessment of Hawaiian students' educational attainment. They then utilized this alternative theoretical framework to investigate and reassess the status of Native Hawaiian students' progress attending Hawaiian public schools. In addition, the HCIE team of researchers validated the influence of other significant factors in their analysis, such as students' past experiences with racism, poverty, and cultural trauma.<sup>598</sup>

Goodyear-Ka'ōpua's study of a Hawaiian indigenous charter school offered another excellent example of the positive use of indigenous cultural advantage as a pedagogical framework. Their research demonstrated how Native Hawaiian students were empowered to see themselves as more capable of taking charge of their learning outcomes when a cultural strength-based pedagogy approach was utilized.<sup>599</sup>

Kana'iaupuni et al. pointed out three significant implications derived by linking CBE in a strengths-based approach relative to positive student outcomes, namely that: (1) More CBE strengths-based scholarship would deepen student experiences and educational programming beyond the common practice of highlighting important aspects of culture [e.g., Hawaiian] frequently celebrated

---

<sup>598</sup> Kana'iaupuni, Ledward and Malone, p. 311.

<sup>599</sup> Noelani Goodyear-Ka'opua and others, 'Teaching Amid U.S. Occupation: Sovereignty, Survival, and Social Studies in a Native Hawaiian Charter School', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 5 (2008), pp. 155-192.

Noelani Goodyear-Ka'opua, *The Seeds we Planted: Portraits of a Native Hawaiian Charter School* (Minneapolis, MN: University of Minnesota Press, 2013).

only around holidays; (2) Be valuable to educational practitioners, programs, and policymakers seeking to eliminate student achievement disparities, and (3) Could have important broader implications for other educational systems and nations struggling with issues of cultural diversity where past approaches privileging Western cultural traditions have failed to engage, unify and emancipate CLD students in the classroom.<sup>600</sup>

The 1983 and 1993 NHEA evaluations and the data contained in the 2005 and 2009 *Ka Huaka'i* studies, each documented the longstanding gaps in Native Hawaiian students' academic achievement, attendance, and graduation rates. Over the same four decades covered by these studies, Native Hawaiian students were also documented as exhibiting higher than average incidences of disciplinary and risk-taking behaviors in these same studies. (Refer to pages 249-262 above).

Since 1960, various theories have emerged, attempting to explain the historical gaps of minority and indigenous students' academic performance in United States schools. The table below provides a summary of these theories. This synopsis is not meant to be all-inclusive. However, it is inserted to establish a comparison with these theories and the CBE/CRE pedagogies employed by educators in Hawaii.

---

<sup>600</sup> Kana'iaupuni, Ledward and Malone, p. 313.

**Table 7.4: Modern Theories (1960-Present) Used to Explain Minority and Indigenous Student School Achievement Gaps**

Cultural Deficit Theory- Generally attributes the academic deficiencies and gaps of minority (including indigenous students) to be the result of the students' home culture and environment.

Cultural Difference Theories – Attributes the differences in academic achievement as a result primarily of differences in language and communication styles between home and school.

Cultural Compatibility Theories and Cultural Congruence Theories, are similar and explain poorer student outcomes among some groups as being primarily the result of language differences and, more generally, cultural mismatch with mainstream cultures and schooling standards.

Oppositional Theory - Focuses on the factors influencing student responses to cultural mismatches, to include broader societal inequities and experiences with discrimination in their environment.

Culturally Responsive/Relevant Education - Recognizes cultural gaps between home and school as part of the achievement gap and calls for increased cultural relevance in education to engage, support, and empower learners.

Cognitive Theory – This theory suggests that indigenous students learn more readily when prior knowledge (including cultural knowledge) is activated and connected to new information they are learning.

Cultural-Historical-Activity Theory (CHAT) -Emphasizes connectedness to community and culture as the core foundation for teaching and learning.

Sources adapted from:

A. Castagno and B. Brayboy, 'Culturally Responsive Schooling for Indigenous Youth: A Review of the Literature,' *Review of Educational Research*, 78 (2008), pp. 941-993.

Frederick Erickson, 'Transformation and School Success: The Politics and Culture of Educational Achievement,' in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 941-993.

John U. Ogbu, 'Variability in Minority School Performance: A Problem in Search of an Explanation,' in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 83-112

Lynn A. Vogt, Cathie Jordan and Roland G. Tharp, 'Explaining School Failure, Producing Success: Two Cases,' in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 53-65

G. Mohatt and F. Erickson, 'Cultural Differences in Teaching Styles in an Odawa School: A Sociolinguistic Approach,' in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography*, ed. by Henry T. Trueba, G. P. Guthrie and Kathryn H. Au (Rowley, MA: Newberry House, 1981), pp. 105-119.

William Demmert and John Towner, *A Review of the Research Literature on the Influences of Culturally Based Education on the Academic Performance of Native American Students* (Portland, OR: Northwest Regional Educational Laboratory, 2003)  
<http://www.nwrel.org/indianed/cbe.pdf> [accessed January 15, 2010].

Wolff-Michael Roth and Yew-Jin Lee, "'Vygotsky's Neglected Legacy": Cultural-Historical Activity Theory,' *Review of Educational Research*, 77 (2007), pp. 186-232.

What all of these theories have in common is that they take into consideration the importance of congruence between the home and school culture as vital components of successful educational intervention strategies when working with indigenous students. While all of the theories mentioned above, in one form or another, attempt to explain reasons for minority students (including indigenous) achievement gaps in school, the five standards of effective pedagogy and learning established by CREDE through their extensive analysis of the research and development literature in education and diversity stand apart as the most practical framework leading to the synthesis proposed by this thesis, primarily because of their universal application to all students and all age groups.

The underlying data-driven objectives and CBE findings of the HCIE project, including its underlying use of the CREDE standards in Hawaii, will be examined more in-depth in the following pages.

### **Hawaiian CBE and its Relationship to Student Outcomes – Findings of the *Hawaiian Cultural Influences in Education (HCIE)* Project**

The primary objective of the highly collaborative *Hawaiian Cultural Influences in Education (HCIE)* research effort was to understand and describe CBE in the Native Hawaiian context, thereby determining its overall impact on student achievement. HCIE was the first large-scale empirical study of its kind completed involving high school age Hawaiian students. Conducted between 2005-2007, HCIE involved the collaborative efforts of the Kamehameha Schools, Hawaii Department of Education (HIDOE), and *Nā Lei Na'auao*, an alliance of Hawaiian-focused public charter schools.

The project evaluation and results were based on survey data obtained from 600 teachers, 2,969 students, and 2,264 parents at 62 participating schools, including conventional public schools, charter schools, schools with Hawaiian-immersion programs and private schools. The HCIE study utilized hierarchical models to conduct multilevel statistical analyses of the data. Consistent with previous qualitative research done in Hawaii, HCIE's results demonstrated that CBE/CRE pedagogies could positively influence Native Hawaiian students' outcomes.

The HCIE studies quantitatively and qualitatively assessed the overall teaching strategies used by faculty in Hawaii's 7<sup>th</sup>-12<sup>th</sup> grade (Jr. High and High School) classrooms as well as the impact that these same teachers' use of Hawaiian CBE pedagogies had on students' socioemotional behaviors and academic outcomes.<sup>601</sup> The HCIE researchers measured the direct effects of CBE pedagogies on socioemotional factors such as student's self-worth, cultural identity, community involvement and family relationships. The educational outcomes tracked were the levels of students' engagement in the classroom, their academic progress and improvements in behavior at school.<sup>602</sup>

Sixty-two out of eighty-one or seventy-seven percent (77%) of Hawaii's junior high and high schools and forty percent (40%) of teachers elected to participate and completed the HCIE surveys.<sup>603</sup> The participating schools reflected a range of geographic and institutional differences across the State of Hawaii's five

---

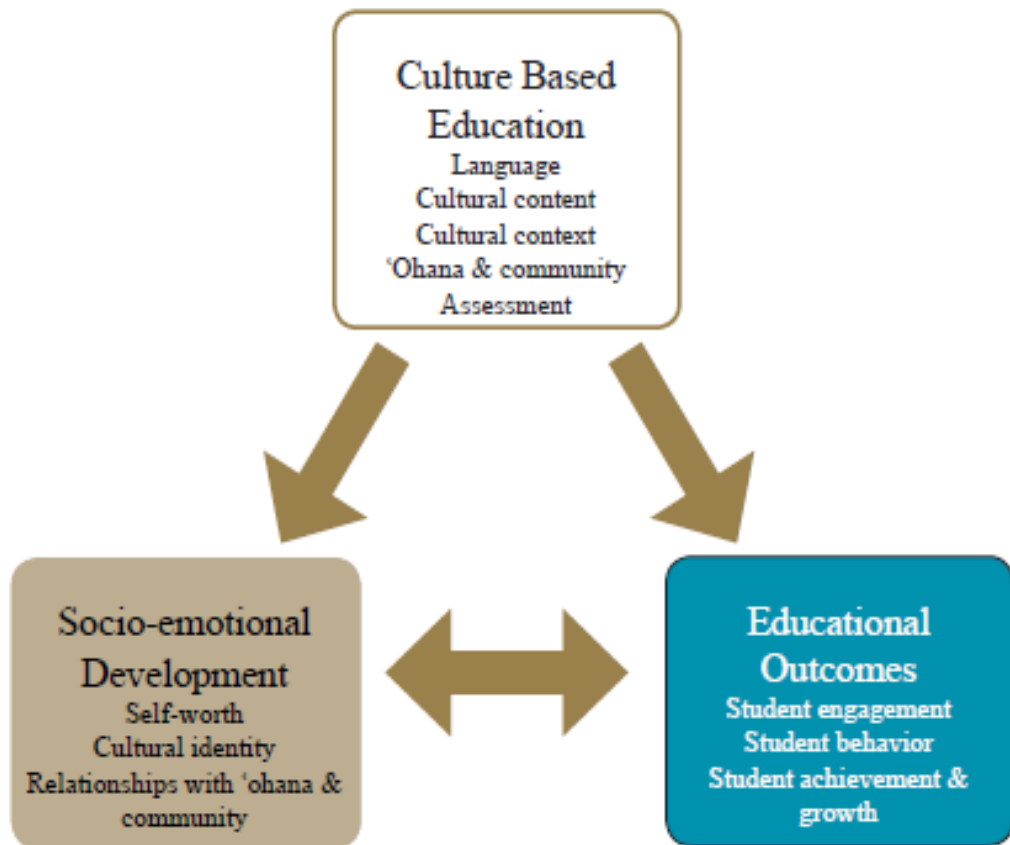
<sup>601</sup> Kana'iaupuni, Ledward and Jensen, p. 5.

<sup>602</sup> Ibid., p. 1.

<sup>603</sup> Ibid., p. 5.

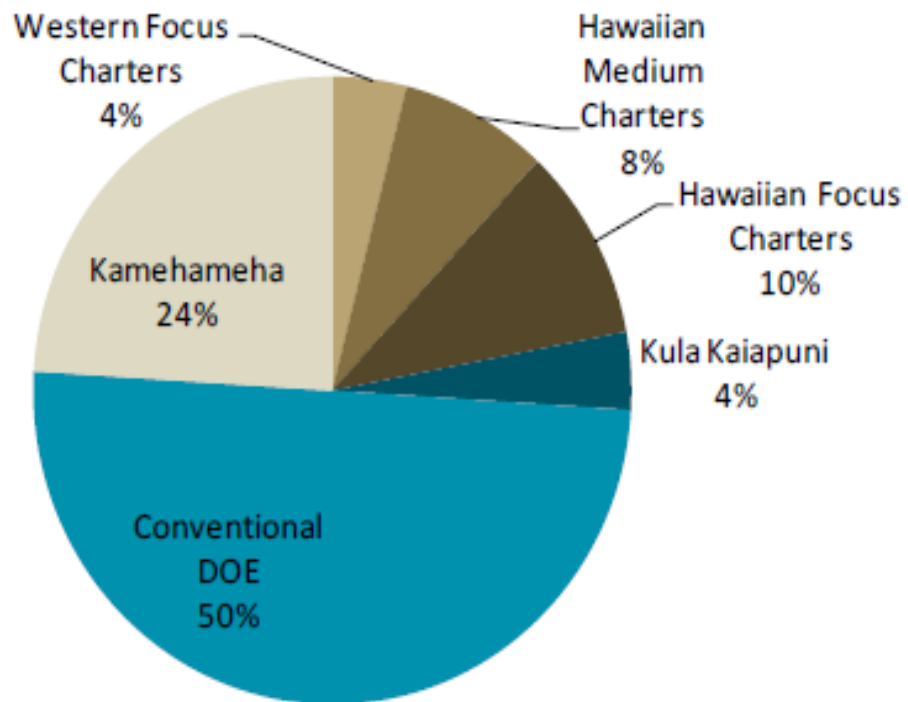
major islands (Hawaii, Maui, Molokai, Oahu, and Kauai), including conventional public and language immersion, start-up and conversion charter schools under the auspices of the Hawaii Department of Education as well as three campuses within the private Kamehameha Schools system. The diagrams below, taken from the HCIE summary reports completed by a team of scholars from the Kamehameha Schools, Research & Evaluation Division, illustrate the scope of the participating teachers by school type and the CBE framework utilized.

**Figure 7.3: Hawaiian Cultural Influences in Education Study Model**



*Source:* Kana'iaupuni, S., Ledward, B. & Jensen, U. (2010). Culture-Based Education and Its Relationship to Student Outcomes. Honolulu: Kamehameha Schools, Research & Evaluation. P.5.

**Figure 7.4: Participating Teachers by School Type**



Source: Kana'iaupuni, S., Ledward, B. & Jensen, U. (2010). Culture-Based Education and Its Relationship to Student Outcomes. Honolulu: Kamehameha Schools, Research & Evaluation. P.5.

Notable was the fact that the development of the *Hawaiian Indigenous Teaching Rubric* (HIER) and the HCIE teacher survey results provided relevant new research data concerning the efficacy of the use of CBE strategies across geographic, institutional, and ethnic differences. While the Kamehameha team of scholars were quick to mention that CBE was not the normative approach to teaching and learning in Hawaii at the time, the HCIE project effort was nonetheless successful in highlighting the potential use of CBE and its appeal among a growing number of teachers in Hawaii seeking to enhance student achievement.<sup>604</sup> Table 7.5 below (also taken the HCIE summary report

<sup>604</sup> Culture-Based Education and Its Relationship to Student Outcomes, p.10.

completed in 2010) lists the CBE themes, pedagogies and best-practices that had the most positive impact upon Hawaiian student outcomes.<sup>605</sup>

**Table 7.5: Culturally Relevant Strategies Reported by Teachers in Hawaii as Effective in Improving Student Outcomes**

Theme	Description	Best Practice
Pilina ‘Ohana	Family integration where parents are seen as a child’s first teachers	Active participation of family members in educational activities;
Pilina Kaiāulu	Community integration informed by a Hawaiian sense of place	Using the community as a setting for student learning
Haku	Original compositions imbued with a person’s experience and spirit	Rigorous assessments accounting for a range of competency and skills
Hō‘ike	Performances requiring multilevel demonstrations of knowledge and/or skills	
Mālama ‘Āina	Land stewardship focusing on sustainability and a familial connection	Place-based and service learning projects promoting community well-being
Kōkua Kaiāulu	Community responsibility embodying the Hawaiian value of lōkahi (unity, balance)	
Ola Pono	Values and life skills that synthesize Hawaiian and global perspectives	Career planning and preparation for global citizenship

Note: Themes above came from responses to open-ended items on the teacher survey.

Source: Kana’iaupuni, S., Ledward, B. & Jensen, U. (2010). Culture-Based Education and Its Relationship to Student Outcomes. Honolulu: Kamehameha Schools, Research & Evaluation. p.10

The HCIE empirical study discovered a set of essential relationships linking the use of culture-based educational strategies by teachers and by schools to student educational outcomes. Reported by Kana’iaupuni, Ledward & Jensen in

<sup>605</sup> Ibid.



their summary report were the following three most significant impacts: (1) CBE positively impacted student socio-emotional well-being (e.g., identity, self-efficacy, social relationships); (2) enhanced socio-emotional well-being, in turn, positively affected math and reading test scores, and (3) CBE was positively correlated to math and reading test scores for all students, and particularly for those with low socioemotional development. All three impacts were more positive when supported by overall CBE use within the school.<sup>606</sup>

Overall, the HCIE studies also verified that the students of teachers using CBE pedagogies reported higher Hawaiian cultural affiliation, civic engagement, and school motivation than did the pupils of other faculty who chose not to use CBE strategies in their classrooms. These same students reported higher levels of trust with their teachers and other school administrators and expressed a more profound sense of belonging at school.<sup>607</sup>

### **Conclusion**

A gradual transformation in public education in Hawaii has been taking place for over four decades. A consensus involving many organizations outside of the Hawaiian Department of Education public schools, including post-secondary educators, non-profit organizations and educational experts, has underpinned and spurred this transformation. In the State of Hawaii, the ongoing financial support and organizing expertise of the Kamehameha Schools has proven to be a critical component enabling more evidence-based research and evaluation of

---

<sup>606</sup> Culture-Based Education and Its Relationship to Student Outcomes, p.1.

<sup>607</sup> Ibid.

culture-based pedagogies, atypical to what might be attainable elsewhere in the United States.

The CBE related educational project initiatives analyzed in this chapter illustrate the significant success that scholars and educators in Hawaii have achieved by innovatively challenging conventional educational assessment methods. They have holistically explored and empirically demonstrated the positive influence that Hawaiian CBE/CRE pedagogies can have on indigenous students' overall sense of well-being, belonging and performance in school by alternatively positioning their research framework from the perspective of indigenous cultural advantage. In addition, the highly collaborative, broad-based community effort sustained over several decades has been a critical factor in promoting and maintaining momentum and progress in Hawaii.

However, the Hawaii Department of Education data indicates that more progress still needs to be made overall. Significant challenges remain to be overcome, as demonstrated by the still lower than average standardized test scores compared to other U.S. states, higher levels of absenteeism and an ongoing problem with teacher retention.<sup>608</sup> While the gaps in Native Hawaiian student achievement levels in core subjects like reading and math have narrowed, they still lag behind their grade-level peers from other ethnic groups. Nevertheless, the implementation of innovative CBE and project-based pedagogies have so far succeeded in addressing several of the historical

---

<sup>608</sup> 2017 *Hawaii Department of Education Data Book*, ed. by Office of the Superintendent, 28th Annual vols (Hawaii: State of Hawaii - Department of Education - Office of Strategy, Innovation and Performance; Assessment and Accountability Branch, 2018)  
<http://arch.k12.hi.us/state/databook/databook.html>.

barriers hindering Native Hawaiian student motivation and engagement in school.

Noteworthy is the fact that the Hawaiian studies referenced in this chapter utilized a longitudinal empirical data-driven approach in their analysis and successfully implemented a set of CBE/CRE pedagogies that worked to improve indigenous student progress. Moreover, the research undertaken in Hawaii quantitatively and qualitatively verified a CBE model capable of improving indigenous student outcomes schooled within the traditional Anglophone-based educational system of the United States. Whether or not the Hawaiian model can be adapted and made replicable for use by other schools and communities teaching indigenous students remains to be seen; however that would be an interesting topic for future research.

A significant challenge faced by most public school educators in the United States today is how to educate and prepare youth for a world in which traditional careers are either dying or being reinvented. The emerging technologies of the *Fourth Industrial Revolution* portend to significantly change the world of work as well as the education sector soon. Seeing this rapid transformation, U.S. industry and government leaders are encouraging schools to be more innovative in their teaching methods to empower students to prepare for success in this new digital age.<sup>609</sup>

---

<sup>609</sup> Matt Elbeck, 'The Fourth Industrial Revolution's Potential Influence on Marketing Education', *E-Journal of Business Education & Scholarship of Teaching*, 12 (2018), pp. 112-119.

Keith Krueger, 'Back to the Future: What the Coming Fourth Industrial Revolution Means for Education', *T H E Journal*, 45 (2018), p. 24.

The last chapter of this thesis will examine the potential of integrating CBE instructional practices with seamless mobile learning (MSL) as a means of facilitating both the increased access and the improvement of educational advancement for indigenous people. Elements of the successful Hawaiian CBE/CRE pedagogies analyzed in this chapter and use of the CREDE universal standards will also be incorporated into that later examination.

**PART III: Wider Implications, Challenges and  
Recommendations**

## CHAPTER 8

### Individual and Collective Consciousness – A Theoretical Bridge

#### Introduction

The epistemologies held by indigenous peoples are inescapable topics when considering the research questions posed by this thesis. Epistemology asks the questions: How do we know we know something? What holds meaning? Is there a difference between knowledge, knowing and understanding?

The Native Hawaiian worldview regarding spirituality, the origins of human consciousness, paradox, duality and man's interconnectedness to his natural environment (the '*āina*') were examined in Chapter 5. Numerous instances were cited in the literature review regarding tensions between Anglophone and indigenous epistemological interpretations that hindered improvements in education for AI/AN/NH students. Another recurring theme was that CBE/CRE curriculum and pedagogies were ineffective unless they incorporated indigenous knowledge systems and ontologies.

This chapter will examine several potential synergies between the Western scientific and indigenous epistemological and ontological constructs of human consciousness, as well as their interconnectedness with nature. This attempt will be hypothetical, and will by no means attempt to answer the considerable philosophical differences which are sure to remain. The rationale for doing so is to establish an explanatory bridge for increased understanding concerning how to improve pedagogies for indigenous learners. The hermeneutical and epistemological differences that repeatedly surfaced in the literature review

pose significant challenges to teachers who work with indigenous students in U.S. schools today

Furthermore, an examination of human consciousness is foundational to what will be proposed in a subsequent chapter regarding the potential integration of digital age technologies with CBE pedagogies. Technologies such as AI and DLT require basic understandings of quantum connectivity and interoperability—similar in basic concept to the Native Hawaiian worldview of the interconnectedness of systems naturally occurring in the universe.

### **The Mind-Body Problem – Differing Hermeneutics**

The existence of consciousness is an extraordinary and multifaceted phenomenon capable of being explored from many vantage points. Despite many years of scientific research and centuries of philosophical conjecture, widespread disagreement remains regarding the nature and origin of consciousness. What is consciousness? What is the composition of consciousness, and how does it relate to our personal experience in the physical world? How does consciousness influence our learning and understanding?

Neuroscientists argue for a computational theory of consciousness, viewing it as an aspect of the electrical processes of the human mind: the brain being similar to a computer and the mind analogous to the output of that computational system.<sup>610</sup>

---

<sup>610</sup> Gerald Edelman and Giulio Tononi, *A Universe of Consciousness: How Matter Becomes Imagination* (New York: Basic Books, 2000).

Indigenous Hawaiians espouse a view that consciousness and human spirituality are part of an inner experience with the holistic reality of an interconnected universe. This concept will be examined further in the paragraphs below.

When juxtaposed between the somewhat opposing worldviews held by Western and Indigenous epistemologies, the mind-body problem becomes a classic matter of differing hermeneutics. An incisive statement concerning the mind-body problem was articulated by Nagel when he stated:

The mind-body problem exists because we naturally want to include the *mental life of conscious organisms in a comprehensive scientific understanding of the world...that everything that happens in the mind ...is something that happens in the brain. On the other hand, the defining features of mental states and events, features like intentionality, their subjectivity, and their conscious experimental quality, seem not to be comprehensible simply in terms of the physical operation of the organism.*<sup>611</sup> [Italics added]

Nagel questions whether there is another way of bringing mental phenomenon into a unified concept explaining many of the objective versus subjective theoretical challenges that humans encounter when trying to explain mental processes and experience in general. He concludes that trying to imagine an explanation of the perception of color in the same way that the science of chemistry has done for the processes of combustion, for example, involve implausible forms of reductionism which fall short of a unified objective explanation of human experience.<sup>612</sup>

---

<sup>611</sup> Thomas Nagel, 'What is the Mind-Body Problem?', in *Experimental and Theoretical Studies of Consciousness*, ed. by Gregory R. Bock and Joan Marsh (Chichester, England: John Wiley, 1993) p. 107.

<sup>612</sup> Ibid.



For the purposes of this thesis, Chalmers, a prominent scholar in the field of consciousness theory, has perhaps provided a useful distinction between what he terms the “hard problem” and the “easy problem” of consciousness. According to Chalmers, the easy problem involves explaining cognitive and behavioral functions by specifying or observing the brain’s chemical and neural functions. However, the hard problem leaves a further open question: why is the performance of these functions accompanied by experience? Because of this conundrum, Chalmers concludes that “the standard reductive methods of neuroscience and cognitive science that work for the easy problems do not work for the hard problems.”<sup>613</sup>

Chalmers convincingly argues that one way to come to an acceptable theoretical solution to the “hard problem” might be to interpret the existence of human consciousness as non-reductive. His recommendation illuminates a possible bridge for the integration of the differing Western scientific and Native Hawaiian indigenous hermeneutics concerning the nature of consciousness when he states:

I argue that this problem applies to any reductive explanation. In principle, these can explain only structure and function, and explaining conscious experience requires more than explaining structure and function. *If this is right, there is no wholly reductive explanation of consciousness.*<sup>614</sup> [Italics added]

---

<sup>613</sup> David J. Chalmers, *The Character of Consciousness* (New York, New York: Oxford University Press, Inc., 2010) p. xiv.

<sup>614</sup> Ibid.

## **Hawaiian Hermeneutics and the Understanding of Human Consciousness**

In Chapter 5 of this thesis, it was indicated that the Hawaiian worldview makes a clear distinction between spirit and matter, and that ontologically, all matter is also viewed as conscious, awake and capable of thinking or having a will.

In contrast to the Western worldview, which only attributes consciousness to humans, Hawaiians believe all things in nature possess consciousness. In this same way, Hawaiians often describe all things in nature as having a spirit essence, a soul, or a mind.

Meyer illuminated the need for a deeper understanding of how knowledge is both obtained and understood from both the Anglophone and indigenous Hawaiian perspectives. She argued for the vital inclusion of concepts relative to indigenous epistemology, ontology, causality, and hermeneutics to arrive at a complete understanding of the processes of human learning.<sup>615</sup> She used Native Hawaiian hermeneutics as a platform to argue that human perception, discernment, knowledge creation and understanding, which can be triangulated on “a gross, subtle or causal level,”—are in fact, a “subjective interpretation by each person *within the context of their own (conscious) experience.*”<sup>616</sup>

The Native Hawaiian view, that consciousness plays an active, not a passive role in the process of human thought and understanding, represents a fundamental departure from traditional Western scientific theories of consciousness underpinned by Cartesian empiricism. Meyer further argues that

---

<sup>615</sup> *Ho'Oulu - our Time of Becoming - Hawaiian Epistemology and Early Writings.*

<sup>616</sup> Manulani Aluli Meyer, 'Ekolu Mea Nui: Three Ways to Experience the World', *The Canadian Journal of Native Studies*, 31 (2011), pp. 11-16,188.

the formulation of effective pedagogies for Native Hawaiian students should incorporate both the Western empirical and the more subjective Hawaiian worldviews of consciousness in their implementation. She concludes that all knowledge is indeed empirical, but that we must expand the definition of what empiricism and human experience mean. This expanded definition must include a hermeneutic triangulation of how we interpret or give meaning to our reality. Meyer argues convincingly that the determination of meaning always involves subjectivity, or the nuances of fact, and that our reasoning is still, in the final analysis, a matter of interpretation. She argues for the validation of the Native Hawaiian view of conscious experience and the connectedness mind and body in the following statement:

Of course, indigenous minds have a vastness of rationality to draw from. Our thinking is distinct. We know this. It also affects how we do research, because *how we view, how we think, and how we witness the world are born from sustained consciousness... Body and Mind are not separate.*<sup>617</sup> [Italics added]

This paper adopts Meyer's same terminology and utilizes her philosophical construct for comparative analysis. Meyer's holistic interpretations of consciousness provide useful tools for determining whether or not the inclusion of indigenous ideologies are capable of improving student outcomes. According to Meyer, the Anglophone educational system has traditionally been caught in a type of "two-dimensional epistemology," one that is flat and thus does not have the means to help indigenous students to interpret their world. Because of this two-dimensional conundrum, Meyer further purports that the competition between these two diverse epistemologies has created inequality in U.S.

---

<sup>617</sup> Meyer, 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', 54-62

schools today. Moreover, she asserts that for many indigenous students (i.e., Native Hawaiians), the inequality gap is increasing due to policy initiatives that continue to be aimed towards homogeneity and standardization.<sup>618</sup>

According to Meyer, Native Hawaiians divide human experiences into three planes—*physical, mental and spiritual*, epistemologically separated into *knowing, knowledge and understanding*. These planes can be further characterized and compared with Western philosophy by using the parallel Hawaiian language terminology and concepts as follows:

*Man‘aoi‘o* – the physical plane – knowing – direct experience = empiricism

*Mana‘olana* – the mental plane – knowledge, thoughts, ideas = epistemology

*Aloha* – the spiritual plane – understanding, joy, loving = hermeneutics.<sup>619</sup>

### **Paradox – Indigenous Complementarity or Western Polarity**

What would a functional relationship between the Native Hawaiian concept of consciousness and the traditional Anglophone worldview based on scientific empiricism look like? What opportunities can we create for indigenous students to value their traditions while working in Anglophone educational contexts?

Not unlike the indigenous Hawaiian worldview, the Navajo people have tended to interpret the world in terms of a holistic paradox instead of polarity. Navajo scholars, Maryboy and Begay, describe well this holistic approach in their studies of the Diné (Navajo) people of the American Southwest. As an example, the Navajo language uses the signifier “*saah naaghai bikeh hozhoon*” or

---

<sup>618</sup> 'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', p. 54-62

<sup>619</sup> 'Ekolu Mea Nui: Three Ways to Experience the World', pp. 11-16,188.

shortened to (SNBH or *hozhoon*), to conceptualize relationships of the parts to the whole. In the Navajo worldview, a clear understanding of the use of *hozhoon* can bring a change in thinking and being that can manifest itself at many levels—cognitive, physical, societal and spiritual.<sup>620</sup>

Maryboy and Begay further explain the typical dilemma that many Navajo and other American Indian and Alaska Native students may encounter as they attend U.S. public schools. They assert that indigenous students experience philosophical confusion because of their differing hermeneutics relative to the nature of consciousness embedded in their native languages and cultures.<sup>621</sup>

As described in Chapter 5, the Hawaiian view of the consciousness of all living things is inextricably linked to their understanding of the cosmos—the underlying knowing or the spiritual matrix embodied in or by such terms as *aloha, mana, pono and na'auo*. These processes are both central and self-organizing, and as such, provide unity, coherence and sustain life—a kind of spiritual matrix that binds the human with all cosmic forces, the *āina* (meaning land or the source that feeds) and *ha* (energy or life force).

Western epistemology has historically been based on what might be termed a linear perspective, which allows for a particular way of organizing thought processes and their articulation. For example, with a linear worldview, one can discuss such concepts as progression and time, allowing for a world configured in terms of a beginning, middle and end, or otherwise expressed as past,

---

<sup>620</sup> Maryboy, Begay and Nichol.

<sup>621</sup> Maryboy, Begay, and Nichol, p.2.

present and future. Maryboy and Begay suggest that this fundamental epistemology may be linguistically based. They purport that because the grammatical organization of *English* (i.e., subject-verb-object) and other Latin-based languages are largely noun-based, they orient toward more linear thinking as well as to oppositional concepts such as polarity. As a consequence, polarity based-thinking will typically conceive the opposites (e.g., good or bad) as mutually exclusive with little or no gradation. Many indigenous languages (e.g., Navajo and Hawaiian) are largely verb-based and relationally organized. Maryboy and Begay further argue that “this polarized division has created an underlying set of values, often resulting in a blame-based society.”<sup>622</sup>

The English term “paradox” is suggestive of a particular indigenous Navajo value of perceiving and understanding life’s experiences in terms of balancing opposites. The term paradox points to a series of concepts central to traditional Navajo epistemology and ontology, such as complementarity, dynamic movement, cyclical balance and transformation.

Maryboy and Begay visually portray and contrast the Western and Navajo epistemologies in the diagrams shown below. They suggest that the Western linear paradigm often categorizes things in terms of opposites and discrete parts with little or no emphasis on the relationship of the parts. They illustrate this concept as opposites existing at the two ends of a straight line.<sup>623</sup>

---

<sup>622</sup> Maryboy, Begay, and Nichol, p. 4.

<sup>623</sup> Maryboy, Begay, and Nichol, p. 4.

### Figure 8.1: Linear Polarity



**Violence**

**Non-Violence**

Source: Nancy C. Maryboy, David H. Begay and Lee Nichol, 'Paradox and Transformation', *World Indigenous Nations Higher Education Consortium Journal* 200, 2 (2006).

According to Maryboy, Begay and Nichol, there is no inherent hierarchy or polarity assumed in the indigenous Navajo epistemology. Similar to the processes found in the natural cycles of night and day, the Diné (Navajo) people view this sense of naturally derived equilibrium as an innate part of the cosmic order of things. In essence, it emerges and becomes visible and apparent as a part of our human consciousness. In this epistemological context, the concept of polarity can be understood as evolving from dialectical tensions occurring naturally. For the Navajo, the polarities exist in a constant state of flux and merge into a continuum with no beginning or end in the form of continuous circular motion. This conceptual worldview can be visually represented in the following two diagrams.<sup>624</sup>

### Figure 8.2: Merging Continuum



**Violence**

**Non-Violence**

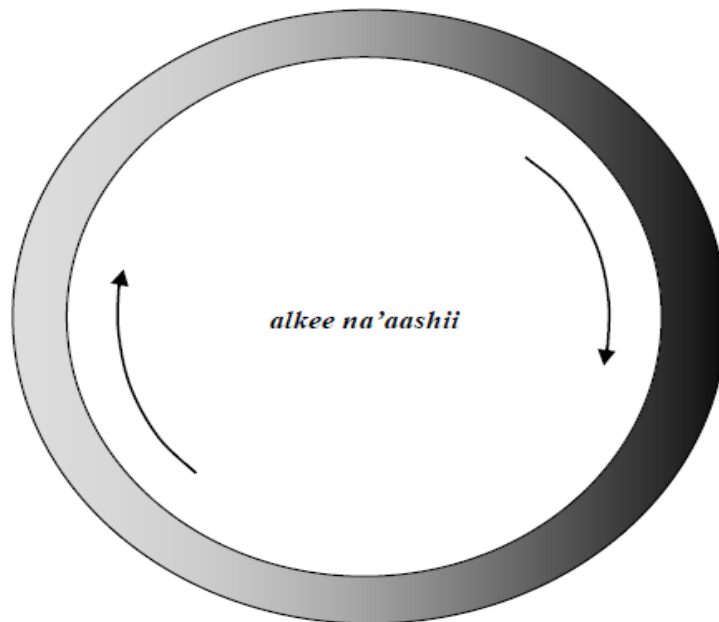
Source: Nancy C. Maryboy, David H. Begay and Lee Nichol, 'Paradox and Transformation', *World Indigenous Nations Higher Education Consortium Journal* 200, 2 (2006).

From the Navajo indigenous perspective, these natural processes can be more accurately represented if one were to take each end of the continuum line shown above, and pull each end around to the top or the bottom to create a

<sup>624</sup> Maryboy, Begay, and Nichol, p. 5.

cyclical continuum. The connection between both ends of the merging continuum turns the linear structure into cyclical movement. The Navajo language term, *alkee na'aashii*, translated as “one follows the other,” implies that a dynamic equilibrium emerges, as illustrated by the arrows in the following diagram.<sup>625</sup>

**Figure 8.3: Cyclical Continuum**



Source: Nancy C. Maryboy, David H. Begay and Lee Nichol, 'Paradox and Transformation', *World Indigenous Nations Higher Education Consortium Journal* 200, 2 (2006).

Through the unity of this form of dynamic movement, as Maryboy and Begay state, “the polarities naturally disappear.”<sup>626</sup> Therefore, this paradigm creates a different epistemological and ontological consciousness, one which reflects natural processes.

This examination of the Hawaiian and Navajo epistemologies is not meant to validate them above the Western worldview. Such an attempt would be subject

---

<sup>625</sup> Maryboy, Begay, and Nichol, p. 7.

<sup>626</sup> *Ibid.*, p. 7.



to vigorous debate and is not the focus of this paper. It is to say, however, that both the Native Hawaiians and Navajos epistemologically, ontologically, and consciously perceive their world differently than what is commonly found in Western scientific and Anglophone educational traditions. Numerous studies referenced in the review of the literature indicated the importance of teachers understanding these differing worldviews in order to develop and implement effective pedagogy for indigenous learners.

### **A Western Non-Reductive Philosophical View of Consciousness**

This section will examine some of the prevailing Western views on the subject of conscious experience.

Chalmers proposes a non-reductive explanation of consciousness as part of the human experience. To do this, he employs theories of physics precisely for the reason that they are based on fundamental principles that enjoy consensus in the scientific community when he states:

*More likely, we will take experience itself as a fundamental feature of the world, alongside mass, charge, and space-time. If we take experience as fundamental, then we can go about the business of constructing a theory of experience.<sup>627</sup> [Italics added and underline]*

Chalmers proposes the development of a set of what he terms “psychophysical principles” which would include the phenomenon of human consciousness. He argues that such a psychophysical theory would help us demonstrate how those physical processes give rise to experience.<sup>628</sup>

---

<sup>627</sup> Ibid., p.19-21.

<sup>628</sup> Ibid.

Chalmers' approach appears to be sound and reasonable from a theoretical perspective. His proposed definition of consciousness as fundamental, similar to how specific laws of physical science (a priori), taken as a non-reductive, allows for a rational concept of conscious human experience. His argument that "if a reductive explanation of consciousness fails, a non-reductive explanation is then the logical choice," offers, at least hypothetically, a type of conceptual bridge between the Western and the Native Hawaiian ontological views concerning human consciousness.<sup>629</sup>

Could Chalmers' definition of consciousness possibly help to expand our understanding concerning how to improve pedagogical methods for educating indigenous students? Do indigenous pedagogies need to be reduced to conform to scientific theory? Is this even wise given the vast number of variables involved in a student's educational process?

Moreover, Chalmers' non-reductive theory of consciousness does not fundamentally interfere with physical laws as they appear because, as he states, "these laws already form a closed system."<sup>630</sup> His key assertion in defining consciousness as "fundamental" is that every person has a rich source of data in the case of their individual conscious experience, and that too is individual and subjective.<sup>631</sup>

---

<sup>629</sup> Ibid.

<sup>630</sup> Chalmers, pp. 19-21.

<sup>631</sup> Ibid.

Where fundamental properties exist, there must consequently be fundamental laws. It is known that experience (including one's experience in school) depends upon mental and physical processes, including pedagogy: but we also know that an explanation of learning and academic achievement cannot be derived from scientific reductionist elements alone (e.g., test scores).

This thesis proposed a search for pedagogies originating from both the Anglophone and indigenous educational traditions that might be useful to improve indigenous student progress. A non-reductive consideration of consciousness could perhaps be a key to building an explanatory bridge between these two traditions. The fact that we are searching for a basic set of principles means, as Chalmers suggests in his view of consciousness as fundamental, "that we can appeal to non-empirical constraints, such as simplicity, elegance and homogeneity in articulating these same things."<sup>632</sup>

The comparative examination of Western and indigenous theories concerning human consciousness potentially suggests one principle for synthesizing the traditional Anglophone and indigenous educational traditions. Both the Western and indigenous perspectives concerning consciousness can be effectively bridged if we can agree, at least hypothetically, to the existence of conscious experience as "fundamental" to the known reality that exists within the dimensions of human learning. This same basic principle may also have potential relevance to the individualization of educational processes for students living in the modern digital age.

---

<sup>632</sup> Chalmers, p.18.

Kelly et al. in, *The Irreducible Mind: Toward a Psychology of the 21st Century*, suggested another possible way of seeing human consciousness and the mind/brain dilemma when they paraphrased some of the writings of John R. Searle.<sup>633</sup> Searle wrote extensively and opined on the limitations of the modern theories about the future of artificial intelligence and the ability of computers to duplicate the functions of the human brain:

One can accept the reality of a conscious mental life without lapsing into dualism.... Rather, consciousness emerges, roughly in the same way that solidity emerges when water freezes upon reaching a certain critical temperature. It is a system-level property of the brain. And this is not epiphenomenalism, the idea that consciousness is real but ineffectual; like the solidity of ice or other emergent properties, consciousness has causal consequences, causal powers.<sup>634</sup> [Underlining emphasis added]

Kelly et al. summarize their view views concerning conscious processes and human reality in the following plausible statement: “Although consciousness is thus at least in principle causally reducible, it is not ontologically reducible; for this would involve showing that what appears to us as consciousness is, in reality, something else, but in the case of consciousness itself, unlike the apparent rising and setting of the sun, *the appearance is the reality*.”<sup>635</sup>

---

<sup>633</sup> John R. Searle, 'Minds, Brains, and Programs', *Behavioral and Brain Sciences*, 3 (1980), pp. 417-457.

John R. Searle, 'Can Computers Think?', in *Minds, Brains, and Science* (Cambridge, MA: Harvard University Press, 1984), pp. 28-41.

John R. Searle, 'Consciousness, Explanatory Inversion, and Cognitive Science', *Behavioral and Brain Sciences*, 13 (1990), pp. 585-642.

<sup>634</sup> Edward Kelly and others, *Irreducible Mind: Toward a Psychology for the 21st Century* (Lanham, MD: Rowman & Littlefield Publishers, Inc., 2007) p. 24.

<sup>635</sup> Ibid.

### **Eras of Collective Human Consciousness**

The public school movements over roughly the last 150 years have been fundamentally designed to promote the productive potential inherent in each student and thereby create a skilled workforce to advance the aims that were originally set-forth during the era of the Industrial Revolution of the late 19<sup>th</sup> and first half of the 20<sup>th</sup> centuries.

One's ideas about education invariably flow from perceptions and conceptual assumptions about the meaning of the human journey and the purpose of life. Much of this is shaped by culture, family, and other environmental factors and experiences during the era in which one might live. Moreover, collectively, these assumptions then become institutionalized in our educational processes and reflect, at any point in time, the teachings and "consciousness" of an era. However, human consciousness changes over history. The thinking of a sophisticated urbanite of the 21<sup>st</sup>-century is vastly different from the way a medieval serf perceived the world.

Rifkin theorized that we are living now an era that he called the *Third Industrial Revolution*,<sup>636</sup> a time where *changes in human consciousness* have come about as a result of the rise of computerization and new complex energy regimes. According to Rifkin, these changes have made possible more interdependent and complex social arrangements requiring sophisticated communication systems, which in turn, mandated the use of more flexible and dynamic educational processes. Today, few would deny the reality that with the

---

<sup>636</sup> Jeremy Rifkin, *The Third Industrial Revolution – how Lateral Power is Transforming Energy, the Economy, and the World* (New York and London: Palgrave Macmillan, 2011) pp. 9-73.

advancement of the ICT revolution driven by the Internet, social media and mobile technology that the *consciousness and unconscious processes* of our thinking and social interactions have not altered the world in which we live.

Rifkin’s historical outline of how the collective consciousness of human societies has evolved over the centuries is summarized in the table below. This outline establishes a conceptual foundation for the next chapter that will examine the potential integration of CBE/CRE pedagogies with emerging technological systems.

<b>Table 8.1 – A Historical Outline of Collective Human Consciousness</b>		
<b>Type of Society</b>	<b>Communication and Educational Modality</b>	<b>Dominant Thinking or Prevailing Consciousness</b>
<b>Hunter-gatherer societies</b>	Oral language and culture	Mythological consciousness
<b>Hydraulic-agrarian societies</b>	Written language and culture	Theological consciousness
<b>First Industrial Revolution and the Enlightenment Era (15<sup>th</sup>–18<sup>th</sup> Centuries)</b>	Print technology becomes the communication medium; books and accelerated knowledge exchanges occur	Ideological or Common-belief level of consciousness; new philosophies and ideas through individual expression
<b>Second Industrial Revolution (19<sup>th</sup> and 20<sup>th</sup> Centuries)</b>	Electronic communications in all forms, public educational systems emerge for productive training	Psychological consciousness
<b>Third Industrial Revolution (21<sup>st</sup> Century)</b>	The convergence of rapid distributed information and communications technologies (ICT) with renewable distributed energy and the emergence of advanced computing and information processing systems.	Biosphere consciousness, global connectedness, and exchange of ideas
Jeremy Rifkin, <i>The Third Industrial Revolution – how Lateral Power is Transforming Energy, the Economy, and the World</i> (New York and London: Palgrave Macmillan, 2011)		

## **The Fourth Industrial Revolution The Need for a Whole New Collective Consciousness**

In 2016, Klaus Schwab, the German economist, first labeled today's emerging technological advances as *The Fourth Industrial Revolution* (often called Industry 4.0).

The *Fourth Industrial Revolution* is a way of describing the blurring of the boundaries between the physical, digital, and biological worlds. It involves a fusion of the technological advances occurring in AI, robotics, DLT, the Internet of Things (IoT), genetic engineering, quantum computing, and other technologies. Industry 4.0 represents the collective force behind many products and services that are fast becoming indispensable to modern life. Some examples are GPS systems, voice-activated virtual assistants like Apple's Siri, as well as Facebook's ability to recognize your face and tag you in a friend's photo. The rapid emergence of these technologies is paving the way for transformative changes in the way we live, radically disrupting almost every business sector. The pace of these changes portends the need for the education sector to transform the ways we access and acquire learning in the future.

The *Fourth Industrial Revolution* is also emerging at a time when concerns about inequality, social and political tensions are increasing – at a time where vulnerable populations, including many indigenous peoples, are increasingly exposed to economic uncertainty. What type of collective mindset will be required to navigate this coming era of change? What kind of educational institutions will be needed to ensure a world where all have the opportunity to enjoy the highest possible level of their individual development?

Schwab suggests that in order “to create an equitable and inclusive future, we will have to adjust our mindsets and that of our major institutions.”<sup>637</sup> He suggests that through our institutions (including education), humanity must work together to solve three significant challenges for the benefits of the *Fourth Industrial Revolution* to be fully realized. Schwab describes those challenges as:

- (1) To ensure that the benefits of the *Fourth Industrial Revolution* are distributed fairly— “the wealth and well-being generated by the previous industrial revolutions were, and continue to be, unevenly distributed.”
- (2) To manage the externalities of the *Fourth Industrial Revolution* in terms of the risks and the harm they might cause to vulnerable populations, the natural environment and future generations.
- (3) To ensure the *Fourth Industrial Revolution* is human-led and human-centered—Schwab’s interpretation of “human-centered” involves a leadership mindset where people are respected in themselves rather than in financial terms.

Schwab further proposes the creation of a positive global culture and consciousness underpinned by four core human values: 1) where individuals are empowered not determined; (2) where thoughtful systems and technologies are not viewed as mere tools but bring increased well-being; (3) where decisions are made by conscious design, not by default; and (4) where human values are placed at the core of how all technologies are built and deployed.<sup>638</sup>

---

<sup>637</sup> Klaus Schwab, *Shaping the Future of the Fourth Industrial Revolution: A Guide to Building a Better World* (New York: Currency Books, 2018) p. 13.

<sup>638</sup> *Shaping the Future of the Fourth Industrial Revolution*, pp. 12-17.



Seldon analyses in his work, *The Fourth Education Revolution*, the significant challenges that educators will need to grapple with as a result of the emergence of AI and the transformation propelled by these new technologies. He describes five inherent problems of our current educational structures because they remain mired in a 20th century Industrial Age model; namely: (1) gross social unfairness; (2) the factory line mentality and processes classroom education; (3) teachers weighed down by administration; (4) a very narrow range of student abilities developed; and (5) each student homogenized not individualized by “one size fits all” standardization of curriculum and degree requirements.<sup>639</sup>

Seldon envisions that the best schools in the future will be structured to function differently. Without the need for conventional classrooms, each student would advance their learning using a personal work plan. He further suggests that the proper and effective deployment of AI would help ensure that the five problems inherent in the Industrial Age model of education would be removed.<sup>640</sup>

Student mobility might be one of the significant logistical challenges to the attainment of the transition in education proposed by Seldon. People are continually exchanging information today while on the move with supercomputing devices (i.e., mobile phones, laptops, pads) in their hands.

---

<sup>639</sup> Seldon.

<sup>640</sup> Ibid., p. 174.

## Conclusion

It was not the purpose of this chapter to provide an exhaustive examination of the phenomenon of consciousness. An attempt was made only to suggest a potential approach for synthesizing the different theories concerning the origins and nature of the conscious human experience that underlie both the Western and the indigenous epistemological and ontological perspectives. An argument was put forth to suggest a potential middle ground state for the improvement of education for indigenous learners because:

- (1) The epistemologies held by indigenous peoples are inescapable topics when considering the research questions posed by this paper.
- (2) Because we are all conscious human beings and learning in any form requires both thinking and an intentional conscious effort, and.
- (3) The exploration of the arguments presented in this chapter concerning the differing explanations of consciousness could be useful for the professional development of the instructors of indigenous students as well as the development of improved CBE/CRE based curriculum and pedagogies in the future.

The emerging *Fourth Industrial Revolution* represents an immense challenge for the global education sector to transform and reinvent itself. Considering this significant challenge, educators will have to grapple with the formation of not only a new array of educational delivery options but also with a set of parallel standards and values to align with them. That effort will require the evolution of different forms of cooperation, very likely resulting in a new collective consciousness. How will educators shape the future in this era of disruptive change and successfully help their students to navigate and balance the

disruptive factors caused by Industry 4.0 forces? Given the velocity of transformation in technology taking place, this is a critical question that will have to be answered sooner rather than later.

In this context, both Schwab and Seldon argue for the mandatory development of a values-centered and principles-based collective mindset, ensuring that the best interests of all humanity are satisfied. They posit that such a collective mindset must include the utilization of AI and the other emerging technologies to advance educational opportunities for Third World citizens.<sup>641</sup> Similar values and principles of equity and fairness are also relevant to the future provision of CBE for indigenous learners in this upcoming digital age. The next chapter will examine some of these issues and propose a few alternatives to meet the challenges described above.

---

<sup>641</sup> *Shaping the Future of the Fourth Industrial Revolution.*

Seldon.

## CHAPTER 9

### Synergizing DLT Infrastructure with CBE Pedagogies A New Paradigm of Seamless Education for Indigenous Learners

#### Introduction

The emerging *Fourth Industrial Revolution*<sup>642</sup> is rapidly transforming many global industries, which are influenced by the growth and use of artificial intelligence (AI), distributed ledger technology (DLT), ubiquitous cloud and edge computing as well as other emerging digital platform-based systems. However, as Schwab argues, we will need to build new ways to educate the world's children and empower all stakeholders to help accomplish this end. Schwab further asserts that this will primarily come down to a unified synthesis of people, culture and values.<sup>643</sup> The recent COVID-19 pandemic worldwide has exponentially increased the critical importance of ICT networks to secure, manage and distribute high-quality educational services to the edge-computing devices remotely held by faculty, students and employees.

In this chapter, no attempt will be made to provide an in-depth analysis of such a broad topic. Nevertheless, to remain relevant, new pedagogies will be required to benefit from the increased use of these emerging digital technologies that have so much potential to accelerate learning. In addition, educational leaders in the United States face mounting pressure to respond to open-ended questions about accountability, shifting demographics, competition

---

<sup>642</sup> *Shaping the Future of the Fourth Industrial Revolution*.

<sup>643</sup> Chee-Kit Looi, L-H Wong and Y. Song, 'Mobile Computer Supported Collaborative Learning', in *The International Handbook of Collaborative Learning*, ed. by Cindy E. Hmelo-Silver and others (2013), pp. 420.

'Mobile Learning: Research, Practice and Challenges', pp. 5-11.

for students, changing workforce expectations and a need for alternative business models.<sup>644</sup>

This chapter will offer a view forward to some of the synergistic learning opportunities possible as teachers and pedagogues exchange value through the integrative power of emerging technologies. To this end, this chapter will propose a mobile-assisted seamless learning (MSL) model synergizing four components—distributed ledger technology, learning management systems, edge computing and the ability of teachers and students to retain their personal and cultural identities. This model will also illustrate the potential of synthesizing both the Anglophone and indigenous pedagogical traditions to build a theoretical foundation for future research into MSL, DLT, and alternative business models such as Education-as-a-Service (EaaS).<sup>645</sup>

In the past decade, scholars have investigated how MSL might contribute to learning across various contexts and devices.<sup>646</sup> The review of the pertinent literature associated with technology-enhanced learning (TEL) found a significant gap in the research related to what scholars have termed “seamless learning.”<sup>647</sup> This chapter examines those unexplored areas and suggests a

---

<sup>644</sup> Louis Soares, Patricia Steele and Lindsay Wayt, *Evolving Higher Education Business Models: Leading with Data to Deliver Results*, (Washington, DC: American Council on Education, 2016).

<sup>645</sup> Victor Chang and Gary Wills, 'A University of Greenwich Case Study of Cloud Computing – Education as a Service', in *E-Logistics and E-Supply Chain Management: Applications for Evolving Business* (IGI Global, 2013), pp. 232-244.

<sup>646</sup> Looi, Wong and Song, 'Mobile Computer Supported Collaborative Learning', in *The International Handbook of Collaborative Learning*, ed. by Hmelo-Silver and others, pp. 420.

'Mobile Learning: Research, Practice and Challenges', pp. 5-11

<sup>647</sup> Chen, Wenli, and others, pp. 484-491.

new method for synergizing critical aspects of the recommended framework for assessing the effectiveness of MSL.

This chapter is organized into the following five segments:

(1) First, the most common terms and concepts associated with TEL and seamless learning will be defined to provide a basis for later analysis.

(2) Second, DLT will be defined in general along with a parallel summation of the current status in the developments cloud, fog and edge computing. After that, the potential use of these data-processing infrastructures in education together with one type of integrated DLT architecture, Hyperledger Fabric (HF), will be examined.

(3) An analysis will then be presented concerning today's Generation Z student learning preferences and how they will likely influence the structure of TEL, mobile learning (m-learning) and seamless learning pedagogies.

(4) Subsequently, the significant gaps discovered in the research associated with the ten dimensions of MSL will be investigated and a synergistic model utilizing the Hyperledger suite of open-source applications associated with DLT will be proposed as a potential solution to integrate the unexplored dimensions and research on MSL.

(5) Finally, several use cases demonstrating the ability of the DLT facilitated model to drive MSL learning and bridge the strengths of the Anglophone and indigenous pedagogical traditions within the CREDE teaching and learning framework will be presented.

Diagrams, graphic representations and charts will be used extensively to convey and effectively portray the technical concepts and ideas.

<b>Table 9.1 – Key Terms and Definitions Forms of Technology Enhanced Learning (TEL)</b>
<p><b>Mobile Learning (m-learning):</b> Learning through mobile personal devices while interacting with different content across various social contexts.</p> <p><b>Mobile Seamless Learning (MSL):</b> Education through wireless, mobile, ubiquitous technologies incorporating pedagogies tailored to a student’s individual, social and cultural frameworks.</p> <p><b>Seamless Learning:</b> Continuous learning across multiple contexts through networked personal computing devices.</p> <p><b>Self-Directed Learning:</b> Individuals managing and directing their own learning in balance with their daily schedules and availabilities.</p> <p><b>Ubiquitous Learning (u-learning):</b> Learning that can be accessed from multiple environments and contexts which makes content more available while providing contextual adaptation.</p> <p><b>Cloud-Based Learning:</b> Learning through cloud-based technologies provides opportunities for collaboration between peers, teachers, and family members.</p> <p><b>Collaborative Learning:</b> An exchange of information which results in the creation of new knowledge provided by the scaffolding offered by peers.</p> <p><b>Massive Open Online Courses (MOOC):</b> A collection of freely accessible online resources, in most cases facilitated by experts, providing active engagements of participants by embedding the resources into a social media-rich environment.</p>
<p><i>Source:</i> Adapted from Looi, C.-K., Wong, L.-H., &amp; Song, Y. (2013). Mobile Computer Supported Collaborative Learning. In C. Hmelo-Silver, A. O'Donnell, C. Chan &amp; C. Chinn (Eds.), <i>The International Handbook of Collaborative Learning</i> (pp. 420-436). New York: Routledge.</p>

### **Distributed Ledger Technology (Blockchain) Explained**

Even though distributed ledger technology (DLT), more commonly known as the blockchain, has become a part of the technology vernacular and is increasingly being adopted by the global industry, it can be misunderstood by those who have not been exposed to the technology. Blockchain is a *distributed ledger* that provides a way for information to be recorded and shared by a community. A community can be of any size or at any location as long as members are connected digitally. Each member maintains his or her copy of the information

and all members must validate any updates collectively. The information might represent transactions, contracts, assets, identities, or practically anything else that can be described or distributed in a digital form, including educational content. Each update is a new “block” added to the end of a “chain.” A protocol controls how further edits or entries are initiated, validated, recorded and distributed. Cryptography replaces third-party intermediaries as the keeper of trust, with all participants running complex algorithms to certify the integrity of the whole.

In this paper, the term distributed ledger technology or the acronym DLT has been adopted because of the common tendency for persons not familiar with the technology to immediately associate the term blockchain with its most commonly known application, the Bitcoin cryptocurrency. In instances where sources quoted or referenced have been selected that use the term blockchain, that terminology will be preserved to consistent with the referenced source. It is important to note here that the cryptography and underlying infrastructure of Bitcoin, based on a “proof of work,”<sup>648</sup> is inflexible and too costly for productive use by the global education sector.

DLT can be further explained by dissecting and defining its keywords.

Distributed reflects its decentralized nature as opposed to a siloed or centralized database infrastructure. Ledger is a connotation for a database of records, and technology refers to the protocol that enables the working of a database in a decentralized way, eliminating the need for a central authority to

---

<sup>648</sup> A Proof-of-Work (PoW) system (or protocol, or function) is a consensus mechanism. It deters denial of service attacks and other service abuses such as spam on a network by requiring some work from the service requester, usually meaning processing time by a computer.



maintain a check against manipulation. DLT allows for the storage of all information securely and accurately using encryption, and this data can only be accessed using "keys" and cryptographic signatures. Once the information has been stored, it becomes an immutable database that is governed by the standards, values, and rules of the network. Thus, the most significant potential of DLT is how information can be exponentially and securely recorded.

DLT can provide the backbone infrastructure for information collected through any Internet-connected network and can operate as either a public, private, or hybrid ledger.<sup>649</sup> The key advantages of using a single ledger framework as an application suited for education will be analyzed in a later section.

Distributed ledgers are not a new technology; in fact, many organizations use them to maintain data at different locations or on various computer networks. The dominant database management architecture of most entities today functions through a central computerized system where nodes are updated periodically. However, this makes this form of database vulnerable to cyber-crime and prone to delays since a central body must update each distantly located node on the network.

The very nature of the DLT decentralized ledger makes the nodes more protected from cyber-crime, as all the copies stored across the network must be simultaneously attacked to be successful. DLTs are supported by encryption and the use of private and public key access, so keys are needed to access the

---

<sup>649</sup> The LuxTag Project, Private vs. Public Blockchain: What are the Major Differences? <https://medium.com/luxtag-live-tokenized-assets-on-blockchain/private-vs-public-blockchain-what-are-the-major-differences-d92a504f3a4a>.

data.<sup>650</sup> Additionally, the concurrent (peer-to-peer) sharing and updating of records can make the whole process much faster, more productive, and significantly more cost-effective. In other ways the DLTs are inefficient compared to traditional centralized data management systems. The technology can be deployed in a myriad of DLT applications such as social networks, messengers, exchanges, storage platforms, voting systems, prediction markets, online shops, and of course, the distribution and sharing of educational content.

The information recorded by DLTs can take on any form, whether it be a transfer of money, ownership, a transaction, someone's identity, or an agreement between two parties. However, to do so requires a confirmation from several devices such as a computer or mobile device on the network. Once an agreement, otherwise known as a consensus or smart contract<sup>651</sup> is reached between these devices to store something at a place (chain) on the distributed ledger, it is immutable. It cannot be disputed, removed or altered, without the knowledge and permission of those who made that record.

The architecture of the Internet and other networks is becoming more distributed and decentralized as a result of a natural convergence taking place between AI, DLT and ubiquitous cloud, fog and edge computing. This trend and the challenges it presents will be analyzed more in-depth later in this chapter.

The diagram on the next page<sup>652</sup> situates the blockchain within the current

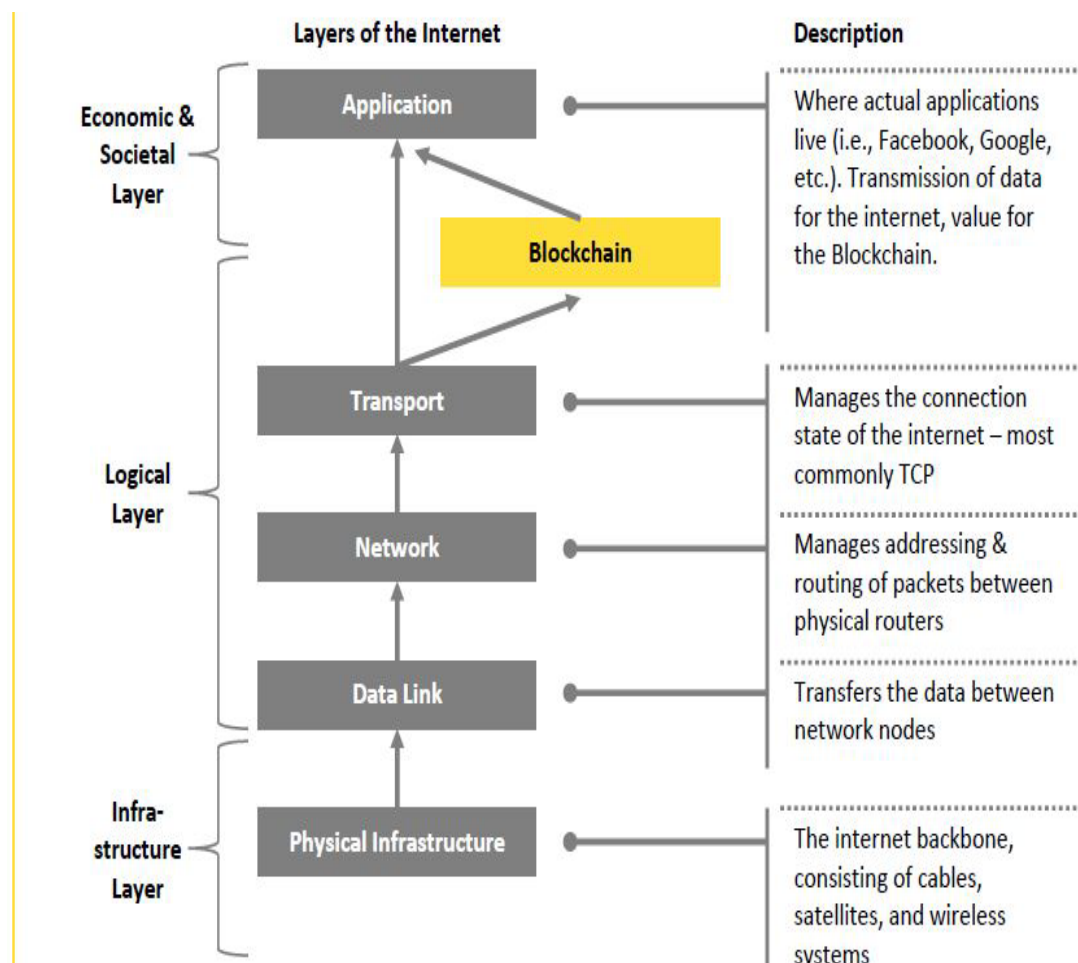
---

<sup>650</sup> Coindesk, Blockchain 101, <https://www.coindesk.com/learn/blockchain-101/what-is-blockchain-technology>.

<sup>651</sup> Roberto Tonelli and others, *Implementing a Microservices System with Blockchain Smart Contracts*, 2019 IEEE International Workshop on Blockchain Oriented Software Engineering (IWBOSE), (IEEE, 2019). <https://doi.org/10.1109/IWBOSE.2019.8666520>

vertical infrastructure layers of the Internet as it operates today. It is important however, not to think in such a vertical manner when considering options afforded through using the DLT in education. The reason for this is that when we look at systems vertically rather than systemically, it is common to miss opportunities to leverage the synergies available when digital networks are interconnected. Today, virtually all digital networks operate through interconnectivity. While it is true that there are societal, logistical and infrastructural layers of the Internet’s interactive architecture, *it is at the societal or human behavioral level where education and learning take place; all the other layers are merely tools to achieve this end.*

**Figure 9.1: Blockchain within the Context of the Internet**



Source: Rico Garcia Ondarza, 'Enhancing Blockchain Innovation Via Regulation: The Case for an E-Corporation' (Masters of Public Policy, Harvard Kennedy School of Government, 2019), p. 10. [https://issuu.com/medauras/docs/blockchain\\_regulation\\_study\\_-\\_april](https://issuu.com/medauras/docs/blockchain_regulation_study_-_april)

## **Distributed Ledger Technology - Applications in Education**

Clark recommends several levels of education that could benefit from the use of DLTs in the following statement: “Blockchain is a technology that clearly has applications in the world of learning at the individual, institutional, group, national and international levels. It is relevant in all sorts of contexts: schools, colleges, universities, MOOCs, CPD, corporates, apprenticeships, and knowledge bases.”<sup>653</sup> He makes an important distinction when he clarifies that dissimilar to traditional vertical or hierarchical IT architectures, the blockchain technology itself becomes the focus; as a result, trust migrates towards the technology and away from the institution.<sup>654</sup>

According to a recent European Commission report, many stakeholders within educational circles seem to be somewhat unaware of DLTs social advantages and potential.<sup>655</sup> One of the possible causes of this lack of awareness might be that many features of DLT-based products and services make them significantly different from the Internet-based commercial uses already familiar to educators (e.g., learning management systems and software).

In the view of Stensaker and Maassen, there is an increasing need in higher education for the trustworthy transfer of credits and certifications across

---

<sup>653</sup> Grech, Alexander and Anthony F. Camilleri, *Blockchain in Education*, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017), p.52.  
[https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255\\_blockchain\\_in\\_education%281%29.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255_blockchain_in_education%281%29.pdf)

<sup>654</sup> Ibid.

<sup>655</sup> Grech and Camilleri.

international boundaries.<sup>656</sup> Li makes a similar call for a system of recognizing credits between Chinese universities so they are transferrable.<sup>657</sup> In this regard, DLT- based qualifications represent a new digital mechanism affording secure universal access, immutability, ease of credit or transcript transfer, and, if necessary, foreign currency payments for competing universities and students.

While DLT applications are capable of providing positive, even revolutionary transformations in the education sector, they also have the potential to bring disruptive challenges to educational entities and their current centralized information management systems. A recent European Union Joint Research Commission Report forecasted that any field of activity in education founded on time-stamped recordkeeping of titles and ownership could be disrupted by blockchain technology. This could include, but not be limited to, such things as the award of qualifications, licensing and accreditation, management of student records, intellectual property management and payments.<sup>658</sup>

On the other hand, the adoption of DLT by schools provides many new options for education providers to streamline the plethora of record-keeping, student tracking and data management issues they face on an ongoing basis. The table below lists some of the advantages of moving digital records to a distributed ledger that could be available in education and other business sectors.

---

<sup>656</sup> B. Stensaker and P. Maassen, 'A Conceptualisation of Available Trust-Building Mechanisms for International Quality Assurance of Higher Education', *Journal of Higher Education Policy and Management*, 37 (2015), pp. 130-140.

<sup>657</sup> F. Li, 'Developing a Credit Recognition System for Chinese Higher Education Institutions', *Ibid.*, pp. 424-431.

<sup>658</sup> Grech and Camilleri.

**Table 9.2 – Key Advantages of Distributed Ledger Technology**

- **Self-sovereignty**, i.e., for users to identify themselves while at the same time maintaining control over the storage and management of their personal data;
- **Trust**, i.e., for a technical infrastructure that gives people enough confidence in its operations to carry through with transactions such as payments or the issue of certificates;
- **Transparency & Provenance**, i.e., for users to conduct transactions in the knowledge that each party has the capacity to enter into that transaction;
- **Immutability**, i.e., for records to be written and stored permanently, without the possibility of modification;
- **Disintermediation**, i.e., the removal of the need for a central controlling authority to manage transactions or keep records;
- **Collaboration**, i.e., the ability of parties to transact directly with each other without the need for mediating third parties.

Source: Grech, Alexander and Anthony F. Camilleri, *Blockchain in Education*, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017) [https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255\\_blockchain\\_in\\_education%281%29.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255_blockchain_in_education%281%29.pdf)

According to Williams, there are three main reasons why the development and use of DLT in education might become widespread in the future. The first is cost. For example, DLT-based platforms offer students attending U.S and U.K. higher education institutions an attractive, lower-cost solution for the accreditation of their college and work-based achievements. Massachusetts Institute of Technology (MIT) has moved aggressively in this direction, announcing that they will use blockchain for most of their student transcripts and other sharable credentials in the future to increase efficiency and decrease costs.<sup>659</sup>

The second advantage is flexibility. Unlike institution-managed course and assessment timetables, so-called “blockcerts” would be accessible at any time

---

<sup>659</sup> Teppo Felin and Karim Lakhani, 'What Problems Will You Solve with Blockchain?', *MIT Sloan Management Review*, (2018). <https://sloanreview.mit.edu/article/what-problems-will-you-solve-with-blockchain/>

or place to sync with students' schedules as well as facilitate the real-time updating of their learning advancement and skills profiles.

The third advantage is portability, allowing for certifications to be more readily transferred and validated nationally and internationally.<sup>660</sup> Williams, Shum and Crick's study analyzed the portability of blockcerts and showed the various stages that colleges could use them to profile, assess and certify students' progress along their education to career pathway. (Refer to the table below):

<b>Table 9.3 – Five processing stages – student activity to DLT certification</b>
<p><u>Stage 1</u> – Students' online activity in on-campus tasks or work placement projects is captured and stored in large data sets on university-hosted or external secure network servers.</p> <p><u>Stage 2</u> – Second generation learning analytics systems supported by AI, on either university-managed or secure external platforms, are used to assess each student's level of engagement in collaborative networking; discourse analysis; learner-generated content; disposition analytics, intrinsic motivations; and context analytics.</p> <p><u>Stage 3</u> – Analytics outcomes are matched to student success algorithms; these include the validation of individual and collaborative achievements. Those meeting the defined criteria of (preselected) smart contracts are prepared for transmission.</p> <p><u>Stage 4</u> – Triggering, either automatically or manually by student/university/work placement supervisor, of smart contracts and the transmission of input data to blockchain ledgers.</p> <p><u>Stage-5</u> – Certification (for example, by blockcerts) of the students' individual and collaborative achievements are made publicly available via blockchain. Cryptocurrency payments are made to service providers as required.</p>
<p>Source adapted from: Peter Williams, 'Does Competency-Based Education with Blockchain Signal a New Mission for Universities?', <i>Journal of Higher Education Policy and Management</i>, 41 (2019), pp. 111. <a href="https://doi.org/10.1080/1360080X.2018.1520491">https://doi.org/10.1080/1360080X.2018.1520491</a></p> <p>Simon Buckingham Shum and Ruth Deakin Crick, <i>Learning Dispositions and Transferable Competencies: Pedagogy, Modelling and Learning Analytics</i>, ed. by Peter Williams (2019) pp. 104-117, Vancouver, British Columbia, Canada edn, 2nd International Conference on Learning Analytics &amp; Knowledge, 29 Apr - 02 May 2012, (New York: ACM Press, 2012). as referenced in Williams, pp. 104-117</p>

<sup>660</sup> Peter Williams, 'Does Competency-Based Education with Blockchain Signal a New Mission for Universities?', *Journal of Higher Education Policy and Management*, 41 (2019), pp. 104-117. <https://doi.org/10.1080/1360080X.2018.1520491>

Recent literature concerning DLT makes frequent reference to “self-sovereignty”—i.e., an individual’s ability to own and control his or her own identity and data online.<sup>661</sup> According to Lewis, public distributed ledgers facilitate self-sovereignty by giving individuals (e.g., educators and students) the ability to be the final judge of who can access and use their data and personal information.<sup>662</sup> This can be thought of in educational terms as both educators and learners acquiring significant self-authority over the way their academic portfolios, transcripts and identities are shared online. In this context, each individual can select and release all or parts of this information in return for access to educational information and services they want without the need for constant recourse to a third-party intermediary to validate the data or identity.

Aspects of these forms of ID management and self-selection can be readily facilitated and serviced using DLT. These forms of sovereign control for both individuals and educational institutions are exceptionally affordable through one DLT platform called Hyperledger because it is one of the few DLTs that allows for both public and private transactions.<sup>663</sup>

### **DLT and the Concept of Self-Sovereign Identity**

DLTs can empower individuals to design their pathways over a lifetime of learning and work. DLTs also introduce trust, transparency, and efficiency into

---

<sup>661</sup> John Lilic, 'uPort: A Glimpse into a Next Generation Self Sovereign Identity System', *LinkedIn*, (2015).

<sup>662</sup> Antony Lewis, *A Gentle Introduction to Self-Sovereign Identity*, *Bits on Blocks: Thoughts on Blockchain Technology*, (2017) <https://bitsonblocks.net/2017/05/17/a-gentle-introduction-to-self-sovereign-identity>.

<sup>663</sup> Hyperledger Blockchain Technologies for Business, *Business Description Whitepaper: Detailed Explanation of the Hyperledger framework*, [https://www.hyperledger.org/wp-content/uploads/2018/07/HL\\_Whitepaper\\_IntroductiontoHyperledger.pdf](https://www.hyperledger.org/wp-content/uploads/2018/07/HL_Whitepaper_IntroductiontoHyperledger.pdf).



an education system that can, at times, be difficult for students to navigate and use. The privacy required for self-sovereign identities to function can be maintained using the Hyperledger framework. These benefits are multiplied by the power of DLTs to create secure networks for educational institutions to seamlessly connect to both their students and to education technology providers.

Enabling the secure sharing and exchange of data in a self-sovereign framework shifts the control of learning to the individual and away from the institution. This shift offers the potential to fundamentally transform the education ecosystem according to research conducted by IBM.<sup>664</sup> A new network of organizations called The Sovrin Alliance has been collaborating with such companies as Cisco, IBM and T-Mobile on this concept and is establishing standards for the self-sovereign identities for individuals and organizations. Their objective is to give people and organizations the freedom to collect and carry their own lifelong verifiable digital profile or credentials.<sup>665</sup>

At present, every industry, be it education, finance, or healthcare, creates costly, inefficient, proprietary data solutions that prevent people from managing their digital identities cohesively. These proprietary, industry-specific solutions for verifiable claims often fail to scale outside of that industry or jurisdiction and are vulnerable to theft and fraud. As a result, neither the individual nor the

---

<sup>664</sup> Tapscott and Kaplan.

<sup>665</sup> The Sovrin Solution, Control Your Digital Identity, [www.sovrin.org](http://www.sovrin.org) accessed 5 April 2019.

Sovrin Foundation, *Sovrin: A Protocol and Token for Self-Sovereign Identity and Decentralized Trust*, ed. by Phil Windley and Drummond Reed, A White Paper from the Sovrin Foundation V 1.0, (2018). <https://sovrin.org/wp-content/uploads/2018/03/Sovrin-Protocol-and-Token-White-Paper.pdf> [accessed 5 April 2019].

institution obtain full benefits from the system. DLT has the potential to remove barriers to scale and geography so that educators can access and analyze, with an individual's permission, massive amounts of data for purposes of scientific research as well as in their administrative, academic, managerial or professional roles.

Education seems to work best when it is adaptable to include all types of teaching and learning and every type of student. DLT offers a tool and a facilitation engine to drive this form of inclusion. The use of DLT infrastructure also provides a more secure platform on which to create a global network for lifelong learning. According to MIT business professor Christian Catalini:

By automating the aggregation of information and preferences, and overcoming the limits of our cognitive ability, the ecosystems built on top of blockchain technology will be able to source and remunerate talent, ideas and capital at a scale previously unimaginable.<sup>666</sup>

The digital age brought abundance, mass participation, new delivery channels and new business models. As more academic information becomes digitized and alternative forms of education become normalized as part of the *Fourth Industrial Revolution*, security notions, transparency and openness will likely grow in importance. The recent COVID-19 pandemic has significantly disrupted the normal processes of classroom-based instruction and highlighted the need to look at alternative ways of using technology to communicate and distribute learning opportunities. Within this new reality and educational reality, the well-designed deployment of DLT infrastructure, students can be helped and

---

<sup>666</sup> Christian Catalini, *How Blockchain Technology Will Impact the Digital Economy*, Oxford Business Law Blog, (2017). <https://www.law.ox.ac.uk/business-law-blog/blog/2017/04/how-blockchain-technology-will-impact-digital-economy>

rewarded for their efforts while focusing on work and also be able to engage in more collaborative activities throughout their lifelong learning process.<sup>667</sup>

While new blockchain courses, labs and education programs are continually appearing, the education sector will need to embed digital citizenship concepts into the curricula of schools and universities. Loizzo and Ertmer argue that courses teaching students, parents and employees how to be good digital citizens involving blockchain technology should incorporate elements of its responsible use, a truthful online reflection of their skills, personal accountability and secure data management.<sup>668</sup> New blockchains are emerging all the time that enable different and powerful changes to the status quo; however, the question needs to be asked: What is the most appropriate DLT framework for use in education? Hyperledger Fabric (actually a suite of digital apps integrated using blockchain technology) represents one possible option.

### **An Explanation for Hyperledger Framework and Its Uses in Education**

During 2015 and 2016, The Linux Foundation announced the creation of the Hyperledger Project. This announcement was followed by several meetings and the establishment of a consortium to enable the world's largest companies to work together.<sup>669</sup> The stated objective of the project was “to advance cross-

---

<sup>667</sup> Common Sense Education, *Digital Citizenship*, 2019 vols (Common Sense Media).  
<https://www.commonsense.org/education/digital-citizenship>

<sup>668</sup> Jamie Loizzo, *10 Tips for using Social Tools with Students*, International Society for Technology in Education (ISTE), (2015). <https://www.iste.org/explore/In-the-classroom/10-tips-for-using-social-tools-with-students>

<sup>669</sup> Hyperledger, Linux Foundation's Hyperledger Project Announces 30 Founding Members and Code Proposals to Advance Blockchain Technology, (2016)  
[:https://www.hyperledger.org/announcements/2016/02/09/linux-foundations-hyperledger-project-announces-30-founding-members-and-code-proposals-to-advance-blockchain-technology.](https://www.hyperledger.org/announcements/2016/02/09/linux-foundations-hyperledger-project-announces-30-founding-members-and-code-proposals-to-advance-blockchain-technology)

industry global collaboration by developing distributed ledgers, with a particular focus on improving the performance and reliability of these systems (as compared to comparable cryptocurrency) so that they were capable of supporting global business transactions by major technological, financial and supply chain companies.”<sup>670</sup>

The Hyperledger framework (sometimes referred to as Hyperledger Fabric or HF) is an open-source, *permission-based DLT platform* providing a modular architecture with a delineation of roles between the nodes in the infrastructure for the execution of smart contracts.<sup>671</sup> HF is also currently the most widely used and accepted *private distributed ledger technology platform*. It is primarily utilized in enterprise settings to make transactions between multiple businesses more seamless and efficient. HF’s modular design means that entities can plug in different functionalities to accommodate each party’s customized needs. The fact that HF can function as a non-public, private blockchain affords educational institutions, and even indigenous communities, the significant option to secure and protect their proprietary curriculum resources and other intellectual property at scale and at a reduced cost.

In addition, HF is a good option for use by the educational sector because:

(1) HF only has to authenticate those who agree to the smart contract.

Thus, it is more secure, controllable, scalable and customizable to the size of any single educational entity or a group of institutions. HF has no limit to the

---

<sup>670</sup> Ibid.

<sup>671</sup>A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract. Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and irreversible.

number of parties who can participate in the chain. As a result, multiple educational entities interacting with learners can seamlessly exchange value and participate. This fundamental aspect of HF protects intellectual property rights, sovereignty and facilitates the tracking and verification of ongoing learning progress. The functionality of HF and how it has the potential to facilitate seamless learning when combined with edge computing will be examined later in this chapter.

(2) HF provides a membership identity service that manages user IDs and authenticates all participants on the network. HF uses control lists for access, thereby providing additional layers of permission through the authorization of specific network operations. Therefore, its functionality can be easily adapted, understandable and likely acceptable to most IT managers who are accustomed to operating under a centralized data management system using a hierarchy to secure and govern access to proprietary data.

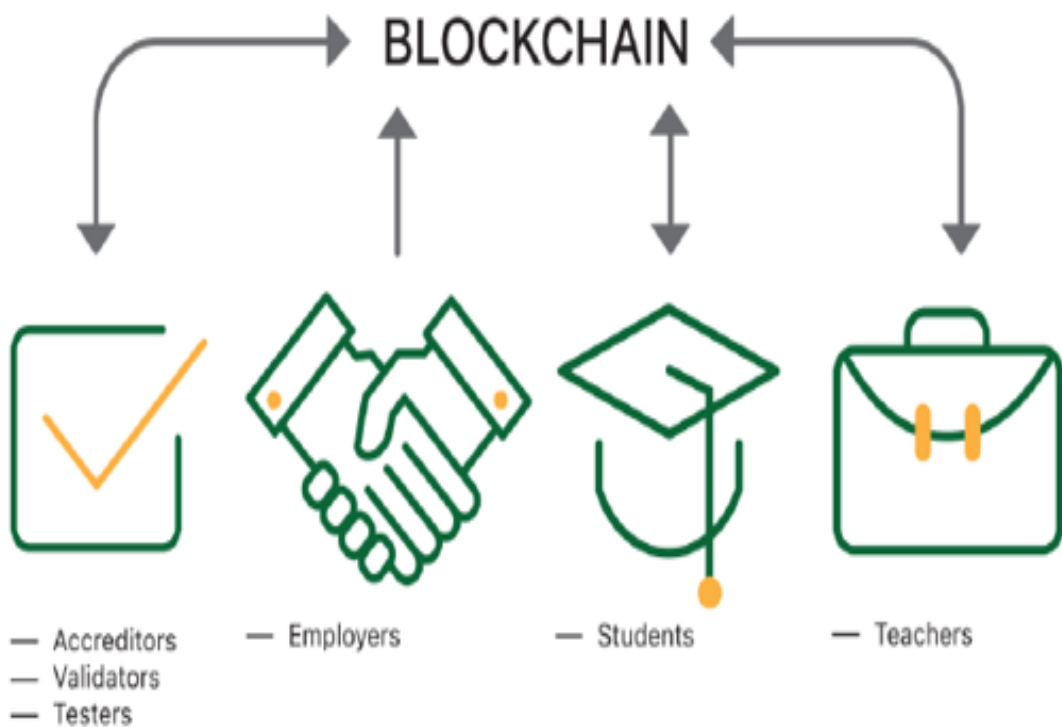
(3) The Hyperledger Certified Service Provider (HCSP) program is a pre-qualified tier of vetted service providers who have deep experience helping enterprises successfully adopt Hyperledger. The HCSP partners offer Hyperledger support, consulting, professional services and training for organizations starting to use Hyperledger. The existence of this program ensures that educational organizations and all HF end-users would get the support needed for them to build and roll out new education-specific applications more quickly and efficiently while feeling secure that there are

trusted and vetted partners available to support their production and operational needs.<sup>672</sup>

(4) Most important is the fact that HF is open-source and has already achieved massive adoption by well-known technology platform companies who are each making substantial investments (e.g., IBM, Digital Asset, Cisco, Fujitsu, Hitachi, Intel, NEC, NTT DATA, Red Hat, VMware).

The graphic below, taken from the EU JRC report, lists some of the parties involved in education that could benefit from the use of the HF infrastructure.

**Figure 9.2: Educational Stakeholders with Interest in the Blockchain**



Source: Alexander Grech and Anthony F. Camilleri, *Blockchain in Education*, ed. by Andreia Inamorato dos Santos, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017) [https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255\\_blockchain\\_in\\_education%281%29.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255_blockchain_in_education%281%29.pdf) .

<sup>672</sup> Hyperledger, Hyperledger Certified Service Providers: Partnership Support Program at: <https://www.hyperledger.org/resources/hcsp>.

The following paragraphs highlight some of the institutions in the U.K. that have adopted DLT infrastructure early on in their administration of course offerings and recruitment. This list is not all-inclusive, and it is not within the scope of this thesis to analyze these respective university initiatives. Nonetheless, they do represent the current interest in DLT overall for the delivery of educational content that is sure to increase in the future. Weblinks to the respective DLT courses and programs offered by these institutions are provided in the paragraphs below as well as in the footnotes.<sup>673</sup>

The University of Oxford is collaborating with other universities to establish the world's first "blockchain university"—Woolf University. Professors from the University of Cambridge, The University of Edinburgh, The University of Chicago, Massachusetts Institute of Technology, Cornell University, Harvard University and ETH Zurich are working together with Oxford in this effort. Woolf professors teach through tutorials: every week, students meet with a professor, typically online through a video call. Students work directly with faculty in a small group of two or three students, and other educators help guide and mentor students in their field of expertise. (<https://woolf.university/>)

2. Open University U.K. (OU) – OU is engaged in blockchain research primarily for accreditation purposes. The Knowledge Media Institute of OU states they are interested in enhancing standards for badging, certification and reputation on the Web with the use of the DLT as a trusted ledger. OU is leveraging the potential of the Ethereum blockchain for accreditation to turn badges into smart

---

<sup>673</sup> Oxford University - <https://blockchain.univ.ox.ac.uk/>  
[https://georythmikigr.s3.amazonaws.com/uploads/file\\_attachment/file\\_name/448/oxford\\_blockchain\\_strategy\\_programme\\_prospectus.pdf](https://georythmikigr.s3.amazonaws.com/uploads/file_attachment/file_name/448/oxford_blockchain_strategy_programme_prospectus.pdf).

contracts and has developed a prototype for assembling and issuing micro-credentials on a blockchain.<sup>674</sup>

3. The University of Edinburgh established a Blockchain Technology Laboratory (BTL) in 2016 in collaboration with the initiative of R&D technology company IOHK. The BTL at the University of Edinburgh aims to study all aspects of distributed ledger technology and has initiated active global cooperation with other labs located at the Tokyo Institute of Technology and the National Kapodistrian University of Athens<sup>675</sup>

### **Problems in Understanding Distributed Ledger Platforms and the Difference between Centralized versus Distributed Networks**

At this juncture, it is crucial to resolve a perpetual misunderstanding relative to the consideration of distributed ledger systems. Misunderstandings sometimes arise because the design of DLT platforms functions as both distributed and decentralized networks, but researchers and practitioners, accustomed to thinking of these as opposites, frequently confuse the terminology as well as the underlying architectural and cryptographic designs of most DLT-based platforms.

According to Vitalik Buterin, the founder of Ethereum, even though “decentralization” is one of the words most often used in the crypto-economic industry as a *raison d’être* for the creation of blockchain-based systems, it is frequently incorrectly used, and therefore there exists considerable confusion

---

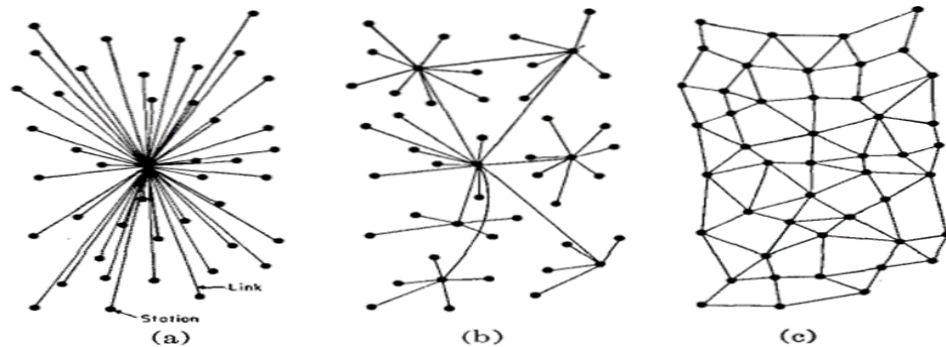
<sup>674</sup> Open University UK, Open Blockchain: Researching the Potential of Blockchains, <https://blockchain.open.ac.uk/> (<http://kmi.open.ac.uk/projects/name/open-blockchain>).

<sup>675</sup> University of Edinburgh, Blockchain Technology Laboratory Home, <https://www.ed.ac.uk/informatics/blockchain>



as to its true meaning. Buterin further illustrates and explains this conundrum via the use of what he terms “the following completely unhelpful, but unfortunately, all too common, diagram.”<sup>676</sup>

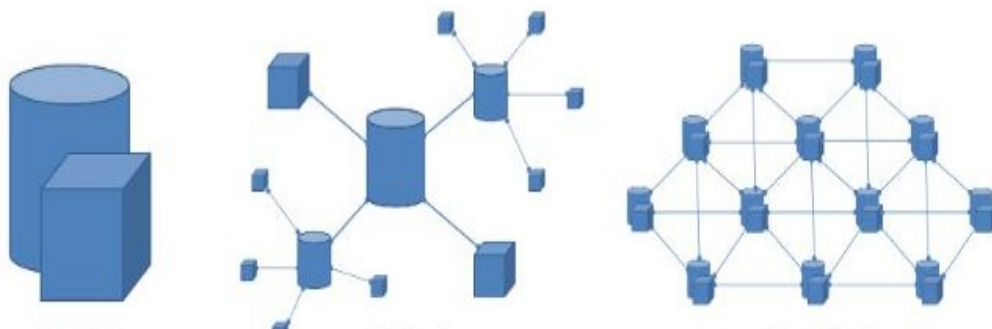
**Figure 9.3: Centralized (a), Decentralized (b), & Distributed Networks (c)**<sup>677</sup>



Source: Vitalik Buterin, *The Meaning of Decentralization*, 2019 vols (Medium, 2017).  
<https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>

Buterin clarifies that the blockchain system he invented, *Ethereum*, operates using both distributed and decentralized exchange stacks. While this is also true regarding the majority of the current DLT systems, the definitions of distributed and decentralized are reversed—compared to the previous diagram above—as is illustrated in the picture below.

**Figure 9.4: Reversed Distributed & Decentralized Networks**



Source: Vitalik Buterin, *The Meaning of Decentralization*, 2019 vols (Medium, 2017).  
<https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>

<sup>676</sup> Vitalik Buterin, *The Meaning of Decentralization*, 2019 vols (Medium, 2017).  
<https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274> .

<sup>677</sup> Paul Baran, *On Distributed Networks*, First Congress of the Information System Sciences, Sponsored by the MITRE Corporation and the USAF Electronic Systems Division, (Santa Monica, CA: RAND Corporation, 1962)  
<https://www.rand.org/content/dam/rand/pubs/papers/2005/P2626.pdf>.

Buterin explains further that this difficulty arises because, with software decentralization, there are three separate axes of centralization and decentralization involved, all of which are quite independent of each other.<sup>678</sup>

The axes described by Buterin are as follows:

- ❖ Architectural (de)centralization – How many physical computers make up a system or network? How many of those computers can it tolerate breaking down at any single time?
- ❖ Political (de)centralization – How many individuals or organizations ultimately control the computers of the system or network?
- ❖ Logical (de)centralization – Does the interface and data structures that the system presents and maintains, look more like a single monolithic object, or an amorphous swarm? One simple heuristic is: if you cut the system in half, including both providers and users, will both halves continue to operate as independent units?<sup>679</sup>

The critical thing to understand concerning the clarifications provided by Buterin is that distributed ledgers or blockchains are politically decentralized (i.e., no one controls them) and architecturally decentralized (i.e., there is no central infrastructural point of failure), but they are logically centralized (i.e., *there is one commonly agreed upon state, and the system behaves like a single computer*).

This structural clarification of DLT will be significant when we examine the benefits of seamless learning integration later on in this chapter.

---

<sup>678</sup> Buterin.

<sup>679</sup> Buterin.

## **The Evolution and Importance of Edge Computing – (Cloud, Fog, Edge)**

Edge computing is a distributed, open IT architecture that features decentralized processing power. Edge computing enables connected devices to process data closer to where it is created – or at the “edge.” This can be either within the device itself (i.e., sensors), or close to the device, and provides an alternative to sending data to a centralized cloud or other databases for processing. Many companies (e.g., Amazon, Google, Microsoft, Huawei, IBM, Samsung, Siemens AG, Tesla) are researching and making substantial investments in edge computing.<sup>680</sup>

The evolution of edge computing has come about primarily due to the proliferation of chip-processor enabled mobile devices and the Internet of Things (IoT) technologies (e.g., smart home sensors, Siri, smart TVs). Edge computing allows data-stream acceleration, including real-time data processing without latency. Thus, it will enable smart applications and devices to respond to data almost instantaneously as it is being created, thereby eliminating lag time. The proximity of the edge device and the speed of its processing power is critical for many emerging technologies such as self-driving cars. Since the beginning of the information technology era in the 1960s, the principal asset has been “data” and the ability to obtain insight from it. There have been many technological advancements, ranging from the early mainframe to today’s interconnected mobile and Internet of Things (IoT) devices. While few modern advancements equal the impact of the Internet or the repeated reinvention of

---

<sup>680</sup> Linknovate, *Top 10 Emerging Technologies' Leaders & Trends*, <https://www.linknovate.com/view-resource/top-emerging-technologies/?key=5dcd732800f65d071fe28a8e> [accessed 2019].

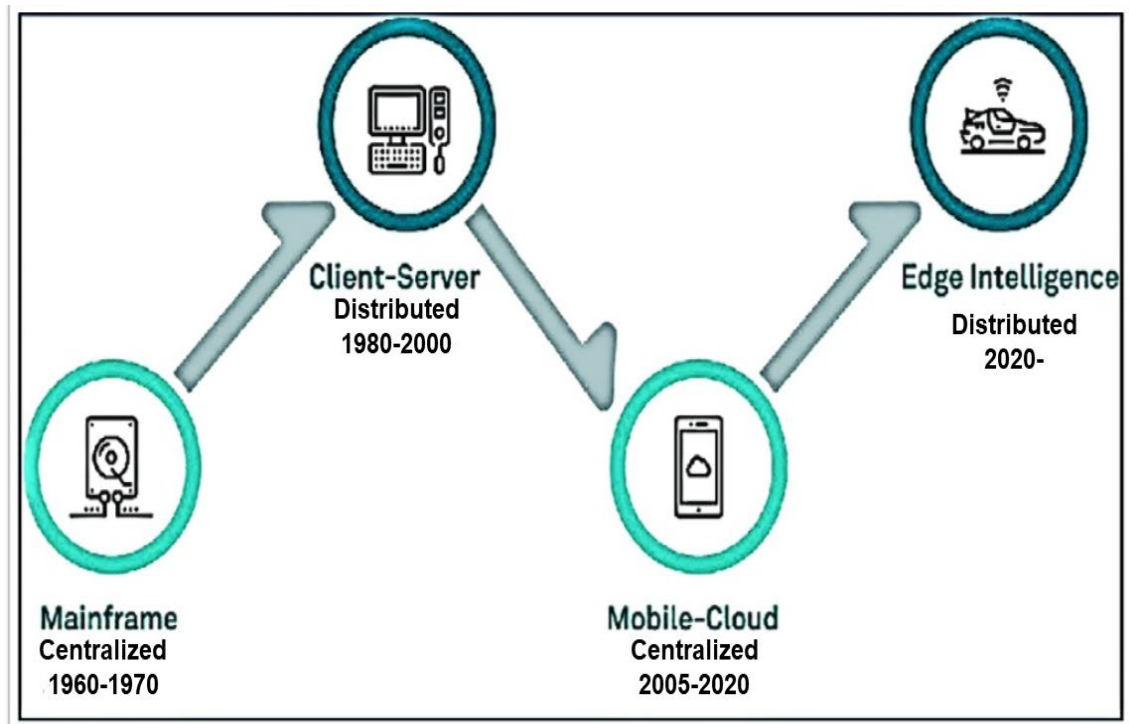
more powerful and lower cost information processors, the general movement over time has been from centralized to distributed data processing. Forrester Research, an international information technology research firm, warns that “the coming ‘sensor deluge’ makes large parts of cloud computing unrealistic, and as IoT enabled systems to continue to proliferate, the rise of edge computing becomes inevitable.”<sup>681</sup>

The several diagrams on the following pages may be the best way to succinctly show the most significant transformations caused by edge computing and where this all might lead or impact the education sector.

---

<sup>681</sup> Abhijit Sunil and others, 'Predictions 2020: Edge Computing - New Form Factors, Partnership Strategies, and the Promise of 5G Will Converge to Catapult Edge Toward Mainstream', *Forrester Research Report*, (2019).

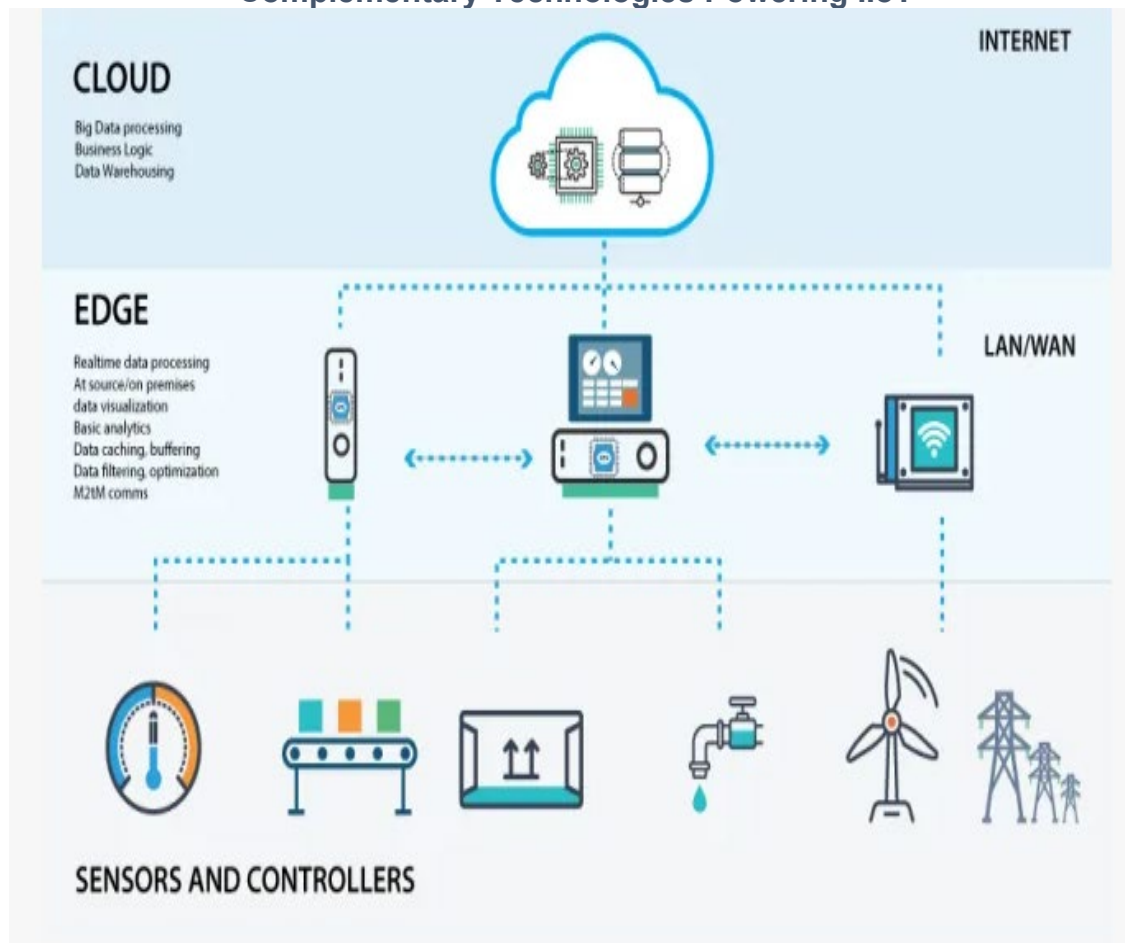
**Figure 9.5: Evolution of Computing Architecture**



Source: The Future of Geospatial Intelligence - Scientific Figure on ResearchGate. Available from: [https://www.researchgate.net/figure/the-evolution-of-computing-architecture\\_fig2\\_317987508](https://www.researchgate.net/figure/the-evolution-of-computing-architecture_fig2_317987508)

The diagram above illustrates how computing has evolved in the last six decades toward distributed computing at the “edge.” Cloud computing is the current centralized paradigm. In 2020, almost all web content is serviced through a major data center (e.g., cloud servers). Researchers rent their private servers from the cloud to test their models and do their experiments. Enterprises perform their business logistics through remote servers. The cloud offers a convenient way for businesses, small or large, to get computing sources from a service provider instead of building their own data center. The diagrams below illustrate graphically how these three computing layers interface with each other and how mobile devices and IoT devices are securely connected.

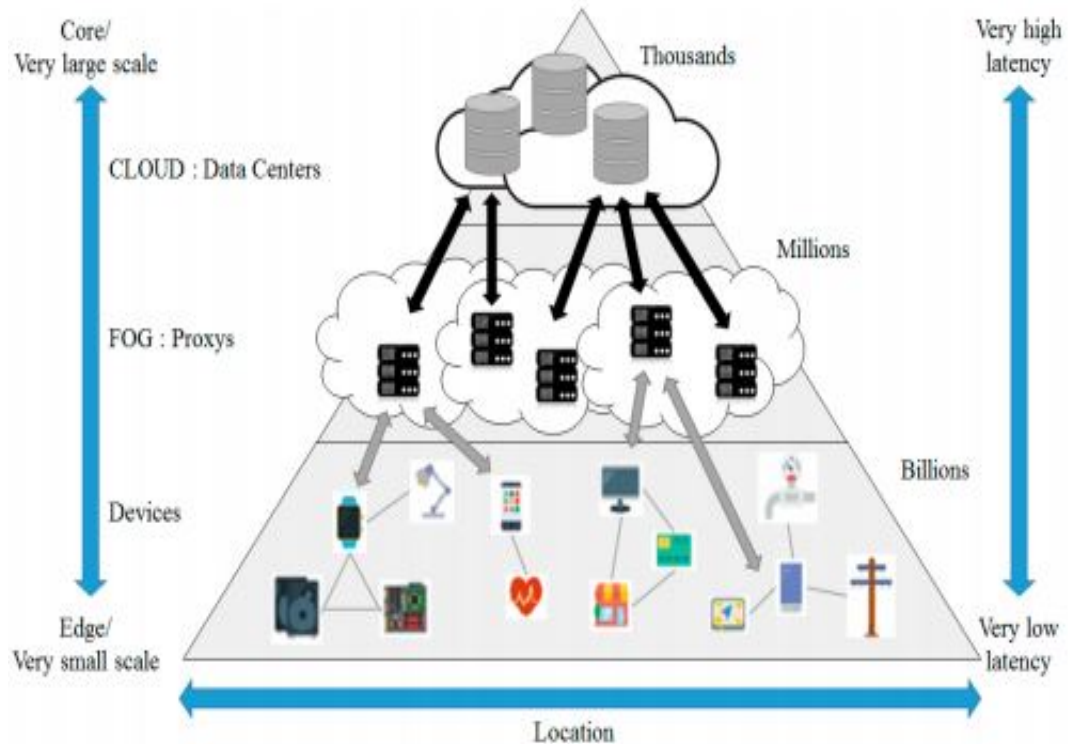
**Figure 9.6: Cloud and Edge Computing – Complementary Technologies Powering IIoT**



Source: Open Automation Software – IIoT Edge Computing vs. Cloud Computing  
<https://openautomationsoftware.com/blog/iiot-edge-computing-vs-cloud-computing/>

Today, the usage of cloud services can be seen everywhere, available through providers such as – AWS, DigitalOcean, Azure, Google Cloud, and VMWare. The overall computing architecture and systems are changing rapidly with the addition of another more proximate computer layer between the cloud and edge called the fog layer. The fog layer operates through smaller computer nodes connected back to the cloud data center but situated physically closer to the data end-users and edge devices, as shown in the diagram on the next page.

**Figure 9.7: Cloud, Fog, and Edge**



Source: Hyun-Jong Cha, Ho-Kyung Yang and You-Jin Song, (2018) A Study on the Design of Fog Computing Architecture Using Sensor Networks, Seoul, South Korea: Sunmoon University and Dongguk University. P. 4 Retrieved from <https://www.mdpi.com/1424-8220/18/11/3633/pdf>

It is crucial to point out here that real-time computing capacity and security increases the closer one gets to the edge. Industry leaders are lamenting the fact that the original design of today's Internet infrastructure has created a massive security and data protection threat. For this reason, other researchers and technology leaders are looking to the decentralized architecture of DLTs as more secure and trustworthy compared today's vulnerable Internet architecture. They predict that it will replace the current Internet infrastructure in the future.<sup>682</sup>

<sup>682</sup> Muneeb Ali, 'Trust to Trust Design of a New Internet' (Doctor of Philosophy, Princeton University, 2017). <https://muneebali.com/thesis>

George Gilder, *Life After Google: The Fall of Big Data and the Rise of the Blockchain Economy* (Washington D.C.: Regener Publishing, 2018).

Tapscott and Kaplan.

## **The Impact of Generation Z upon Educational Delivery in the Future**

One of the most profound changes in global society today is the emergence of the post-Millennial generation, Gen Z (born 1996-2012). They have been called “Digital Natives,” the “Internet Generation (IGen),” and “Screensters” since they are the first generation born in an Internet-connected environment and are incredibly tech-savvy.<sup>683</sup> While every new generation has faced its share of disruption in technology, economics, politics and society, no other generation could connect every human being on the planet and, in the process, provide the opportunity for each person to be educated while being socially and economically engaged. What might the advancement of Gen Z imply for many businesses and, in particular, for educational institutions in the future?

Gen Zs are accustomed to multimedia and various forms of technology that comprise a seamless part of their daily lives. They use multiple edge devices simultaneously, switching between smartphones, iPads, tablets, and laptops. For example, a recent study found that more than half of U.S. teenagers do not wear wristwatches because they use their smartphone to tell time, get directions, or take a picture.<sup>684</sup>

Rothman asserts the significance of understanding Gen Z and essential changes that will likely be required for instructors to adapt technologically to their learning preferences and strengths as they begin to graduate from college in 2020. She indicates that because Gen Z is the first generation born into an

---

<sup>683</sup> Adam Renfro, 'Meet Generation Z', *GettingSmart.Com*, (2012.)  
<http://gettingsmart.com/2012/12/meet-generation-z/>

<sup>684</sup> Darla Rothman, 'A Tsunami of Learners Called Generation Z', *Public Safety: A State of Mind*, 1 (2014). <https://mdle.net/journal.htm>



internet-connected world, their use of technology has developed the visual proclivities of their brains. As a result, visual forms of learning are more effective with them. Conversely, their frequent use of fast-paced multimedia has impacted their attention spans, ability to focus, and analyze complex data or information. Rothman portends that schools will have to provide even more professional development to help instructors move from the traditional classroom to a transformational learning model using new software, digital and social media platforms. <sup>685</sup>

Koulopoulos and Keldsen, in *The Gen Z Effect: The Six Forces Shaping the Future of Business*, examined the future world of Gen Z, where disruptive invention and reinvention will likely be the acknowledged norm. These authors asserted the importance of educational institutions embracing Gen Z and the critical need to help these students take on and solve some of the enormous challenges and opportunities that will present themselves during the *Fourth Industrial Revolution*.<sup>686</sup>

In a 2016 study conducted by Adobe Inc., researchers summarized findings of a survey conducted with 1000 U.S. students (ages 11-17) and 400 teachers of Gen Z. The results showed that both the students (78%) and the teachers (77%) surveyed felt that Gen Z students learned best by creating together with peers and through hands-on experiences. The five overall insights that Adobe emphasized in their study were:

---

<sup>685</sup> Ibid., p.1

<sup>686</sup> Tom Koulopoulos and Dan Keldsen, *The Gen Z Effect: The Six Forces Shaping the Future of Business*. [Electronic Resource], 1st edn (Bibliomotion, 2014).

- (1) Gen Z students see tech and creativity as essential and intersecting aspects of their identities;
- (2) Gen Z students are excited but nervous for their futures and do not feel fully prepared for the “real world;”
- (3). Students and teachers wanted more focus on creativity;
- (4) Creativity will play a critical role in the careers of the future, and (5). Technology will likely set Gen Z apart as they enter and participate in the future workforce.<sup>687</sup>

Hora’s research indicated that Gen Z individuals are self-starters, appreciate skills that are valued, have a long-term focus and are hard workers who are willing to learn on their own. In light of these characteristics, Hora recommended several strategies that educators could consider initiating to enhance their missions to align with Gen Z’s strengths as well as educate and prepare this generation of learners for the expectations of employers.<sup>688</sup>

Rothman suggested what educators will need to consider to engage Gen Z students in purposeful learning activities. She described those needs in the following terms (Refer to the list provided in the table on the next page based on Rothman’s study):

---

<sup>687</sup> Stephanie Morey and Jodi Mouratis, *New Adobe Study Shows Gen Z Students and Teachers See Creativity as Key to Success*, <https://news.adobe.com/press-release/creative-cloud/new-adobe-study-shows-gen-z-students-and-teachers-see-creativity-key>, Adobe Press Release, (Anaheim, CA: 2016).

<sup>688</sup> Hora.

**Table 9.4 – Learning Preferences of Generation Z  
What will it take to engage them in learning?**

- Fast delivery of content with complex graphics – They are kinesthetic, experiential, hands-on learners who prefer to learn by doing rather than being told what to do or by reading text. Learning is not a spectator sport.
- Prefer random access, graphics first, connected activities. They have a need for speed and instant gratification.
- Integration of continuous grading, instant feedback, clear goals, rewards, challenges, and positive reinforcement.
- Task switching (multitasking) has given them a short attention span. They may be hard to teach, easily bored and ready to move into the next thing. Due to this, learning needs to be delivered in smaller “bites.”
- Gen Z will learn more effectively if they are left to solve problems and find solutions by trial and error.
- Ability to express opinions in small group discussions and Q & A sessions.
- Access to too much data makes Gen Z go for the quick answer rather than the more extended problem-solving approach.
- Gen Z’s do not take the time to determine the reliability of their information. Library resources are more accurate than search engines (Google) but do not fit Gen Z’s need for speed, convenience, or ease of use.
- Gen Z must learn to discover, curate, and manage information. Focus on critical thinking and problem solving instead of memorizing information.
- Prefers to work in teams/small groups. Creativity and collaboration are natural to them, whether it is a spontaneous or structured activity.
- Flexibility to learn in the way that works best for them. They need options to choose from, so learning can be personalized. This makes them more reflective and independent learners than other generations.

(Underline added for reader focus and emphasis)

Source: adapted from Darla Rothman, 'A Tsunami of Learners Called Generation Z,' *Public Safety: A State of Mind*, 1 (2014). <https://mdle.net/journal.htm>

A 2015 Barnes & Noble College report showed Gen Z learns best through visual technology tools, websites and other independent study materials. In addition, they have a high preference for learning by engaging in classroom discussions and working in groups to solve problems.<sup>689</sup>

<sup>689</sup> Barnes & Noble College, *Getting to Know Gen Z: Exploring Middle and High Schoolers' Expectations for Higher Education*, (2015). <https://next.bncollege.com/wp-content/uploads/2015/10/Gen-Z-Research-Report-Final.pdf>

Researchers are still discovering the nuances and idiosyncrasies of this generation of students; however, a few scholars recommended some potentially useful teaching strategies for both the classroom and beyond. According to Schawbel, teachers should look to “go virtual” by incorporating collaborative assignments or in-class activities on virtual environments that work best for Gen Z students. Schawbel cautioned that, in doing so, instructors should not make virtual environments the sole avenue for instruction and learning because the facilitation of critical thinking and reflection is also essential to the process of learning.<sup>690</sup>

Renfro’s study demonstrated that Gen Z individuals highly prefer the use of handheld multi-functional mobile devices with the ability to watch a video, snap a photo, connect to the Internet, play games and listen to music.<sup>691</sup>

McWilliam argued that instructors would need to shift their mindset from the role of “sage-on-the-stage” to what she termed a “meddler-in-the-middle.” According to McWilliam, the meddler-in-the-middle teaching approach involves the faculty member learning and doing, making mistakes and engaging in trial and error alongside the students.<sup>692</sup> McWilliam described this form of pedagogy as a definite challenge to traditional notions of good teaching. She suggested five different ways in which a meddler-in-the middle might allocate his or her time in the classroom.

---

<sup>690</sup> Dan Schawbel, *Gen Y and Gen Z Global Workplace Expectations Study*, <http://millennialbranding.com/2014/geny-genz-global-workplace-expectations-study/>, (Millennial Branding and Randstad US, 2014).

<sup>691</sup> Renfro.

<sup>692</sup> Erica McWilliam, *Teaching Gen Z*, Erica McWilliam, Com.Au, (2015).  
<http://www.ericamcwilliam.com.au/teaching-gen-z/>

1. less time giving instructions and more time spent being a usefully ignorant team member in the thick of the learning action;
2. less time spent being a custodial risk minimizer and more time spent being an experimenter, risk-taker and learner;
3. less time spent being a forensic classroom auditor and more time spent being a designer, editor and assembler of high challenge tasks;
4. less time spent being a counselor and ‘best buddy’ and more time spent being a collaborative critic and authentic evaluator; and,
5. less emphasis on grades and more emphasis on the achievement of PBs (personal bests).<sup>693</sup>

The research on Gen Z is relevant to the questions posed by this thesis because it recommends some of the potential adaptations in pedagogy that will be necessary to more effectively engage, motivate and maximize learning outcomes for this modern generation of students. The online and plugged-in characteristics of Gen Z learners can be viewed as strengths to be optimized or deficits that might hinder effective teaching. What appears certain is that effective pedagogy in the future will necessitate the use of TEL in a much more flexible and seamless fashion to engage actively and educationally impact this generation. The implications of the COVID-19 pandemic have only served to elevate the imperative for educators to accelerate their competency and adoption of online edge-computing instructional modalities.

---

<sup>693</sup> McWilliam.

## **Gaps in the Research – Issues in the Development of Seamless Learning**

The rise of Internet-based cloud services, platform mega-enterprises, and communication, visualization, and simulation technologies now make it possible to offer students authentic learning experiences ranging from experimentation to real-world problem-solving. Hand-held supercomputers have the processing power to benefit from edge computing and adapt to localized physical and social settings, even in remote areas of the world.

Research into the adoption of mobile technologies in education has generated new approaches to cross-contextual learning and strategies for so-called mobile learning (m-learning).<sup>694</sup> TEL supported by wireless technologies and anywhere computing, has been termed by researchers as ubiquitous learning (*u-learning*).<sup>695</sup> Recent studies have also investigated the concept of what has been named “seamless learning”—defined as the ability to support continuous educational delivery and learning across various contexts and devices.<sup>696</sup>

In 2006, an international group of scholars initiated an in-depth investigation of seamless learning. It proposed crucial new research into learning under

---

<sup>694</sup> 'Mobile Learning: Research, Practice and Challenges', pp. 5-11.

<sup>695</sup> Rogers and Price, 'Using Ubiquitous Computing to Extend and Enhance Learning Experiences', in *Ubiquitous Computing in Education: Invisible Technology, Visible Impact*, ed. by van Hooft and Swan, pp. 329-347.

<sup>696</sup> Chee-Kit Looi and others, 'Anatomy of a Mobilized Lesson: Learning *My Way*', *Computers & Education*, 53 (2009), pp. 1120-1132.

Lung-Hsiang Wong, 'A Brief History of Mobile Seamless Learning', in *Seamless Learning in the Age of Mobile Connectivity*, ed. by Lung-Hsiang Wong, Marcelo Milrad and M. Specht (Springer, 2015), pp. 3-40.

circumstances where every learner has access to a networked personal computing device and can use it to learn across a variety of contexts.<sup>697</sup>

Seamless learning implies that every student can learn whenever they are curious and in scenarios that might include learning individually, with peers, in small groups, with teachers, family members, in a classroom and within other supporting communities.

Looi et al. revealed the existence of a significant gap in the literature and they recommended the need to formulate test environments and conduct longitudinal studies to explore the use of seamless learning to promote 21st-century knowledge, skills, and positive attitudes of the next generation of students.<sup>698</sup>

De Waard et al. forecast in their study that the use of social media, mobile technologies and MOOCs will continue to have a significant influence upon learning and teaching processes in the future.<sup>699</sup>

Another group of international scholars postulated what they considered to be the most critical questions for researchers and educators to answer when considering effective ways to design, implement and evaluate seamless learning environments. They list some of the design challenges faced by seamless learning scholars and educationalists as:

---

<sup>697</sup> Chan and others, pp. 3-29.

<sup>698</sup> 'Leveraging Mobile Technology for Sustainable Seamless Learning: A Research Agenda', pp. 154-169.

<sup>699</sup> Inge de Waard and others, 'Using m-Learning and MOOCs to Understand Chaos, Emergence, and Complexity in Education', *The International Review of Research in Open and Distance Learning*, 12 (2011), pp. 94-115.

- How to design seamless learning activities that support innovative learning practices?
- How to design seamless learning activities that integrate learning across informal and formal settings, with the eventual aim of nurturing autonomous learners?
- How to design learning activities that reflect the cultural diversity of learners?
- How to assess seamless learning in these new educational contexts?<sup>700</sup>

Another significant issue identified by this same group of researchers pertained to the integration of software components in distributed environments (e.g., device- versus cloud or edge-based), and also across a variety of new hardware and peripherals (e.g., IC chip sensors embedded in IoT devices). Further identified by the same study was the challenge to support content delivery and learner artifact creation on diverse types of devices across different learning contexts.<sup>701</sup> This thesis chapter proposes a DLT framework facilitated integration that has the potential to close the gap in both the research on seamless learning as well as provide answers to some of the questions listed above.

According to Anastopoulou et al., the primary goal of seamless learning and motivation for learning scientists to promote it is two-fold: (1) To foster students' thinking habits so that they can build 21<sup>st</sup>-century skills to make contributions to

---

<sup>700</sup> Milrad and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Berge and Muilenburg, pp. 95-108.

<sup>701</sup> Ibid., p. 100.



society, and (2) To design and implement not just episodic learning activities, but ongoing sustainable programs capable of transforming learners into more self-directed individuals that can carry out learning tasks in any learning context on a perpetual basis without external assistance.<sup>702</sup> Wong, Chai, Chin, Hsieh, & Liu concurred with these objectives and posited that seamless learners mediated by technology should be empowered to explore and identify latent spaces in their daily lives that offer opportunities to learn uninhibited by externally-defined learning goals and resources.<sup>703</sup>

Singapore scholars, Wong and Looi, make a seminal contribution to the field of TEL pedagogy in their critical review of the literature associated with the field of mobile seamless learning (MSL). In their comprehensive study, they put forth a framework in which they identified ten key features that characterize the seamlessness of the integration of wireless, mobile and ubiquitous computing technologies.<sup>704</sup> The ten characteristics centered on the use of mobile devices as the primary means of enabling seamless learning. The MSL framework was updated by Wong et al. in 2012 to include elements for more learner-centric u-learning.<sup>705</sup> The objective of these scholars in proposing this framework was to

---

<sup>702</sup> A. Anastopoulou and others, 'Creating Personal Meaning through Technology-Supported Science Learning Across Formal and Informal Settings', *International Journal of Science Education*, 34 (2012), pp. 251-273.

<sup>703</sup> L-H Wong and others, 'Towards a Seamless Language Learning Framework Mediated by the Ubiquitous Technology', *International Journal of Mobile Learning and Organization*, 6 (2012), pp. 156-171.

<sup>704</sup> Lung-Hsiang Wong and Chee-Kit Looi, 'What Seams do we Remove in Mobile Assisted Seamless Learning? A Critical Review of the Literature', *Computers & Education*, 57 (2011), pp. 2364-2381.

<sup>705</sup> Lung-Hsiang Wong, 'A Learner-Centric View of Mobile Seamless Learning', *British Journal of Educational Technology (BJET)*, 43 (2012), E19-E23.

come to a set of characteristics when, if addressed, would result in more genuinely effective seamless learning for both students and their instructors.

**Table 9.5 – Mobile Seamless Learning (MSL) Framework – Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE) Design**

- **(MSL 1):** encompassing formal and informal learning
- **(MSL 2):** encompassing personal and social learning
- **(MSL 3):** across time
- **(MSL 4):** across locations

**(MSL 5): Ubiquitous access to learning resources (online data and information, teacher-created materials, student artifacts, online student interactions, etc.; ubiquitous access to learning resources)**

- **(MSL 6):** encompassing physical and digital worlds
- **(MSL 7):** combined use of multiple device types (tech)

**(MSL 8): seamless switching between multiple learning tasks**

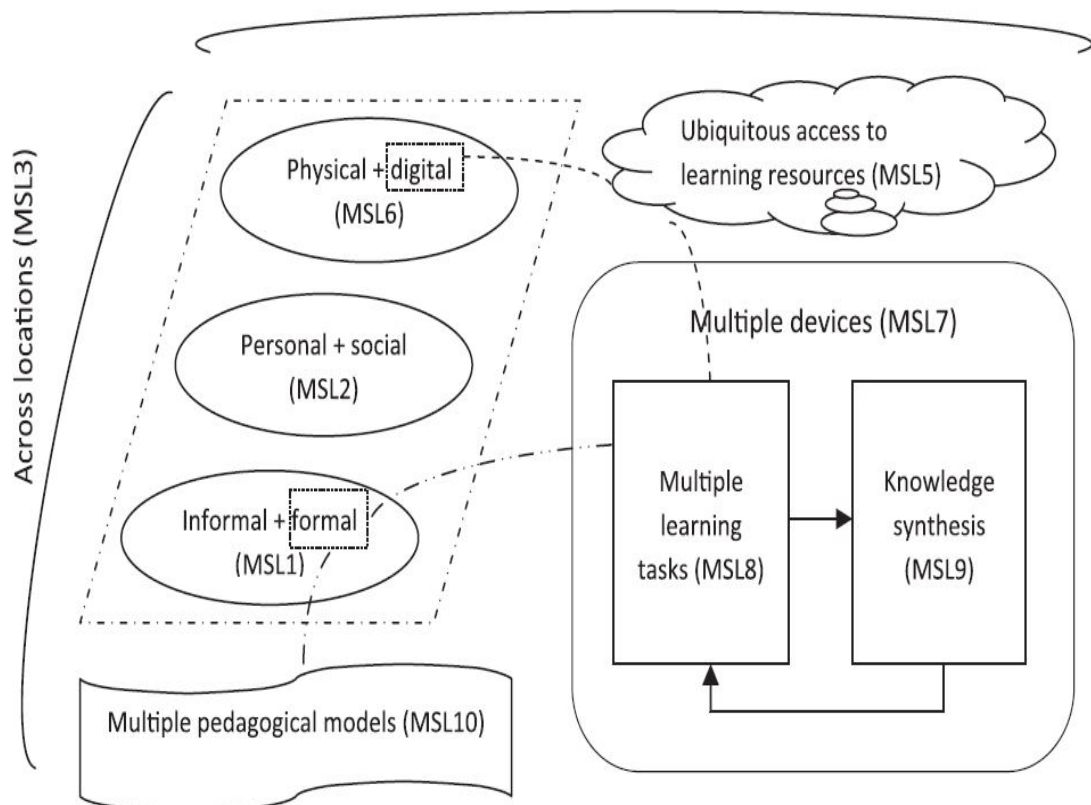
**(MSL 9): knowledge synthesis (prior, new knowledge, multidisciplinary learning)**

**(MSL 10): encompassing multiple pedagogical or learning activity models (facilitated by teachers)**

Source: Lung-Hsiang Wong and Chee-Kit Looi, 'What Seams do we Remove in Mobile Assisted Seamless Learning? A Critical Review of the Literature', *Computers & Education*, 57 (2011), pp. 2364-2381.

The MSL 5, MSL 8, MSL 9, and MSL 10 characteristics are purposely bolded and set apart from the others above because of their critical importance to the proposal being made by this thesis. Wong critiqued the typology of the ten dimensions and argued for a more “personal learning environment” to be established for mobile learners. As a result, Wong’s study proposed the use of a more learner-centric model to visualize better the relationships among the ten dimensions of the MSL framework (Refer to Figure 9.8 below for Wong’s model).

**Figure 9.8: Hierarchical View of the Ten MSL Dimensions**  
Across time (MSL4)



Source: Lung-Hsiang Wong, 'A Learner-Centric View of Mobile Seamless Learning', *British Journal of Educational Technology (BJET)*, 43 (2012), E19-E23.

The figure above is intended to show a hierarchical view of the ten MSL dimensions. It is learner-centric in the sense that it represents a model of the MSL framework and ecology not from the perspective of MSL designers or facilitators (e.g., teachers) but from the vantage point of the individual seamless learner instead. Wong makes a significant point when he states that “placing the learner at the center does not mean that she is the center of attention of teachers, but rather, the center of the production of knowledge that occurs in various contexts within the multidimensional learning spaces.”<sup>706</sup>

<sup>706</sup> 'A Learner-Centric View of Mobile Seamless Learning', p.E20.

A critical review of the literature on seamless learning revealed significant gaps in the research. Wong and Looi posited that scholarship was severely lacking on the practical implementation of seamless learning concepts under the ten-part framework and argued for more studies to be done in the unexplored areas of the framework. At that time, the MSL research community had been emphasizing the first six dimensions of the framework. However, Wong and Looi argued “*that the last four relatively unexplored dimensions have their respective utility and importance in facilitating more holistic seamless learning experiences and achieving more profound and sustainable learning outcomes.*”<sup>707</sup> [underline added]

In particular, further in-depth analysis of the pertinent literature discovered a dearth of research recommending an analysis of the MSL 8, MSL 9 and MSL 10 dimensions.

The various scholars referenced in the following pages epitomize and describe some of the core challenges faced in structuring a pedagogical and technological design associated with seamless learning as well as their open declaration of the remaining gaps in the pertinent literature and studies tied to the MSL 8,9 and 10 dimensions. These considerations are relevant to the hypothesis and research questions proposed by this paper because these same issues regarding pedagogy, epistemology and instructor/student interactions are equally critical if implemented within either the traditional Anglophone or the indigenous pedagogical context.

---

<sup>707</sup> Wong and Looi, 'What Seams do we Remove in Mobile Assisted Seamless Learning? A Critical Review of the Literature', 2364-2381

Stahl suggests that the vision of transforming learning practices with new technologies, especially with regard to enabling learning and collaboration across contexts has not fully crystalized. He attributes the slow progress to the reality that the designing of effective computer support along with appropriate pedagogy and social practices has become more complicated than previously imagined.<sup>708</sup>

Seamless learning scholars such as Milrad and others explain that there is no easy solution to the development of systems and technological tools to mediate autonomous and social learning in seamless learning environments. The list below summarizes the barriers and challenges that these scholars indicate must be overcome before seamless learning technologies and pedagogies can be applied effectively::

(1) The Logistical Challenges: Seamless learning solutions must be able to support individual learners in bridging their ongoing learning processes across contexts, as well as connecting multiple learners within the same learning community but separated by time and (physical or digital) spaces.

(2) Altering Traditional Teaching and Learning Behaviors: The shifting of the epistemological beliefs of individual learners (as well as teachers who are to facilitate seamless learning) from

---

<sup>708</sup> G. Stahl, *Contributions to a Theoretical Framework for CSCL*, Boulder, Colorado edn, CSCL '02 Proceedings of the Conference on Computer Support for Collaborative Learning: Foundations for a CSCL Community, (Hillsdale, NJ: Lawrence Erlbaum, 2002) pp. 62-71.

absolutism and transmissionism to constructivism and socio-constructivism. This is because genuine seamless learning is about treating all the learning spaces and resources that learners have access to as ingredients to facilitate their ongoing co-construction of knowledge rather than a series of facts that are best to be learned through didactic teaching.

(3) The Design Challenge: Educational practitioners and researchers must find effective ways to design, implement and evaluate, innovative learning environment and technologies in a wide variety of learning settings.<sup>709</sup>

### **Education Specific Seamless Learning through an Extendable Infrastructure at the Edge (ESSL--EIE)**

Having previously defined and described the relevance and potential importance of edge computing and DLT to the field of TEL and the pedagogical and technological challenges faced by educators to meet the demands of Gen Z learners, it is now appropriate to recommend some potential solutions for closing the gaps in research and infrastructure associated with the ten dimensions of effective seamless learning.

Recommended in the diagrams and analysis on the following pages is a proposed new integrative model for seamless learning that capitalizes on the

---

<sup>709</sup> Milrad and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Berge and Muilenburg, p. 100.

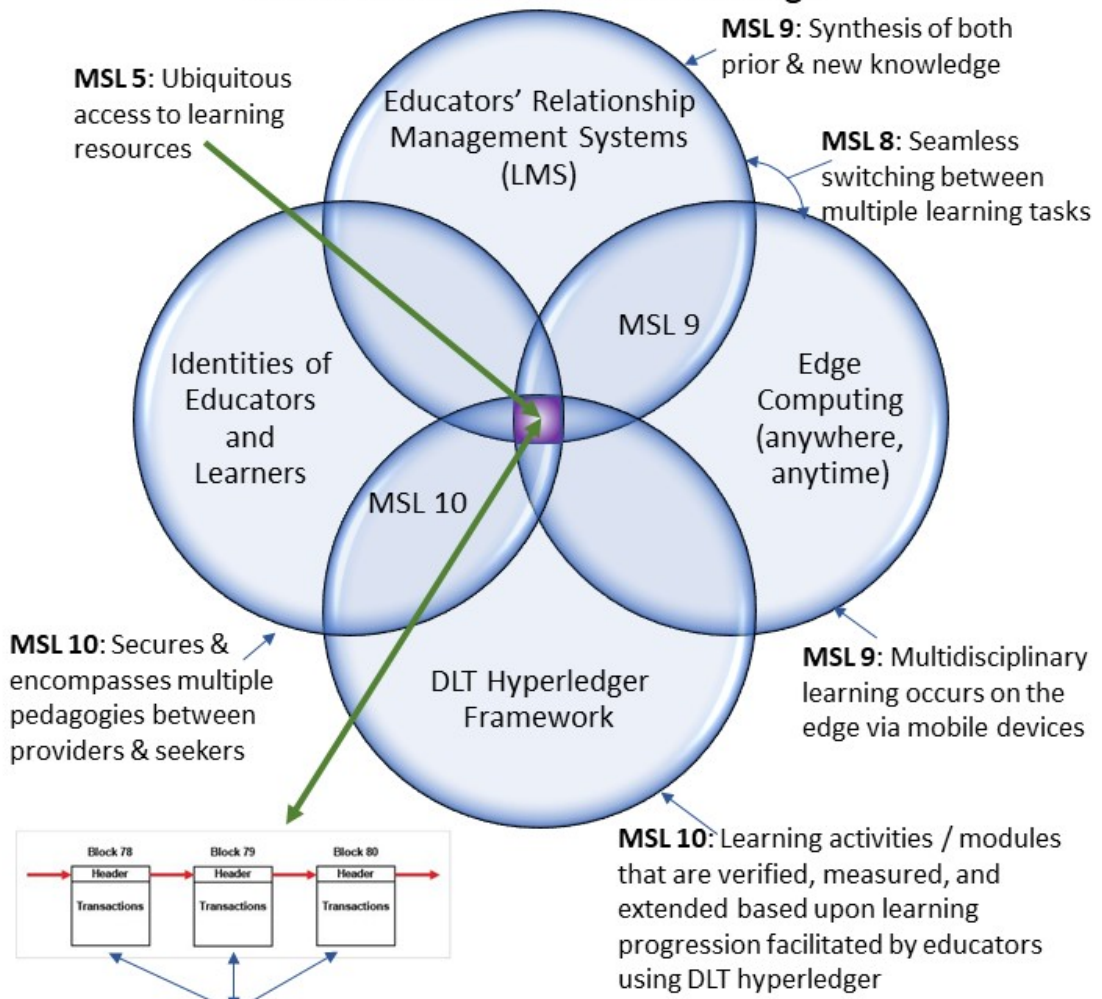
advantages afforded through edge computing networks and institutional learning management systems (LMS).

*The DLT Hyperledger framework is recommended as the critical MSL component or technological tool for the facilitation of the myriad of possible mobile-assisted interactions that might occur between educational providers and learners.*

The sovereign identities held by all parties and participants in the proposed integration are also central to the security, trustworthiness, efficiency and flexibility of the proposed integrated model's design.

After explaining the overall infrastructure and design of the model, its use will be illustrated through several uses cases for its potential application, not only in the Native Hawaiian secondary and undergraduate teaching and learning context, but also in other scenarios. This approach was also selected due to the advocacy in this dissertation of the seven universal CREDE standards as the pedagogical framework in tandem with the analysis proposed by the two research questions.

**Figure 9.9: Education Specific Seamless Learning Through an Extendable Infrastructure at the Edge**



**Education and Seamless Learning at the Edge through Extendable Infrastructure**

- Security, privacy, & immutability of exchange between educators and learners.
- Seamless, mobile, & ubiquitous learning.
- **Key Innovation:** DLT hyperledger facilitates m-learning, increases access and accelerates educational advancement for both educators & learners as they connect and exchange value through smart contracts.

Source: Author's own work

**Explanation and Benefits of Education Specific MSL Learning at the Edge**

The reader will note that the Venn diagram above integrates the bottom three features that characterized seamlessness as proposed by Wong, Looi and



others in their *Wireless, Mobile, and Ubiquitous Technologies in Education*

(WMUTE) framework (refer to pages 349 & 350). These scholars suggested that the ten dimensions of MSL could be divided into three foci: (1) a technology focus (MSL 5, MSL7); (2) a pedagogy focus (MSL 8 and MSL10) and (3) a learner focus (MSL1,.2,3,4, 6 and MSL9),<sup>710</sup>

The ESSL-EIE model synergizes the combination of all three of these foci by integrating the relatively unexplored MSL 9 and MSL 10 dimensions, bridged and supported by MSL 8, to bring about access for all education providers and learners to u-learning resources (MSL5).

The most significant innovation provided by this model relative to the aims of this paper is the facilitation and acceleration of knowledge synthesis for the learner that happens in the MSL 9 dimension. This holistic, integrative approach also allows for each of the unexplored dimensions of MSL to begin to function synergistically: *a result not possible if they were researched or tested as stand-alone activities. Another conceptual argument proposed by this paper posits that the insertion of the DLT Hyperledger framework as a facilitating technology allows for the three pedagogical, technological and learner-centric foci of the MSL to intersect and function seamlessly.* Also, when these dimensions of MSL are synergized in this manner, a myriad of new options for more cost-effective, anytime, anywhere, knowledge transfer and learning become more feasible. A few of these options are:

---

<sup>710</sup> Wong and Looi, 'What Seams do we Remove in Mobile Assisted Seamless Learning? A Critical Review of the Literature', 2364-2381

1. The proximity and power of edge computing afford multidisciplinary learning to occur anytime, anywhere via mobile devices. (MSL 9)
2. A synthesis of both prior and new knowledge (MSL 9) between education providers and learners can occur through secure, private and controlled interactions available via simple access to any online wireless network or institutional learning management system.
3. The identities of all learners, educational providers and other stakeholders (e.g., professors, faculty, teachers, administrators, parents, mentors, tutors) and their content and pedagogies are secure, immutable and certifiable using the DLT Hyperledger framework (MSL 10). In this way, value can be safely exchanged (i.e., financial, intellectual property, certification of learning progress, controlled access and individual or group content distribution).
4. Seamless switching can be accomplished between multiple learning tasks initiated by either the learner or educator (MSL 8).
5. As a result of all the MSL affordances mentioned above, all stakeholders have access to ubiquitous learning resources (MSL 5) anytime and anywhere and at any pace, thereby accelerating the educational advancement and benefits for all participants as they connect through DLT smart contracts.

It is crucial to reiterate that through this process, multiple educators, instructors and peers can securely and independently engage with any learner or group of learners through any number of separate smart contracts. The learning pathway can be self-selected or initiated by the learners based on their interests, educational objectives and curiosity. Also, educators can individualize,

modularize and tailor their educational outreach to fit any circumstance. This infrastructure model positions the fundamental how, when, where and who facets of the numerous MSL interactions facilitated through the DLT Hyperledger, *but it does not, and cannot prescribe, the “what” (e.g., course, module, video, audio, text) exchanges.*

The educational content delivered, and the learning activities facilitated must be initiated and sustained via the smart contract agreements between the parties involved. Moreover, the use of Hyperledger allows the interactions to be extendable, meaning that all participants can permit others to join the chain and extend the teaching or learning opportunity to others using their edge devices. Besides that, the scope of extendibility is not geographically or numerically bound: it can be offered locally, nationally or globally as long as the parties can digitally connect and conclude smart contract agreements.

Because of the two research questions posed by this dissertation, it is now vital to situate the model synthesis in an indigenous educational and learning environment. The Venn diagram on page 355 has been hypothetically adapted and placed into the Native Hawaiian educational environment. A primary assumption underlying this indigenous model framework is that it can be scalable and replicable to numerous other indigenous or Third World community contexts. The design of the indigenous community model also assumes that the various MSL exchanges between educational providers and seekers could be locally determined and controlled, a significant aspect of sovereignty desired by most indigenous communities. Therefore, the model's design allows for local cultural experts, parents and other community members

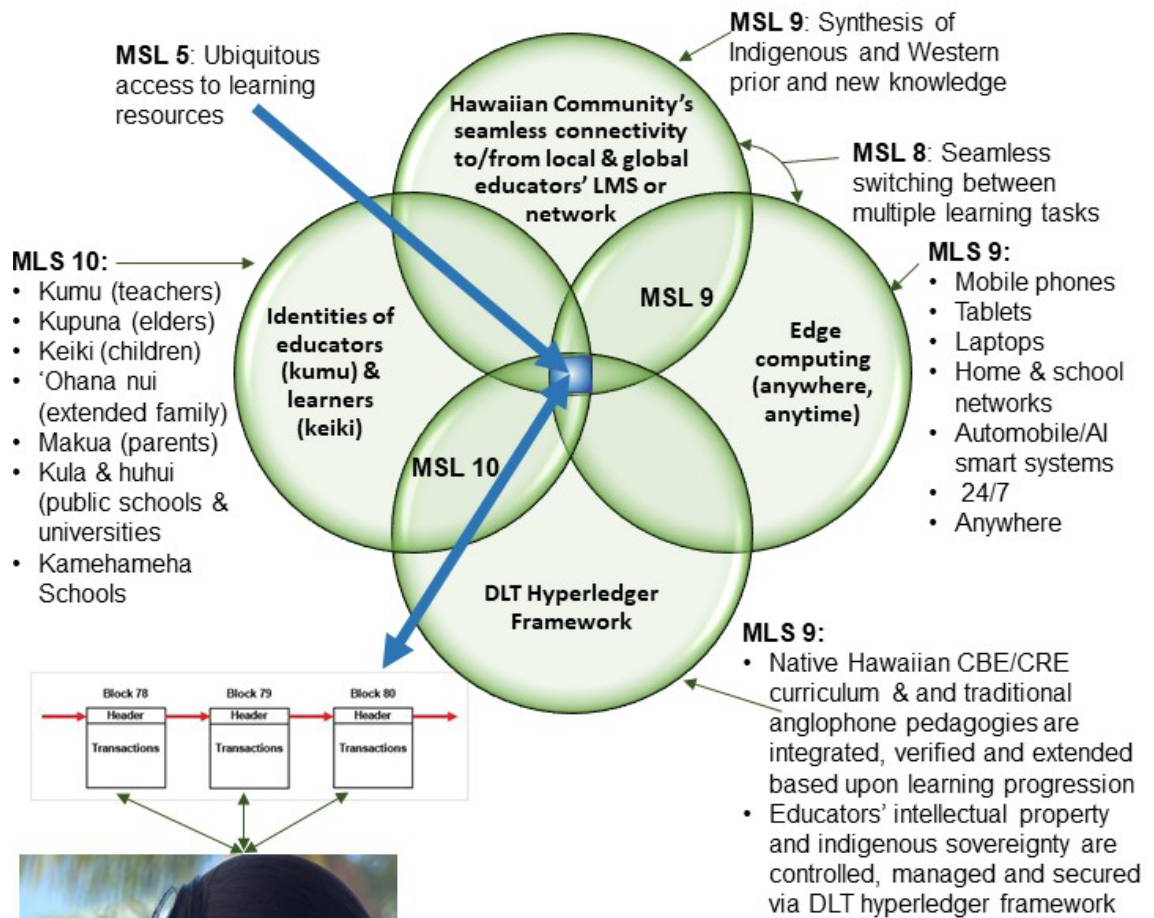
to add value, participate and benefit from the MSL infrastructure. This extendable seamless learning feature is highlighted in the use cases provided on the pages following the diagram. However, local initiation should not limit the opportunity for educationalists from any locale to actively interact with any learner nor benefit from the MSL synergies afforded through the DLT facilitated infrastructure.

Prior and new knowledge is also synthesized seamlessly in this indigenous model (i.e., MSL 9 and 10). Analogous to that recommended by Milrad et al., significant activities such as personal inquiry learning, peer-to-peer collaborative interactions other participatory approaches — “can be enacted to nurture the habit of minds of seamless learning among learners”<sup>711</sup> via the proposed extendable features afforded by a DLT facilitated infrastructure. In addition, the overall design of the model allows for the potential melding of the strengths of both the Anglophone and indigenous pedagogical traditions, a primary objective posed by this thesis, as a means of improving indigenous students’ learning outcomes. Furthermore, the use of modularized Hyperledger infrastructure and its applications facilitates the required synergies through smart contracts as students are interactively engaged via their mobile devices. At the same time, their learning progress is mentored, tracked and verified. Wireless mobile devices are central to the implementation of the educational value exchanges on a flextime basis and integral to the achievement of enhanced seamlessness afforded by the ESSL- EIE model’s design.

---

<sup>711</sup> Milrad and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Berge and Muilenburg p. 100.

**Figure 9.10: Hawaiian Indigenous Education Model  
 CBE/CRE Extendable Infrastructure**



**Culture-Based Education (CBE) & Learning at the Edge  
 ('O ka ho 'ona 'auao mo 'omeheu a ka ako ma ka 'ao 'ao)**

- Enables individualized learning because the CBE is driven by local Indigenous community stakeholders' needs & demands.
- Provides access to all local and international experts, providers, and seekers who mutually benefit.
- Facilitates seamless, mobile, and ubiquitous learning through the DLT framework and smart contracts; propelling learning progression.
- Extends reach and scalability by leveraging open-source platforms and standards for low-cost, secure value exchanges between all stakeholders.

Source: Author's own work

### **Examples of the Potential Use of the Education Specific Seamless Learning through an Extendable Infrastructure at the Edge**

To further demonstrate the flexibility of how MSL might be accomplished and facilitated by using the ESSL—EIE conceptual model, several potential use cases are illustrated in the pages below. Each of the cases differs from the traditional online or degree-seeking options in the way in which the interactions between educational providers and learners are more self-paced and modularized into smaller bits. Such an incremental approach could be especially useful for sustaining the interest, motivation and engagement of Gen Z students.

Modularization also allows instructors to teach or mentor many more students than would normally be achievable in a typical synchronous online setting. Also, the use of the DLT infrastructure by educators is capable of freeing them from many of the administrative duties associated with their current classroom-based or online teaching requirements. As a result, teachers are liberated to focus on mentoring and facilitating each student's learning progress. This is possible because the model is primarily designed to be learner-centric, self-paced and student-driven. The use of DLT Hyperledger offers new possibilities where the learning can be universally accessible and often occur through a series of individualized learn-by-doing activities or segments. Moreover, each student's ongoing learning progress can be independently tracked and secured as well as immutable and verifiable on the ledger at any time.

One adaptation needed, especially by education providers utilizing this DLT facilitated model, is that financial value exchanges (e.g., fees, tuition, courseware payments) will frequently occur over time and in smaller

increments. However, this should not be a significant problem in most cases because HF allows for every participant and every interaction to exchange value as often as needed through smart contracts. A series of private and secure micro-payments can be easily linked to these smart contractual agreements via a wide array of fintech solutions, including the existing legacy payment systems used by banks and educational institutions.

Potential use cases illustrating the potential application of the extendable seamless learning model infrastructure are outlined below in the six hypothetical MSL learning situations. These illustrations are intended to demonstrate how traditional Anglophone and Native Hawaiian pedagogies could be synthesized to accelerate learning for indigenous students. However, they intentionally are not limited to the Native Hawaiian contexts. This paper contends that the application of the integrated ESSL- EIE model is capable of being universally applied to almost any teaching and learning framework where the advantages of TEL are being sought.

Because of this contention, the specific secondary or undergraduate level setting context will first be stated along with an explanation of the educational providers and end-users under each use-case scenario. After that, to further demonstrate the broad application of the model, it will be shown which of the seven universal CREDE teaching and learning standards could be utilized and benefit through the use of the by the DLT facilitated infrastructure.

**Table 9.6 – Examples of MSL Incorporating the DLT Facilitated Model Design**

**Case #1 – Indigenous Hawaiian CBE/CRE Learning (Local Example)**

**Educational Setting:** MSL using edge-devices (mobile phones, laptops) for high-school-age Hawaiian students online and outside of the traditional classroom.

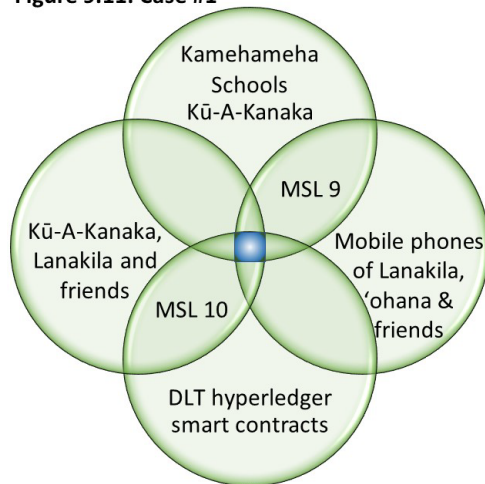
**CREDE Standards benefited through DLT infrastructure and facilitation:** (1) joint productive activity, (2) instructional conversation and (3) contextualization and (4) student-directed activity

**Learner(s):** Lanakila, a 15-year-old Native Hawaiian teenager, is curious and wants to learn how to speak Hawaiian and understand more about her ancestral roots and culture. She searches with her mobile phone and finds several options she likes and engages the educational providers using a DLT HF app downloaded online. Lanakila connects with her parents and other ‘ohana members who also want to join and support her efforts.

**Providers of Education:** Dr. Kū Kahakualau, Hawaiian linguist and cultural expert, through her Hawaiian heritage website and organization, Kū-A-Kanaka, offers what Lanakila wants (<https://www.kuakanaka.com/>). Dr. Ku teaches Lanakila through a series of instructional conversations her first lessons online and via the DLT app and determines what she already knows about the Hawaiian language and culture (contextualization). Lanakila chooses to learn the *hula* and traditional ways of food preparation (student-directed activity) from Auntie Ku and her organization’s cultural specialists. She introduces her parents and other ‘ohana members to the same opportunity, and they all agree to learn together and enter into separate smart contracts with Auntie Kū. (joint productive activity). The learning of everyone is self-paced and happens seamlessly, anytime and anywhere—thus illustrating the extendable feature of the ESSL-EIE model’s design.

Later on, when Lanakila is at the beach “talking story” with her friends, they become interested and decide they all want to learn Hawaiian too. This group chooses to learn together through the Kamehameha Schools ETS Learn program online ([http://ksdl.ksbe.edu/hawaiian\\_resources](http://ksdl.ksbe.edu/hawaiian_resources)). As a group, they set times to study using the free ETS online videos daily after school. (contextualization and joint-productive activity). As Gen Z learners, the DLT app is extendable to each individual, and thus each person learns at their own pace. One year later, three of them, including Lanakila, certify and pass a University of Hawaii – Hilo beginning Hawaiian language test to receive college credit.

**Figure 9.11: Case #1**



- Outcomes
- Lanakila and friends learn Hawaiian and increase their cultural skills.
  - Kū-A-Kanaka and Kamehameha Schools extend outreach to Native Hawaiian groups of students using MSL.



**Case #2 - U.K. University and International Indigenous MSL Example**

**Educational Setting:** International CLD student at the undergraduate college level.

**CREDE Standards benefited through DLT infrastructure and facilitation:**

(1) joint productive activity (2) contextualization and (3) student-directed activity, and (4) modeling

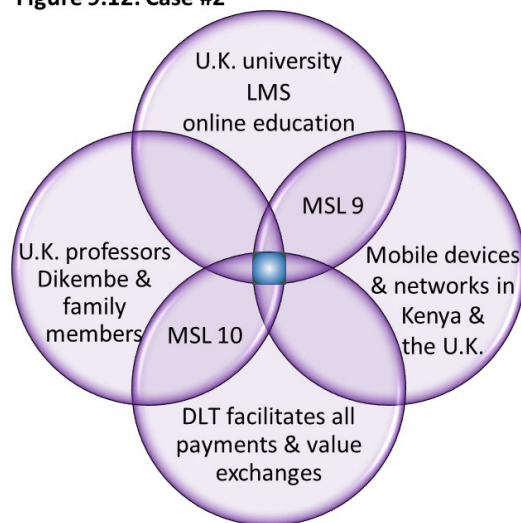
**Learner(s).** Dikembe, a male citizen of Kenya, wants to start his own business in Nairobi and learn about international trade, entrepreneurship and small business management. He does not have the resources to study full-time but can do it around his work schedule. He finds a good program located at a university in the U.K. close to where his relatives live. He decides to engage with the university and establish a flexible arrangement using a DLT smart contract where he can learn at his own pace using a flexible payment mechanism associated with the term and conditions of his smart contract (joint productive activity). After learning about Dikembe’s current skill level, the UK university customizes a set of lesson modules for him to help him accomplish his educational objectives (contextualization). His U.K. relatives agree to learn with him and help him make import/export trading connections through their relationships in the U.K. Since DLT smart contracts are extendable, all participants can exchange and receive monetary value for their inputs in helping Dikembe. (student-directed activity, modeling and observational learning)

**The Provider(s) of Education and Training:** Dikembe finds a School of Business professor with experience in Africa who is teaching at a prominent university in the U.K. The university also has a two-year business degree program which includes, as a requirement of the degree that he establish a new business enterprise.

Another professor at the same university has wanted to engage in an entrepreneurial outreach in Africa for some time to help train individuals on how to operate small businesses successfully. He joins the educational exchange and concludes smart contracts with the university, Dikembe and his relatives. This same professor offers to mentor Dikembe in Kenya personally and when Dikembe comes to visit his relatives in the U.K (instructional conversation). Dikembe learns part-time in Kenya and makes payments incrementally as he earns and learns and completes his individualized degree and apprenticeship training (modeling).

Dikembe takes 3-years instead of the standard 2-years to obtain his degree, but in the interim, the import/export business he established thrives and he is able to improve conditions for his whole family as well as pay for his degree debt-free.

Figure 9.12: Case #2



Outcomes

- Dikembe earns his business degree in Kenya and starts a successful business.
- DLT’s extendable feature allows family members in two countries to earn and learn.
- U.K. university uses MSL to reach more learners and grows their business degree program.
- Both U.K. professors extend their educational outreach to more Third-World students.

### Case #3 – U.S. College Age Student’s Career Learning Pathway

**Educational Setting:** Gen Z High School graduate – U.S. education to career pathway and non-degree seeking context.

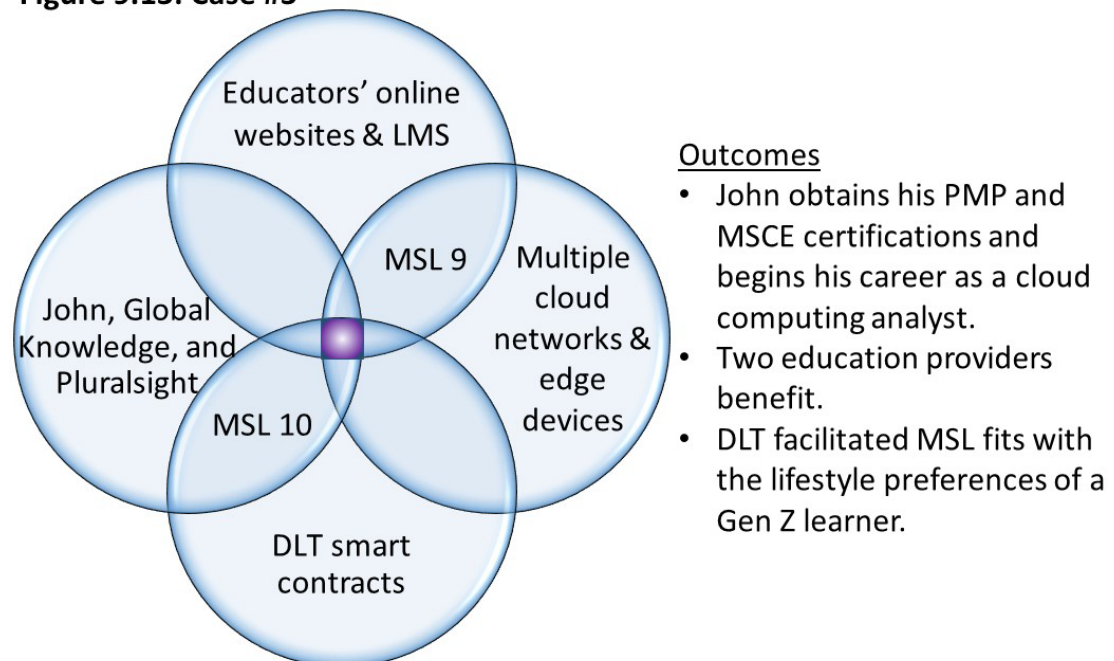
**CREDE Standards benefited through DLT infrastructure and facilitation:** (1) joint productive activity, (2) instructional conversation and (3) student-directed activity

**Learner:** John, an 18-year-old U.S. Gen Z student, wants to structure his own education pathway to a higher paying technical career. He decides he wants to obtain a certification as a project management professional (PMP). He also intends to seek employment as a cloud computing analyst in the future.

**Providers of Education:** Global Knowledge <https://www.globalknowledge.com/us-en/training/course-catalog/> contracts with John to help certify him under their PMP-Project Management Professional program. They agree to structure their standard \$2,000 cost for this certification under a series of sequential smart contracts with tutoring provided online (instructional conversation and joint productive activity) so that John can learn incrementally in small segments and self-paced (student-directed activity). John finishes this certification in 6 months and passes the PMP certification exam. He works full-time with a family friend while he learns and studies at night.

Pluralsight (<https://www.pluralsight.com/>) then enters the relationship with John and agrees to help him certify as a Microsoft Certified Azure Solutions Analyst using a DLT facilitated smart contract process and an online mentored practicum format (joint productive activity). John accomplishes his second goal within nine months and passes the MSCE exam. Afterward, he is hired as a cloud computer analyst with a beginning base salary of \$95,000 per year.

**Figure 9.13: Case #3**



**Case #4 – A non-traditional undergraduate student seeking to upgrade his skills and certify in a new field for more gainful employment**

**Educational Setting:** Non-traditional college-level student seeking to learn new skills online from multiple sources and obtain new certified skills as quickly as possible and at a lower cost

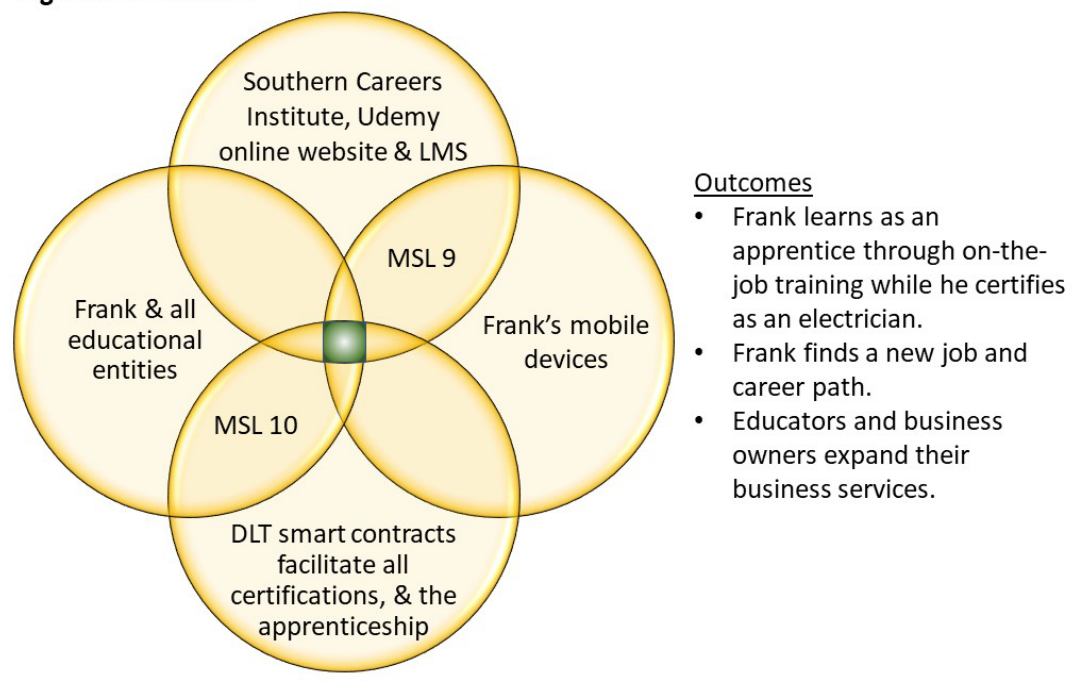
**CREDE Standards benefited through DLT infrastructure and facilitation:**  
(1) Student-directed activity (2) Modeling (through OJT and observational learning)

**Learner:** Frank, a 45-year-old parts assembler at an auto plant, loses his job because of the change to a 100% robotics assembly line at his Ford Motor plant in Texas. He is familiar with electrical systems from his past work experience and decides he wants to be an electrician and certify in that field.

**Providers of Education:** Frank decides to use the self-paced, modular training offered by Udemy <https://www.udemy.com/>. Udemy concludes a series of DLT smart contracts with Frank while he is unemployed and seeking work. (student-directed activity) Frank has no computer at home, so he can only use his smartphone for training. He downloads an HF app goes through it to make all of his course tuition and fee payments.

In the interim, a friend of his has an electrical contracting and services business and agrees to hire Frank temporarily as an apprentice so that he can learn by doing. (Modeling) The business owner also agrees to take amounts out of Frank's for the apprenticeship, which he agrees to provide to him under a DLT smart contract. In the meantime, Frank starts his formal training to become an electrician through the Southern Careers Institute in San Antonio, Texas. He learns at his own pace while being employed and certifies as an electrician in 8 months. He is hired by his current boss as a licensed electrician and is given a raise because of his new higher level of skills.

**Figure 9.14: Case #4**



**Case #5 – An Anglophone/Indigenous Professorial/Cross-Cultural MSL Learning Outreach and Exchange Scenario**

**Educational Setting:** College-level instruction and engaged learning/research initiative involving multiple indigenous communities, cross-cultural exchanges and synthesis of Anglophone and indigenous pedagogies.

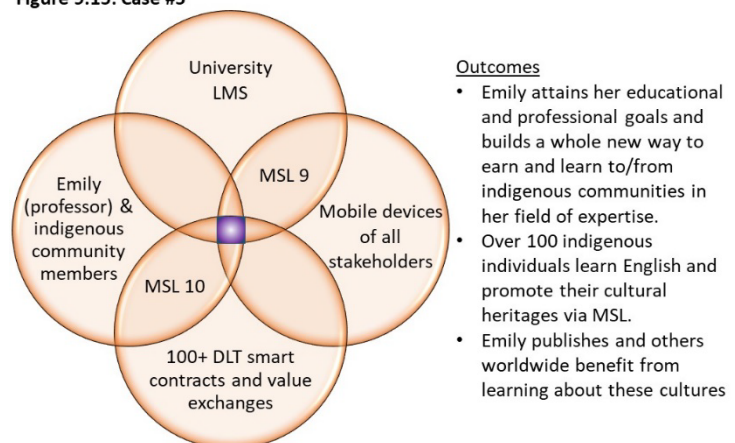
**CREDE Standards benefited through DLT infrastructure and facilitation:** (1) joint productive activity, (2) instructional conversation and (3) contextualization (4) student-directed activity and (5) Modeling,

In this example, the parties involved are both seekers and providers of seamless learning opportunities.

**Party A:** Emily, a university professor in anthropology and geography, wants to reach out and learn from several indigenous cultures around the world. She also desires to expand the delivery of her English-language geography course online with as many individuals as possible. She intends to change her teaching methodology and use the emerging technologies of AI and DLT to extend her influence and facilitate seamless mobile interactions with cultures around the world. Emily is seeking to learn from indigenous community members as a practical means of increasing her geographic and anthropological knowledge. She posts her interest on the Internet and is discovered by five groups totaling over 100 indigenous individuals in five different countries who want to learn and collaborate with her. (contextualization and teaching and learning using joint productive activity). They all have mobile devices and local network capabilities in their locations, and they prefer an educational exchange and dialog using in a peer group learning environment (joint productive activity and instructional conversation).

**Parties B-F:** Groups of individuals in Bali, Indonesia, the Kingdom of Tonga, The Navajo Nation, the Kuchin of Myanmar and Laos and Ami in Taiwan connect with Emily and want to learn English. Emily and these indigenous learners mutually agree that the geography course could be an ideal forum for learning because they can exchange, anthropological, linguistic and cultural knowledge while simultaneously learning English (contextualization, instructional conversation and modeling) Emily benefits through the in-depth exchange of anthropological and cultural understanding. In these instances, Emily and all the participants exchange values and certify progress via the completion of individual smart contracts (DLT implementation benefit) All parties mutually benefit in the accomplishment of their desired learning goals. Peer-to-peer group learning also takes place in the indigenous environment. (student-directed activity) Emily records the video sessions and later publishes her ethnographic research and new knowledge in several academic journals and conference presentations.

Figure 9.15: Case #5



### Case #6 – African Tribal Cultural Preservation and Digital Age Learning

**Educational Setting:** Third World rural group learning context where synthesis and the use of Anglophone and indigenous pedagogical principles are used to benefit students of all age groups

**CREDE Standards benefited through DLT infrastructure and facilitation:**

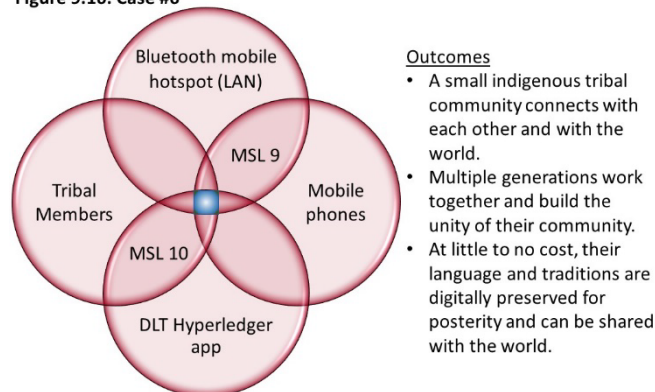
(1) joint productive activity, (2) contextualization (3) student-directed activity, and (4) modeling through the promotion of group observational learning.

**Learners and Providers of Education (the entire village):** A group of Bantu tribal leaders in a rural area of Lesotho in Southern Africa is deeply concerned that their Zulu dialect and cultural traditions are slowly being lost. They take pride in the traditional dance and ceremonies and their various forms of beadwork. For centuries the skill of beadwork has acted as a form of communication for them (contextualization). Two adults in the village have cell phones and connect through a recently installed local cell phone tower. The cell phones act as their village's Bluetooth enabled and edge computing devices as LAN though a wireless hotspot. The leaders determine that they want to video their dances and their beadwork artisans' skills for recording their oral histories and demonstrate their skills for digital archival and preservation. They use their cell phone cameras to record language and traditions. (Modeling and contextualization). A young adult returns from working in Johannesburg, South Africa and informs the elders about blockchain. She transfers a copy of her DLT Hyperledger link and app to the other village phones. All 112 members of the village join the ledger and privately contribute to the project. In the process, they learn about digital systems and are anxious to learn more. (joint-productive activity and student-directed activity where the young adult acts as the teacher). Without DLT facilitation each of the tribal members could not have learned at their own pace, nor their progress tracked independently of one another)

The cost for the villagers to complete this project involves only their own time and effort. In three months, they are finished. The young adult returns to S. Africa and posts the videos on YouTube and other social media websites. Since she speaks South African English, she translates the videos into English. All of the digital information is saved and immutable on the digital ledger. Several anthropologists abroad see the videos posted on YouTube. These professors are so impressed with the entrepreneurial initiative of the 112 village members that they agree to come to the village to set up a small training program in video production skills using principles of joint productive activity.

The tribal leaders now have a quality digital record of their history and traditions for training the next generation about their heritage and a way to preserve their language. They use the English translation to speak to the world for the first time and start making connections across the globe.

Figure 9.16: Case #6



Source: The forgoing Cases #1-6 and Figures 9.3—9.17 are the author's own work

## Conclusion

Scholars worldwide have argued for some time that the convergence of several factors such as ubiquitous access to mobile, connected, handheld computer devices, the proliferation of one-to-one computing, and the evolution of new innovative uses of these handhelds has created the potential for a new phase in the evolution of TEL.<sup>712</sup>

A significant body of recent research referred to as mobile-assisted seamless learning (MSL) has focused on ways to enable students to learn whenever they are curious and seamlessly switch between different contexts (such as in formal and informal or individual and group settings) and by extending the social spaces in which learners interact with each other.<sup>713</sup>

The expectation by scholars is that these mobile technological advances supported by theories of social learning and knowledge-building are capable of positively influencing the nature, process and outcomes of education.<sup>714</sup> These social-cultural developments enabled by one-to-one TEL continue to unfold today, fueled by the rapid proliferation and use of *Fourth Industrial Revolution* technologies such as AI, DLT, robotics and other platform-based systems. The COVID-19 pandemic and its significant implications on the global economy, including the education sector have caused numerous schools and colleges to reevaluate their TEL infrastructure and services in order to accelerate student

---

<sup>712</sup> Chan and others, p. 23.

<sup>713</sup> Anastopoulou and others, pp. 251-273.

<sup>714</sup> Ibid.

learning outside of the traditional classroom setting while continuing to help students to attain their educational objectives.

An argument can be put forth that the pervasive use of mobile devices in everyday situations may be close to the tipping point in terms of effecting fundamental shifts in the ways students learn inside and outside of schools. Furthermore, this change in paradigm is being propelled by the demands and preferences of Generation Z learners as digital-natives.

A comprehensive examination of the literature related to seamless learning revealed the existence of a significant gap in the research, including the need to formulate test environments and conduct longitudinal studies exploring the use of seamless learning to promote 21st-century knowledge, skills and positive attitudes among the next generation of students.

Wong and Looi made a seminal contribution to the field of TEL pedagogy in their critical review of the literature associated with the field of mobile seamless learning (MSL). They put forth a framework in which they identified ten key features that characterize the seamlessness of the integration of wireless, mobile and ubiquitous computing technologies. The ten characteristics centered on the use of mobile devices as the primary means of enabling seamless learning.

Recent studies concerning MSL have argued for more research relative to the last four unexplored dimensions of the WMUTE framework proposed by Wong and Looi, i.e., MSL 7-10, *because of their respective utility and importance in*

*facilitating more holistic seamless learning experiences to achieve more profound and sustainable learning outcomes.*

This thesis argues that more integrated and holistic solutions are required so that the various MSL dimensions can be seen to interact systemically. Previous research efforts have predominantly focused only on a single or at most two of the ten dimensions of the MSL framework. Scholars have also concentrated almost exclusively on the first six MSL dimensions, which involve only formal and informal learning theories associated with the optimal time or location for seamless learning interactions. In other words, *they have been device-centric in their analysis*. Switching the focus to a learner-centric approach shifts the research paradigm and concentration toward the facilitation of good pedagogy for the creation of improved learning outcomes.

**The primary contribution to the areas of research on m-learning, u-learning and mobile seamless learning offered by this dissertation is the proposed ESSL- EIE conceptual model that integrates and synergizes four of the unexplored dimensions of the MSL(WMUTE) framework.**

Because mobile devices are just tools for learning, the three technological, pedagogical and learner foci of the MSL framework should be looked at systemically. This thesis proposes the consideration of the Hyperledger DLT platform as a critical hidden ingredient necessary to synergize and optimize MSL outcomes in all three focus areas.

The ESSL--EIE model integrates four technological components critical to improving student outcomes and effective MS, namely:(1) the existing learning



management systems (LMS) of educators,(2) the private identities of educational providers and learners with (3) the advantages of edge computing, and (4) expanded MSL opportunities facilitated through use of the DLT Hyperledger framework. The seamless integration of these elements for maximizing value exchanges and learning outcomes is not technically and pedagogically feasible without the power and flexibility offered by DLTs. However, *the inclusion and proper use* of Hyperledger and its modular suite of applications makes a new dynamic and lower-cost form of MSL educational exchange more feasible.

The recommendations offered by this paper should be understood as conceptual. They represent only an initial first step to advance the understanding of the unexplored dimensions of the MSL framework. Additional scholarship and, most importantly, the testing of the ESSL-EIE conceptual model under controlled, quantitative, evidence-based research conditions and in range of educational settings will be mandatory to verify the efficacy of the MSL advantages recommended.

Research by educationalists on the use of DLT platforms to facilitate outreach and improve learning outcomes lags far behind that being investigated by global industry and commerce. However, as Seldon suggests, the rapid acceleration of the *Fourth Industrial Revolution* will necessitate that educators mobilize their efforts to counter the behavioral and technological disruptions that will inevitably

occur and ensure that these emerging technologies are used in the best interests of humanity.<sup>715</sup>

There is nothing to suggest that the use of the ESSL--EIE model cannot be deployed to technologically facilitate a workable synthesis of the strengths offered by both the traditional Anglophone and indigenous pedagogical traditions. Moreover, it should be anticipated that numerous other socio-cultural developments in education will emerge in the coming decade—combining new methods for synergizing MSL and CBE pedagogies—as the use of DLTs in educational environments becomes more prevalent.

Additional research efforts should consider not only the affordances of the mobile technologies themselves but also the pedagogical aspects of learners' cross-cultural learning environments and the customized learning goals of individuals.

Researchers still face numerous theoretical, methodological, technological and practical issues to understanding MSL and the design of seamless learning environments. The behavioral versus technical barriers to the implementation of effective MSL are significant. This chapter has proposed the use of a technology-centered design to better secure teacher/student interactions and improve seamless learning outcomes. It represents a technological tool capable of demonstrating how, when and where MSL can be better facilitated. Decisions as to the best methods for structuring the human interactions utilizing the

---

<sup>715</sup> Seldon.

proposed model must be left up to the educational providers and learners themselves.

Some crucial questions emerged in the course of this thesis examination that have significant implications for future research on seamless learning. For example, how does learning in a formal context in school prepare students for learning in seamless learning contexts and vice versa? How should the scaffolding for seamless learning be designed? How can both educators and learners be expertly trained to maximize the affordances offered through MSL? How should the sociocultural interactions be framed to ensure equitable learning environments for indigenous students?

The recommendation of this thesis proposal suggests that future research concerning seamless learning should ideally be participatory, learner-centered and move beyond mere speculations about the superficial potential of mobile technology. In this regard, Sharples, Taylor and Vavoula's exposition offers an excellent summary argument:

Instead of seeing mobile communication and online communities as a threat to formal education, we need to explore how learning can be transformed for the mobile age, through a dialogue between two worlds of education: one in which knowledge is given authority through the curriculum, the other in which it emerges through negotiation and a process of coming to mutual agreement.<sup>716</sup>

Education seems to work best when it is adaptable to include all types of teaching and learning and every type of student. DLTs provide a facilitation framework to help maximize this form of inclusion. The use of DLTs also offer a

---

<sup>716</sup> M. Sharples, J. Taylor and G. Vavoula, 'A Theory of Learning for the Mobile Age', in *The Sage Handbook of E-Learning Research*, ed. by R. Andrews and C. Haythornwaite (London: Sage, 2007), pp. 221-247.

more distributed, equitable and secure platform than is available through the infrastructure of the current Internet on which to create a lower-cost global framework for customized, student-centric lifelong learning.

## CHAPTER 10

### Conclusions and Recommendations

#### Thesis Purpose, Focus and Research Questions

The stated purpose of this thesis, as described in Chapter 1, was initially to investigate the following research question:

(1) How to negotiate the inclusion of both the Anglophone and Native Hawaiian pedagogical traditions to improve educational outcomes for indigenous secondary and college-level students?

The education of Native Hawaiians within the American Anglophone educational system and tradition was chosen for in-depth analysis due to several practical research-based considerations. The first rationale was tied to the size of the indigenous student demographic required for meaningful research analysis. Native Hawaiian students comprise 26.7 percent of the State of Hawaii's public school system, the highest of any racial or ethnic student group. A second vital consideration from a research perspective was the homogeneity of the geographic, linguistic and cultural traditions of Native Hawaiians. Comparatively, a significant segment of the more than 530 designated American Indian and Alaska Native tribal populations in the United States live in rural areas, have less than a few hundred members. Moreover, the languages of these indigenous groups are extraordinarily diverse and, in numerous cases dying out. In contrast, a dramatic resurgence of the Native Hawaiian population and active use of the Hawaiian language has occurred over the last forty years in Hawaii.

The final and perhaps most crucial rationale was the systemic transformation of education that has taken place in the modern era for Native Hawaiians. Since the early 1980s, a proliferation of Hawaiian language immersion programs in public elementary/secondary charter schools, alongside numerous other State of Hawaii and Native Hawaiian-led community initiatives have been instituted to perpetuate the Hawaiian culture and promote educational advancement. This historical reality offered a rich context and volume of scholarly literature for in-depth investigation and analysis.

After analyzing recent research conducted in the fields of seamless learning and mobile-assisted seamless learning (MSL), a significant gap was discovered in the pertinent literature. No studies were found focused on the utilization of the critical emerging technologies such as artificial intelligence (AI) and distributed ledger technology (DLT) to improve indigenous student outcomes or to facilitate CBE/ CRE based education. While the use of AI and DLT is still evolving, their accelerated adoption portends to bring about a significant transformation of all industries, including education during the next decade. If deployed correctly in concert with excellent teaching, it appears that AI and DLT facilitative educational systems could be especially beneficial as a new method of disseminating MSL learning opportunities at a decreased cost to indigenous peoples worldwide. A second research question emerged from further research and this gap in the MSL literature and the current technological environment, namely: 2) How to bring about a practical integration of these alternative pedagogies facilitated by technology-enhanced learning (TEL) applied in and out of school for these same target populations?

## **Review of the Literature---Conclusions and Recommendations**

The primary focus of the literature review was the examination of the Anglophone and Hawaiian indigenous pedagogical traditions. This analysis intended to empirically demonstrate those pedagogies most capable of improving the academic outcomes for Native Hawaiian students attending U.S. secondary schools and colleges

As a result of the examination of the literature, this thesis advocated for the adoption of the seven universal standards of effective pedagogy and learning established by CREDE through their extensive, longitudinal, in-depth analysis of the research literature in education and diversity. The five universal standards applicable to all students succinctly defined are: (1) Joint Productive Activity – *teacher and students producing together*; (2) Language Development-- *developing language and literacy across the curriculum*; (3) Contextualization-- *making meaning: connecting school to students' lives*; (4) Challenging Activities--*teaching complex thinking*; and (5) Instructional Conversation— *teaching through conversation*.

The literature review discovered that over the last thirty years, scholars and educators in Hawaii created theoretical models grounded in CREDE's universal standards to develop other Native Hawaiian and CBE/CRE pedagogies and rubrics (e.g., Nā Honua Maoli Ola, HIER, HCIE). The Hawaiian scholarship further demonstrated that the use of each of these rubrics had a positive influence on NH students' learning self-confidence and academic outcomes based on empirical studies

The University of Hawaii at Manoa, College of Education maintains the only currently operating Center for Research on Education, Diversity & Excellence (CREDE) today. The Hawaiian educators have added two more standards to the original five established, namely: Modeling--promoting observational learning, and Student-Directed Activity--encouraging students' decision-making. It is significant to note that these two additional standards parallel the standards found by earlier CREDE scholars to be distinctly evident in Native American pedagogical styles.

The rationale of the advocacy of these seven CREDE standards by this dissertation centered on their *evidence-based application of effective pedagogy for all students across all cultural, racial, and linguistic groups in the United States at all age levels and all types of media or subject matter*. The standards also theoretically had the potential for the integration of both traditional Anglophone and indigenous pedagogies and CBE/CRE teaching and learning methodologies. Lastly, this same framework served well as a foundation for the determination of the effectiveness of the integrated TEL model and the use of DLTs for enhancing the facilitation of MSL interactions presented in Chapter 9 of this thesis.

A careful analysis exposed seven significant themes or arguments among scholars regarding CBE and CRE. The paragraphs below summarize the seven categories and the research conclusions for each, followed by an analysis of gaps found in the pertinent literature and recommendations for future research efforts



**Argument A – *The Importance of Culture-Based Education (CBE) and***

***Culturally Relevant Education (CRE) Pedagogies*** **Conclusions:** (1) The use of CBE/CRE pedagogies demonstrates substantial promise towards reducing the educational achievement disparities between United States indigenous students and their mainstream peers. The evidence-based CBE/CRE research conducted by scholars in Alaska and Hawaii over the past two decades verified the effectiveness of integrating traditional Anglophone and indigenous pedagogies to improve Alaska Native and Native Hawaiian students’

achievement levels. **Gaps and Recommendations for Future Research:**

More scholarship establishing cause/effect linkages to student success indicators, corroborating the full range of CBE/CRE pedagogies used, and the incorporation of more valid comparison groups is needed. Much of the scholarship analyzed suggested that socio-cultural and socio-economic factors, occurring both inside and outside of the classroom, underlie many of the reasons for indigenous students’ underperformance in U.S. schools.

**Argument B – *Cultural Adaptation of Assessments.*** **Conclusions –** In

numerous instances, the assessments of indigenous students attending U.S schools have been stereotypically biased, lacking in cultural adaptation and sensitivity. They have not considered socio-cultural factors occurring outside of the classroom. **Gaps and Recommendations for Future Research --** A

potentially essential and timely topic for future research might be the creation of an assessment tool that considers the unique socio-cultural interactions encountered by indigenous students in U.S. schools. The CREDE standards and CASI model represent research moving in the critical direction toward more equitable learning and assessment environments. New scholarship research

focused on the benefit of using indigenous pedagogies as an aid to the development of students' higher-order thinking skills is warranted. Indigenous heuristic methods could be useful for at least a partial synthesis between traditional indigenous (e.g., Native Hawaiian) and Anglophone pedagogies and assessment methodologies.

**Argument C – *Decolonialization and Reconciliation*. Conclusions -- U.S.**

educators, influenced by their systemic Anglophone traditions, have inadvertently and even intentionally attempted to assimilate instead of accommodate indigenous populations. Colonial educational policies failed because indigenous peoples fundamentally desire to retain their distinctive cultural heritages and identities. Such historical tensions are natural given the differing epistemological and ontological worldviews. **Gaps and**

**Recommendations for Future Research --** Despite the stresses that will unavoidably occur, those on both sides of the decolonization issue will need to negotiate less confrontational environments where an improved spirit of mutual trust, justice, balance and a desire for healing can take place. Future research could perhaps be more influential if it focused on how a sustainable reconciliation might be achieved more at the local community or school district level rather than through a systemic centralized or national educationally-driven transformation.

**Argument D – *Indigenous Sovereignty over Education*. Conclusions --** The dominant point of view expressed in the literature was that indigenous community leaders, educators and students are in the best position to direct their educational future and that the consensus of all stakeholders at the local

level is a requirement for the self-determination and sustainability of indigenous-led CBE programs.

**Argument E – *Institutional Priorities and Partnerships*. Conclusions--**

Numerous indigenous and non-indigenous educators and scholars favor the combining of Western analytical and indigenous CBE/CRE based pedagogies in a complimentary manner. Analysis of the corpus of scholarship in this regard also revealed that the most beneficial CBE/CRE pedagogies have been multidisciplinary, collaborative, and consensus-driven. The most significant improvements in pedagogy, curriculum development, and systemic reform have taken place in locations where high ratios of indigenous students in attendance mandated institutional action (e.g., Alaska, Hawaii and New Zealand).

**Argument F—*Application of CBE/CRE Pedagogies in the Classroom*.**

**Conclusions--** Any attempt at arriving at a plausible integration of traditional Anglophone and indigenous pedagogies must address the realistic cross-cultural challenges encountered by both teachers and indigenous students in the classroom. Recent studies on the effectiveness of bilingual immersion models suggest that more significant academic progress may be possible if indigenous students are first grounded in their culture and native language and afterward in the English-language curriculum.

**Argument G —*The Synthesis of Pedagogies and Curriculum Using TEL***

**Conclusions--** A considerable research gap exists regarding the potential benefits of combining CBE/CRE pedagogies and curriculum with the latest TEL (e.g., m-learning and u-learning, seamless learning) and the emerging tech systems (i.e., AI, DLT, digital platforms). **Gaps and Recommendations for**

**Future Research** -- Digital-age technologies are now so ubiquitous in every aspect of modern life; it is more important than ever to keep fundamental questions about their potential in the foreground of discussions regarding the future of education and learning. The COVID-19 global pandemic has only highlighted the need to be creative and advance in this direction. Recent studies assert that training in the use of these technologies at the individual student and institutional level is imperative if there is to be any hope of keeping up with the ongoing technological transformation and the demands of Millennial Age and Generation Z students. CBE/CRE based pedagogies synergized and facilitated by the emerging AI and DLT systems represents a significant new unexamined area of research concentration. For this reason, this research focus was chosen for analysis by this thesis.

### **Conclusions and Recommendations – Main Thesis Chapters**

#### **A Comparative Overview of Modes and Models of Indigenous Education --**

The examination of the historical development of the educational methods for indigenous students in Australia, New Zealand and Canada revealed significant differences, as well as commonalities with what has occurred in the United States. In New Zealand, for example, where the percentage of Māori in the nation's schools is much higher in comparison to Australia, Canada and the Continental United States, the systemic integration of CBE teaching and learning approaches for Māori learners has resulted in superior outcomes. The New Zealand Ministry of Education's persistent twenty-year program providing CBR/CRE professional training at all levels has demonstrated and sustained significant improvements in the educational outcomes for Māori students.

The New Zealand situation parallels the positive systemic transformation that has taken place in the State of Hawaii. Analogous to Hawaii, New Zealand has dealt with a demographically significant, homogeneous indigenous student sub-population. The argument can also put forth that the higher levels of systemic change in New Zealand and Hawaii has taken place because indigenous and non-indigenous educators have collaborated in an atmosphere of mutual acceptance, respect and coordination at all levels of education.

### **Native Hawaiian Cultural, Epistemological and Ontological Traditions --**

For Native Hawaiians, colonization, which imposed Western acculturation and assimilation on them, resulted in a loss of their language, traditions, beliefs, values, esteem, vision, and general well-being formerly held together within the traditional Hawaiian worldview. However, these cultural constructs carry forward to influence modern Hawaiians' thinking and subconscious processes to some extent at the feeling level, both of which are involved in information processing and its retention (i.e., learning). Over the last five decades, the *Hawaiian Renaissance* movement has renewed and propelled the Native Hawaiian community's interest in the traditional language, music (mele), dance (hula), arts, crafts, and pedagogical methods. For a large segment of Native Hawaiians today, this movement has brought about new insights that have confirmed for them the importance of past practices and beliefs.

The scholarship presented by this thesis argues that these same cultural constructs influence Native Hawaiian students' epistemology in such a way that Anglophone pedagogies are less effective for them. These conclusions also typify the significant hurdle that researchers still need to overcome to expand

the knowledge base relative to effective CBE/CRE pedagogies. Future research should incorporate the separation of what Tharp and the CREDE scholars termed “psycho-cultural variables” that influence indigenous students’ interactions both in and outside of the classroom. The successful integration of Anglophone and indigenous pedagogical traditions will require that scholars better understand and document these variables as well as incorporate them into their research efforts.

### **The History and Heritage of Native Hawaiian Education**

During the colonial period of the Kingdom of Hawaii (1810-1893), and later during the period when the United States controlled the Republic and Territory of Hawaii (1893-1959), Native Hawaiians experienced both the positive and negative effects of being educated within the Anglophone tradition.

The education of Native Hawaiians in the State of Hawaii has undergone a gradual systemic transformation since the cultural renaissance that began in the early 1960s, primarily due to the establishment of new indigenous-led Hawaiian CBE initiatives and scholarship. The creation of a growing number of Hawaiian Language Immersion and Public Charter Schools has elevated Native Hawaiian teaching methods to a new level of importance within the public education system of Hawaii. More quantitative research is needed to analyze how CBE and CRE pedagogies combined with technology-enriched curriculum and teaching methods might give indigenous students transformational experiences and better prepare them for careers in critical science, technology, engineering and math (STEM) fields.

## **The Successes and the Challenges of Hawaiian CBE in the Modern Era**

A broad community collaboration involving many organizations outside of Hawaii's public schools, including post-secondary educators, non-profit organizations and educational experts, has underpinned and spurred a systemic transformation in the education of Native Hawaiian students, especially at the secondary level. In the State of Hawaii, the substantial ongoing financial support and organizing expertise of the Kamehameha Schools has proven to be a critical component enabling more evidence-based research and evaluation of culture-based pedagogies, atypical to what might be attainable elsewhere in the United States. Researchers and educators in Hawaii have innovatively challenged conventional educational assessment methods. They have empirically demonstrated the positive impact of Hawaiian CBE/CRE pedagogies on indigenous students' overall sense of well-being, belonging and performance in school by alternatively positioning their research framework from the perspective of indigenous cultural advantage.

Significant challenges remain to be overcome, as demonstrated by the still lower than average standardized test scores compared to other states, higher levels of absenteeism and an ongoing problem with teacher retention. While the gaps in Native Hawaiian student achievement levels in core subjects like reading and math have narrowed, they still lag behind some of their grade-level peers from other ethnic groups. Nevertheless, the implementation of innovative CBE and project-based pedagogies has so far succeeded in addressing several of the historical barriers hindering Native Hawaiian student motivation and engagement in school. Moreover, the research undertaken in Hawaii has quantitatively and qualitatively verified a CBE model capable of improving

indigenous student outcomes schooled within the traditional Anglophone-based educational system of the United States. The scalable replication of the Hawaiian model by other schools and communities teaching indigenous students represents an important and interesting focus for future research.

### **Individual and Collective Consciousness – A Theoretical Bridge**

An attempt was made by this thesis to suggest potential approaches for synthesizing the different historical theories concerning the origins and nature of the conscious experience that underlie both the Western and the Native Hawaiian indigenous epistemological and ontological perspectives. An argument was put forth to suggest a potential middle ground for the improvement of education for indigenous learners because: (1) The epistemologies held by indigenous peoples are inescapable topics when considering the research questions posed by this paper. (3) The exploration of the arguments presented concerning the differing explanations of consciousness could be useful for the professional development of the instructors of indigenous students as well as the development of improved CBE/CRE based curriculum and pedagogies in the future.

The emerging *Fourth Industrial Revolution* represents an immense challenge for the global education sector. In this context, both Schwab and Seldon argue for the development of a values-centered collective mindset to ensure that the best interests of all humanity are satisfied. They posit that such a collective mindset must include the utilization of AI and the other emerging technologies to advance educational opportunities for Third World citizens.



### **Synergizing DLT Infrastructure and TEL with CBE Pedagogies—Scholars**

worldwide have argued for some time that the convergence of several factors such as ubiquitous access to mobile, connected, handheld computer devices has created the potential for a new phase in the evolution of TEL. The expectation is that these mobile technological advances supported by theories of social learning and knowledge-building are capable of positively influencing the nature, process and outcomes of education. These socio-cultural developments enabled by one-to-one TEL are being fueled by the rapid proliferation and use of *Fourth Industrial Revolution* technologies such as AI, DLT, robotics and other platform-based systems. This thesis suggests that the pervasive use of mobile devices in everyday situations has reached a fundamental tipping point in terms of its effect upon the ways students learn inside and outside of school. Furthermore, this change in paradigm is being propelled by the demands and preferences of Generation Z learners as digital-natives.

A comprehensive examination of the literature related to seamless learning revealed the existence of a significant gap in the research, including the need to formulate test environments and conduct longitudinal studies exploring the use of seamless learning to promote 21st-century knowledge, skills and positive attitudes among the current and future generations of students.

Recent studies concerning MSL have argued for more research relative to the last four unexplored dimensions of the WMUTE framework proposed by Wong and Looi,( i.e., MSL 7-10) *because of their respective utility and importance in*

*facilitating more holistic seamless learning experiences to achieve more profound and sustainable learning outcomes.*

This paper has argued that more integrated and comprehensive solutions are required so that the MSL framework can be seen to interact more systemically. Previous research efforts have often focused only on a single or at most two of the ten dimensions of the MSL framework. Furthermore, six of the first seven WMUTE dimensions encompass only formal and informal learning theories associated with the optimal time or location of seamless learning. They also have been device not learner-focused in their evaluation. Switching the paradigm to a learner-centric approach shifts the much-needed focus to the facilitation of good pedagogy for the creation of improved learning outcomes.

**The primary contribution to the areas of research relative to m-learning, u-learning and MSL offered by this dissertation is the proposed synergistic model for the integration of four of the unexplored dimensions of the MSL framework.** The design of the proposed model, entitled Education specific Seamless Learning through an Extendable Infrastructure at the Edge (ESSL-EIE), utilizes four key components: (1) the learning management systems (LMS) of educators, (2) the private identities of educational providers and learners, (3) the advantages of edge computing and (4) the use of the DLT Hyperledger framework to integrate the mostly unexplored MSL 5, 8, 9 and 10 dimensions. The seamless integration of these elements for maximizing value exchanges and learning outcomes is not technically and pedagogically feasible without the power and flexibility offered by DLT coupled with the modularization afforded through the Hyperledger suite of applications. The inclusion and proper

use of Hyperledger provides a new dynamic and a lower-cost form of MSL educational facilitation. This thesis has argued conceptually for the use of the Hyperledger DLT framework as a critical hidden ingredient necessary to synergize and optimize student outcomes in all three of the recommended WMUTE focus areas—*technological, pedagogical and learner*.

It is critical to state that the recommendations made by this paper represent only an initial first step for advancing our research understanding of the unexplored dimensions of the MSL framework. Additional scholarship and, most importantly, the *testing of the DLT facilitated model under applied evidenced-based research conditions and, in a range of educational settings, is mandatory to verify the efficacy of the MSL advantages recommended by the ESSL-EIE integration*.

At this early stage, however, there is nothing to suggest that this same model cannot be utilized to technologically facilitate a workable synthesis of the strengths offered by both the traditional Anglophone and indigenous pedagogical traditions. Moreover, it should be anticipated that numerous other socio-cultural developments in education will emerge in the coming decade—combining new methods for synergizing MSL and CBE pedagogies— as the use of DLTs in educational environments becomes more prevalent. Additional research efforts should consider not only the affordability of mobile technologies themselves but also the pedagogical aspects of students' cross-cultural environments and their customized learning objectives.

Researchers still face numerous theoretical, methodological and technological challenges to understanding MSL and in designing seamless learning

environments. The behavioral barriers to the implementation of effective MSL are significant. As a result, any decision regarding the optimal behavioral and technological context for deploying the ESSL-EIE model framework must be left up to local educators and respective educational institutions.

Some crucial questions emerged in the course of this thesis examination that have significant implications for future research related to seamless learning. For example, how does learning in a formal context in school prepare students for learning in seamless learning contexts and vice versa? How should the scaffolding for seamless learning be designed? How can both educators and learners be expertly trained to maximize the affordances offered through MSL? How should the socio-cultural interactions be framed to ensure equitable learning environments for indigenous students?

Future research concerning seamless learning should ideally be participatory, learner-centered and move beyond mere speculations about the superficial potential of mobile technology. Education seems to work best when it is adaptable to include all types of teaching and learning and every kind of student. DLT Hyperledger framework offers a tool and a facilitation engine to drive this form of inclusion and its infrastructure also provides a secure platform on which to create a global network for lifelong learning. If intelligently deployed, ecosystems built on top of DLT can exchange educational content on a scale previously unimaginable. Considerations of this nature have become more imperative given the significant socio-cultural changes brought on by the COVID-19 worldwide pandemic.

## **Summary Statement of Conclusions**

After in-depth analysis, the answer to the first research question posed was affirmative, namely that:

*The Hawaiian studies referenced and examined by this dissertation utilized a longitudinal empirical data-driven approach in their research. They also successfully implemented a set of CBE/CRE pedagogies that worked to improve Native Hawaiian students' progress significantly. Moreover, the Hawaiian scholarship, both quantitatively and qualitatively verified a model capable of improving indigenous student outcomes schooled within the traditional Anglophone-based educational system of the United States.*

The answer to this second question remains conditional and subject to further quantitative analysis and investigation.

***The primary contribution to educational research relative to m-learning, u-learning and MSL offered by this dissertation is the proposed synergistic model for the integration of the four relatively unexplored dimensions of the MSL (WMUTE) framework.***

The model integration, entitled “Education Specific Seamless Learning through an Extendable Infrastructure at the Edge” (ESSL--EIE), adopts the DLT Hyperledger platform to facilitate the intersection and functioning of the three technological, pedagogical and learner-centric dimensions of MSL. The result is a more secure, seamless interface for all educators and learners, the benefits of which can be extended to any number of other participants.

While the ESSL-EIE model does not represent a complete solution, its potential use nonetheless has implications for future MSL-based research. One unique contribution of this paper lies in the model's inherent ability to fill a substantial gap in research related to the functioning and interaction of the MSL 7<sup>th</sup> through 10<sup>th</sup> dimensions. These latter dimensions involve the complex choices, multidisciplinary activities and synthesis of prior and new knowledge between education providers and learners. As a result, they have greater importance and potential to facilitate more holistic seamless learning experiences and achieve more profound and sustainable learning outcomes. As a result, the examination provided by this thesis serves to partially close an important gap in the current level of MSL related scholarship. It also makes a contribution to the MSL research field by introducing a conceptual design capable of being used by other researchers in future quantitative studies aimed at improving and testing seamless learning modalities.

While the TEL infrastructure inherent within the ESSL-EIE model is technologically capable of bringing about a working synthesis between the Anglophone and indigenous pedagogical traditions, it is, as yet, only at the conceptual stages of development. Thus, additional research and pilot-testing, demonstrating the use of the integrated design in actual MSL quantitative research environments are necessary to verify the model's practical application and effectiveness. Finally, the creative use of the ESSL-EIE model synthesis also has potentially broad applications for indigenous communities to collaborate and share their knowledge at a lower cost, and for educators and students worldwide to benefit mutually as the *Fourth Industrial Revolution* advances.

## BIBLIOGRAPHY

*2017 Hawaii Department of Education Data Book, 28th Annual vols* (Hawaii: State of Hawaii - Department of Education - Office of Strategy, Innovation and Performance; Assessment and Accountability Branch, 2018)

<http://arch.k12.hi.us/state/databook/databook.html>

*American Indian Urban Relocation,*

<https://www.archives.gov/education/lessons/indian-relocation.html>

(National Archives - Educator Resources, 2016)

ANKN website page: <http://www.ankn.uaf.edu/about.html>.

*Australian Government Census Statistical Reports (2016)* Retrieved at

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001>

*Blueprint for Change* ([www.blueprintforchange.org](http://www.blueprintforchange.org))

*Canadian Statistical Source* - <https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm>

*Center for Research on Education, Diversity, and Excellence (CREDE) Project*

Website: <http://www.cal.org/what-we-do/projects/crede>

*Center for Research on Education, Diversity, and Excellence (CREDE) Hawai'i*

Project Website: <https://manoa.hawaii.edu/coe/crede/>

*China and its Others: Knowledge Transfer through Translation, 1829-2010* ed.

by J. St. André and H. Peng (Amsterdam – New York, NY: Brill | Rodopi, 2012)

*Demographics of New Zealand,*

[https://en.wikipedia.org/wiki/Demographics\\_of\\_New\\_Zealand](https://en.wikipedia.org/wiki/Demographics_of_New_Zealand)

*Encyclopedia of the Scientific Revolution: From Copernicus to Newton,* ed. By

Wilbur Applebaum, Garland Reference Library of the Humanities, 1800 vols (New York, NY: Garland Publishing, Inc., 2000)

*The Europeans, Culture and Cultural Values*, Qualitative study by Optem for DG EAC, June 2006, pp.34-38.

[http://ec.europa.eu/culture/eac/sources\\_info/studies/pdf\\_word/report\\_synth\\_Cult\\_06\\_en.pdf](http://ec.europa.eu/culture/eac/sources_info/studies/pdf_word/report_synth_Cult_06_en.pdf)

*Going Home Hawaii* ([www.goinghomehawaii.org](http://www.goinghomehawaii.org))

*Hawaii Department of Education website, Race-Ethnicity of Students in Public Schools in Hawai'i: Sy 2011-2012*, <https://dashboard.hawaii.gov/Formal-Education/Race-Ethnicity-of-Students-in-Public-Schools-in-Ha/2xhc-wbnw/data>

*History of Indian Education*,

<https://www2.ed.gov/about/offices/list/oese/oie/history.html> (U.S. Department of Education - Office of Elementary and Secondary Education)

*Indian Education Act of 1972*, <https://www.justice.gov/crt/title-ix-education-amendments-1972>

*Kanu O Ka Āina: Nā Lei Na'auao*, 2017 vols

[https://www.kalo.org/apps/pages/index.jsp?uREC\\_ID=209524&type=d&pREC\\_ID=465138](https://www.kalo.org/apps/pages/index.jsp?uREC_ID=209524&type=d&pREC_ID=465138) [accessed April 4, 2017]

*The Kumulipo: A Hawaiian Creation Chant*, trans. by Martha Warren Beckwith, Second edn (Honolulu, HI: Univeristy of Hawaii Press, 1951, Reprinted 1972)

*Laws of the Republic of Hawaii* passed by the legislature at this session. (1896), Honolulu, HI: Hawaiian Gazette Company. Note: The law cited as banning the Hawaiian language is identified as Act 57, sec. 30 of the 1896 Laws of the Republic of Hawaii:

*Maori Population Estimates: At 30 June 2018*,

<https://www.stats.govt.nz/information-releases/maori-population-estimates-at-30-june-2018>



*Nā Lau Lama Community Report - Executive Summary*, (Hawaii Department of Education, Office of Hawaiian Affairs, and Kamehameha Schools in partnership with many community organizations, 2008)

[http://www.ksbe.edu/assets/spi/pdfs/reports/na-lau-lama/Executive\\_Summary\\_Final.pdf](http://www.ksbe.edu/assets/spi/pdfs/reports/na-lau-lama/Executive_Summary_Final.pdf) [accessed May 15, 2014]

*Native Hawaiian Education Act*, (U.S. Department of Education)

<https://www2.ed.gov/policy/elsec/leg/esea02/pg104.html>

*Numbered Treaty Overview*, Canadiana.Org (Formerly Canadian Institute for Historical Microreproductions) - Canada in the Making,

[http://www.canadiana.ca/citm/specifique/numtreatyoverview\\_e.html](http://www.canadiana.ca/citm/specifique/numtreatyoverview_e.html)

*Office of Hawaiian Affairs: History* <https://www.oha.org/about/abouthistory/>.

*One Hundred Year Study on Artificial Intelligence (AI100)*,

<https://ai100.stanford.edu/> , August 1, 2019 vols (Stanford, CA: Stanford University)

'Ottawa, First Nations Education Pact Will Give Communities Greater Control',  
*The Spectator*, (August 17, 2017), section Canada/World, A8

*Population of New Zealand*, <https://www.explore-new-zealand.com/population-of-new-zealand.html>

*Teachers Matter: Understanding Teachers' Impact on Student Achievement*,

(RAND Education and Labor, 2012) <https://www.rand.org/education-and-labor/projects/measuring-teacher-effectiveness/teachers-matter.html>

*Termination and Relocation*,

[http://www.c3ta.org/knowledgebases/resources/termination-and-relocation-1389.html?node=1\\_1\\_3](http://www.c3ta.org/knowledgebases/resources/termination-and-relocation-1389.html?node=1_1_3) , (Central Comprehensive Center, Knowledge Bases)

*United States Department of Education Website* link located at

<https://www2.ed.gov/about/offices/list/oese/oie/history.html>

*U.S. Census, 2010 Census Redistricting File,*

<https://www.census.gov/data/datasets/2010/dec/redistricting-file-pl-94-171.html>

*U.S. Census 2017 Report Estimates,*

<https://newsmaven.io/indiancountrytoday/news/census-releases-latest-population-numbers-native-americans-are-at-2-09-uf7gL2XbP0SRzFml7jXUXQ/>

*Worcester V. Georgia, 31 U.S. 515, (US Supreme Court, 1832)*

<https://www.oyez.org/cases/1789-1850/31us515> [accessed May 8, 2014]

Adams, B., S. Adam and M. Opbroek, 'Reversing the Academic Trend for Rural Students: The Case of Michelle Opbroek', *Journal of American Indian Education*, 44 (2005), pp. 55-79

Adams, D. W., *Education for Extinction: American Indians and the Boarding School Experience, 1875-1928* (Lawrence, Kansas: University of Kansas Press, 1995)

Adams, H., *Prison of Grass: Canada from the Native Point of View* (Toronto, Ontario: General Publishing, 1988)

Agarwal, Pooja K., 'Retrieval Practice & Bloom's Taxonomy: Do Students Need Fact Knowledge before Higher Order Learning?', *Journal of Educational Psychology*, 111 (2019), pp. 189-209

Aguilera, Dorothy and others, 'Culturally Responsive Education for American Indian, Alaska Native, and Native Hawaiian Students', *Journal of American Indian Education*, 46 (2007), pp. 4-147

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c8b6a49b7662a8539b36142fe2e2156b96be360b5f34e6bd24&fmt=C>

Ah Nee-Benham, Maenette K.P., eds., *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice, Volume II* (New York and London: Routledge-Taylor and Francis Group, 2008)

—'Where can We Collectively be that is Greater than Where We are Now?', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 1 (2004), pp. 35-48

Ah Nee-Benham, Maenette K. P. and Joanne Elizabeth Cooper, eds., *Indigenous Educational Models for Contemporary Practice: In our Mother's Voice - Volume I* (Mahwah, New Jersey: Lawrence Erlbaum Associates, 2000)

Akena, Francis A., 'Critical Analysis of the Production of Western Knowledge and its Implications for Indigenous Knowledge and Decolonization', *Journal of Black Studies*, 43 (2012), pp. 599-619

Alexander, W. D., 'The Development of Education in Hawaii', *The Friend LIX*, December (1902), pp. 22-24

Ali, Muneeb, 'Trust to Trust Design of a New Internet' (Doctor of Philosophy, Princeton University, 2017) <https://muneebali.com/thesis>

Alia, Valerie, 'Outlaws and Citizens: Indigenous People and the New Media Nation', *International Journal of Media & Cultural Politics*, 5 (2009), pp. 39-54

Allen, H., 'History Matters: A Commentary on Divergent Interpretations of Australian History', *Australian Aboriginal Studies*, 2 (1988), pp. 79-89

Almeida, Deirdre, *Countering Prejudice Against American Indians and Alaska Natives through Antibias Curriculum and Instruction*, (Charleston, West Virginia: ERIC Clearinghouse on Rural Education and Small Schools, 1996) <http://files.eric.ed.gov/fulltext/ED400146.pdf>

American Indian College Fund, *Facts about American Indian Education*, (American Indian College Fund, 2010) <https://eric.ed.gov/?id=ED527093>

American Indian Higher Education Consortium AIHEC,

<http://aihec.org/index.html>

Ames, C., 'Classroom Goals, Structures, and Student Motivation', *Journal of Educational Psychology*, (1992)

Amin, S., *Eurocentrism* (New York: Monthly Review Press, 1988)

Anastopoulou, A. and others, 'Creating Personal Meaning through Technology-Supported Science Learning Across Formal and Informal Settings', *International Journal of Science Education*, 34 (2012), pp. 251-273

Andersen, Clair, Tracey Bunda and Maggie Walter, 'Indigenous Higher Education: The Role of Universities in Releasing the Potential', *The Australian Journal of Indigenous Education*, 37 (2008), pp. 1-8

Anderson, J. M., 'The Second Digital Divide: The Effects of Ethnicity and Socioeconomic Status on Student Technology Access and use Outside the School Day' (Doctoral, Baker University, 2014)

Andersson, Theodore, Mildred Boyer and Southwest Educational Development Laboratory, *Bilingual Schooling in the United States* (Austin, Texas: Southwest Educational Development Laboratory., 1970)

Andrade, Carlos, *Ha'ena: Through the Eyes of the Ancestors* (Honolulu: Latitude 20, 2008)

Andrews, Lorrin, 'Entry for Akua', in *A Dictionary of the Hawaiian Language* (Honolulu, HI; Rutland: The Board of Commissioners of Public Archives of the Territory of Hawaii; Tuttle, 1865 Reprinted 1974), pp. 44

Applebee, Arthur N., *Beyond the Lesson: Reconstructing Curriculum as a Domain for Culturally Significant Conversations*. Report Series 1.7, (Albany, New York: National Research Center on Literature Teaching and Learning; University at Albany; State University of New York, 1993)

- Aronson, Brittany and Judson Laughter, 'The Theory and Practice of Culturally Relevant Education: A Synthesis of Research Across Content Areas', *Review of Educational Research*, 86 (2016), pp. 163-206
- Au, Kathryn H. and Julie Kaomea, 'Reading Comprehension and Diversity in Historical Perspective: Literacy, Power, and Native Hawaiians', in *Handbook of Research on Reading Comprehension*, ed. by S. Isreal and G. Duffy (New York, NY: Routledge, 2009), pp. 571-586
- Au, Kathryn H. and Cathie Jordan, 'Hawaiian Americans: Teaching Reading to Hawaiian Children: Finding a Culturally Appropriate Solution', in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography – Book 1*, ed. by Henry T. Trueba (Rowley, MA: Newbury House Publishers, 1981), pp. 139-152
- Aud, S., M. Fox and A. Kewalkamani, *Status and Trends in the Education of Racial and Ethnic Groups (NCES 2010-015)*, (Washington, D.C., U.S. Government Printing Office: U.S. Department of Education, National Center for Educational Statistics, 2010)
- Aud, Susan and others, *The Condition of Education 2013. NCES 2013-037*, (National Center for Education Statistics, 2013)
- Banks, J. A., 'Diversity, Group Identity, and Citizenship Education in a Global Age', *Educational Researcher*, 37 (2008), pp. 129-139
- Baran, Paul, *On Distributed Networks*, First Congress of the Information System Sciences, Sponsored by the MITRE Corporation and the USAF Electronic Systems Division, (Santa Monica, CA: RAND Corporation, 1962)  
<https://www.rand.org/content/dam/rand/pubs/papers/2005/P2626.pdf>
- Barfield, Owen, *Saving the Appearances: A Study in Idolatry* (London; New York: Faber & Faber Publishers; Harcourt Brace Jovanovich, 1957 Reprinted 1965)

Barnes & Noble College, *Getting to Know Gen Z: Exploring Middle and High Schoolers' Expectations for Higher Education*, (2015)

<https://next.bncollege.com/wp-content/uploads/2015/10/Gen-Z-Research-Report-Final.pdf>

Barnes, Phil, *A Concise History of the Hawaiian Islands* (Honolulu, HI: Petroglyph Press, Ltd., 2009)

Barnhardt, Ray, 'Cross-Cultural Issues in Alaskan Education', in *Educational Renewal in Rural Alaska, Vol II*, ed. by R. Barnhardt, A. O. Kawagley and F. Hill, II vols (1982)

—'Domestication of the Ivory Tower: Institutional Adaptation to Cultural Distance', *Anthropology & Education Quarterly*, 33 (2002), pp. 238-49

—'Educational Renewal in Rural Alaska: The Alaska Rural Systemic Initiative', *Rural Educator*, 21 (2000), pp. 9-14

—'Higher Education in the Fourth World: Indigenous People Take Control', *Canadian Journal of Native Education*, 18 (1991), pp. 199-231

—*Indigenous Education Around the World - Workshop Papers*, World Indigenous People's Conference: Education June 15-22, 1996, Albuquerque, New Mexico edn, (1999)

[https://archive.org/details/ERIC\\_ED467395/page/n1](https://archive.org/details/ERIC_ED467395/page/n1)

—'Preparing Teachers for Rural Alaska', *Sharing our Pathways*, 4 (1999), pp. 1-3

Barnhardt, Ray and A. Oscar Kawagley, 'Education Indigenous to Place: Western Science Meets Native Reality', in *Ecological Education in Action*, ed. by Gregory Smith and Dilafruz Williams (New York, NY: State University of New York Press, 1999), pp. 117-140

Barnhardt, Ray and Anagayuqaq Oscar Kawagley, *Alaska Rural Systemic Initiative*, (2001)

- 'Culture, Chaos and Complexity: Catalysts for Change in Indigenous Education', *Cultural Survival Quarterly*, 27 (2003), pp. 59-64  
<https://www.culturalsurvival.org/publications/cultural-survival-quarterly/culture-chaos-complexity-catalysts-change-indigenous>
- 'Indigenous Knowledge Systems and Alaska Native Ways of Knowing', *Anthropology and Education Quarterly*, 36 (2005), pp. 8-23
- Barnhardt, Ray, Angayuqaq Oscar Kawagley and Frank Hill, 'Cultural Standards and Test Scores', *Sharing our Pathways: A Newsletter of the Alaska Rural Systemic Initiative*, (2000)
- Barsh, Russel L. and Ronald L. Trosper, 'Title I of the Indian Self-Determination and Education Assistance Act of 1975', *American Indian Law Review*, 3 (1975), pp. 361-395
- Bass, R. and J. W. Good, 'Educare and Educere: Is a Balance Possible in the Educational System?', *Educational Forum*, 68 (2004), pp. 161-168  
<https://doi.org/10.1080/00131720408984623>
- Battiste, M., 'Enabling the Autumn Seed: Toward a Decolonized Approach to Aboriginal Knowledge, Language, and Education', *Canadian Journal of Native Education*, 22 (1999), pp. 16-27
- Battiste, M., L. Bell and L. M. Findlay, 'Decolonizing Education in Canadian Universities: An Interdisciplinary, International, Indigenous Research Project', *Canadian Journal of Native Education*, 26 (2002), pp. 82-95  
<http://proquest.umi.com/pqdlink?did=325001141&Fmt=7&clientId=12306&RQT=309&VName=PQD>;
- Beamer, Winona (Nona), *Na Mele Hula: A Collection of Hawaiian Hula Chants* (Honolulu, Hawai'i: Institute for Polynesian Studies, Brigham Young University-Hawaii Campus, 1987)
- Bear, Charla, 'American Indian Boarding Schools Haunt Many', in *History of Indian Schools Traced through Reports - Excerpts Quoted from the 1886*

*Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior* (2008)

<http://www.npr.org/templates/story/story.php?storyId=16516865> [accessed February 13, 2013]

Beare, H., *Creating the Future School* (London: Routledge, 2001)

Beckwith, Martha, *Hawaiian Mythology*, Second Edition (Honolulu: University of Hawaii Press, 1970)

Benham, Maenette K. P., 'A Challenge to Native Hawaiian and Pacific Islander Scholars: What the Research Literature Teaches Us about our Work.', *Race, Ethnicity and Education*, 9 (2006), pp. 29-50

Benham, Maenette K. P. and Ronald H. Heck, *Culture and Educational Policy in Hawaii: The Silencing of Native Voices*, Sociocultural, Political, and Historical Studies in Education (Mahwah, NJ: Erlbaum Press, 1998)

Benzoni, Girolamo, Jana Byars and Robert C. Schwaller, *The History of the New World: Benzoni's Historia Del Mondo Nuovo* (University Park, Pennsylvania: Penn State University Press, 2017)

Bergson, Henri, *Creative Evolution*, trans. by Arthur Mitchell (Henry Holt and Company; Dover Publications, 1911 Reprinted 1998)

Bernard, Theos, *Hindu Philosophy* (Greenwood Press, 1968)

Beyer, Kalani, 'Comparing Native Hawaiian Education with Native American and African American Education during the Nineteenth Century', *American Educational History Journal*, 41 (2014), pp. 59-75

Bilal, Dania and Joe Kirby, 'Differences and Similarities in Information Seeking: Children and Adults as Web Users', *Information Processing & Management*, 38 (2002), pp. 649-670  
<https://www.sciencedirect.com/science/article/pii/S0306457301000577/pdf?md5=ffcb064a307b7e638cdaa12b01e47ce4&pid=1-s2.0-S0306457301000577-main.pdf>



Bill, Willard E. and Washington Office of the State Superintendent of, Public Instruction, *From Boarding Schools to Self Determination*, (1988)

Billy, C. & M. Goetz. 'Advancing Tribal Students and Sovereign Nations: AIHEC's Vision for the Tribal College Movement.' *Tribal College Journal of American Indian Higher Education*. (2016), 28(2).

Bin-Sallik, Mary A., 'Aboriginal Tertiary Education in Australia: How Well is it Serving the Needs of Aborigines' (Doctor of Education, Harvard University, 1989) <http://hdl.voced.edu.au/10707/101445>

Bishop, Russell and others, 'Te Kotahitanga: Addressing Educational Disparities Facing Maori Students in New Zealand', *Teaching and Teacher Education: An International Journal of Research and Studies*, 25 (2009), pp. 734-742

Blaisdell, R. K., 'The Kanaka Maoli World', in *The Hawaiian Odyssey*, ed. by E. Herter (Bishop Museum Press, 1993), pp. 47-76

Bloom, B. S. and others, *Taxonomy of Education Objectives, Handbook I: Cognitive Domain*. (New York: David McKay, 1956)

Blueprint for Change (<https://www.blueprintforchange.org/>). The E Ho'okanaka Project (Be A Person of Worth) Retrieved March 18, 2018 from company records and program information Refer also to: <https://www.ehookanaka.org/>

Blumenfeld, P., 'Classroom Learning and Motivation: Clarifying and Expanding Goal Theory', *Journal of Education Psychology*, 84 (1992), pp. 272-281

Bowker, A., *Sisters in the Blood: The Education of Women in Native America* (Newton, MA: WEEA Publishing Center, 1993)

Boxer, Andrew, 'Native Americans and the Federal Government', *History Today - History Review*, (2009) <https://www.historytoday.com/archive/native-americans-and-federal-government>

Brayboy, B. M., 'Postsecondary Education for American Indian and Alaska Natives: Higher Education for Nation Building and Self-Determination', *ASHE Higher Education Report*, 37 (2012), pp. 1-140

Brisk, Maria E. and others, *Educators' Preparation for Cultural and Linguistic Diversity: A Call to Action*, (Washington, DC: American Association of Colleges for Teacher Education, 2002)

Bronfenbrenner, Urie, *The Ecology of Human Development* (Cambridge, MA: Harvard University Press, 1979)

Brown, L. and S. E. Kurpius, 'Psychosocial Factors Influencing Academic Persistence of American Indian College Students', *Journal of College Student Development*, 38 (1997), pp. 3-12

Buckingham Shum, Simon and Ruth Deakin Crick, *Learning Dispositions and Transferable Competencies: Pedagogy, Modelling and Learning Analytics*, 2nd International Conference on Learning Analytics & Knowledge, 29 Apr - 02 May 2012, Vancouver, British Columbia, Canada edn, (New York: ACM Press, 2012)

Burnaby, Barbara. Language Policy and Education in Canada. [https://www.researchgate.net/publication/227194713\\_Language\\_Policy\\_and\\_Education\\_in\\_Canada](https://www.researchgate.net/publication/227194713_Language_Policy_and_Education_in_Canada). (2008).

Burt, Edwin A., *Metaphysical Foundations of Modern Physical Science* (Mineola, NY: Dover Publications, Inc., 2003)

Buterin, Vitalik, *The Meaning of Decentralization*, <https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>, 2019 vols (Medium, 2017)

Cajete, G., *Ignite the Sparkle: An Indigenous Science Education Model* (Skyland, NC: Kivaki Press, 1999)

—*Native Science: Natural Laws of Interdependence* (Skyland, NC: Kivaki Press, 2000)

Cajete, Gregory, *Look to the Mountain: An Ecology of Indigenous Education* (Durango, CO: Kivaki Press, 1994)

Cajete, Gregory A. and Santa Clara Pueblo, 'Contemporary Indigenous Education: A Nature-Centered American Indian Philosophy for a 21st Century World', *Futures*, 42 (2010), pp. 1126-1132

Calfee, Robert C., and others and Harvard University, Cambridge, MA, Graduate School of Education, *Designing Reading Instruction for Cultural Minorities: The Case of the Kamehameha Early Education Program*, (1981)

Canadian Council on Learning, *Redefining how Success is Measured in First Nations, Inuit and Metis Learning*, (2009)

Carjuzaa, Joanna and William G. Ruff, 'When Western Epistemology and an Indigenous Worldview Meet: Culturally Responsive Assessment in Practice', *Journal of the Scholarship of Teaching and Learning*, 10 (2010), pp. 68-79

Carter, K., 'Do Teachers Understand Principles of Writing Tests?', *Journal of Teacher Education*, 35 (1984), pp. 57-60

Castagno, A. and B. Brayboy, 'Culturally Responsive Schooling for Indigenous Youth: A Review of the Literature', *Review of Educational Research*, 78 (2008), pp. 941-993

Castaneda, Lillian V., *Improving Programs of Schools Serving Culturally and Linguistically Diverse Student Populations*, (1992)

Catalini, Christian, *How Blockchain Technology Will Impact the Digital Economy*, Oxford Business Law Blog, (2017)  
<https://www.law.ox.ac.uk/business-law-blog/blog/2017/04/how-blockchain-technology-will-impact-digital-economy>

Cazden, C. and E. Leggett, 'Culturally Responsive Education: Recommendations for Achieving Lau Remedies II, ' in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography*, ed. by Henry T.

Trueba, G. P. Guthrie and Kathryn H. Au (Rowley, MA: Newbury House, 1981), pp. 69-86

Cazden, C. B. and V. P. John, 'Learning in American Indian Children', in *Anthropological Perspectives on Education*, ed. by M. L. Wax, S. Diamond and F. O. Gering (New York: Basic Books, 1971), pp. 256

CBC News, A History of Residential Schools in Canada (2016)

<https://www.cbc.ca/news/canada/a-history-of-residential-schools-in-canada-1.702280>

Cha, Hyun-Jong, Ho-Kyung Yang and You-Jin Song, (2018) A Study on the Design of Fog Computing Architecture Using Sensor Networks, Seoul, South Korea: Sunmoon University and Dongguk University. p. 4 Retrieved from: <https://www.mdpi.com/1424-8220/18/11/3633/pdf>

Chadwick, Clifton and Soledad Valenzuela, 'Culture, Change, and Educational Improvement', *Educational Technology Magazine: The Magazine for Managers of Change in Education*, 48 (2008), pp. 27-36

Chalmers, David J., *The Character of Consciousness* (New York, New York: Oxford University Press, Inc., 2010)

Champagne, D., 'Beyond Assimilation as a Strategy for National Integration: The Persistence of American Indian Political Identities', *Transnational Law & Contemporary Problems*, (1993), pp. 109

Chan, Tak-Wai and others, 'One-to-One Technology-Enhanced Learning: An Opportunity for Global Research Collaboration', *Research and Practice in Technology Enhanced Learning Journal*, 1 (2006), pp. 3-29

Chang, Victor and Gary Wills, 'A University of Greenwich Case Study of Cloud Computing – Education as a Service ', in *E-Logistics and E-Supply Chain Management: Applications for Evolving Business* (IGI Global, 2013), pp. 232-244

- Chapple, Simon, Richard Jefferies and Rita Walker, *Māori Participation & Performance in Education: A Literature Review and Research Programme*, (New Zealand: Ministry of Education, 1997)
- Charlot, John, *Classical Hawaiian Education: Generations of Hawaiian Culture* (La'ie, HI: The Pacific Institute BYU Hawaii, 2005)  
<http://www2.hawaii.edu/~charlot/BOOKS/CHE%20post/che.pdf>
- Chatterjee, Kanad, 'Shaping the Future: An Online Education Ecosystem', *Childhood Education*, 94 (2018), pp. 56-59
- Chen, Wenli and others, *Extending Students' Learning Spaces: Technology-Supported Seamless Learning*, 9th International Conference of the Learning Sciences (ICLS) 2010, Chicago, Illinois edn, (International Society of Learning Sciences (ISLS), 2010)
- Chikonzo, Agnes, 'The Potential of Information and Communication Technologies in Collecting, Preserving and Disseminating Indigenous Knowledge in Africa', *International Information & Library Review*, 38 (2006), pp. 132-138
- Chun, Malcolm N., *No Na Mamo; Traditional and Contemporary Hawaiian Beliefs and Practices* (Honolulu, HI: University of Hawai'i Press, 2011), in *JSTOR* <http://www.jstor.org/stable/j.ctt6wqfb6> [accessed June 4,2018]
- Ciotti, Joseph E., *Historical Views on Mauna Kea: From the Vantage Points of Hawaiian Culture and Astronomical Research*. 45 vols (US: Hawaiian Historical Society, 2011)
- Clare, Mary M., 'Decolonizing Consultation: Advocacy as the Strategy, Diversity as the Context', *Journal of Educational & Psychological Consultation*, 19 (2009), pp. 8-25
- Cleary, L. and T. Peacock, *Collected Wisdom: American Indian Education* (Boston: Allyn and Bacon, 1999)

Coindesk, Blockchain 101, <https://www.coindesk.com/learn/blockchain-101/what-is-blockchain-technology>.

Collier, Virginia P., 'A Synthesis of Studies Examining Long-Term Language Minority Students Data on Academic Achievement', *Bilingual Research Journal: The Journal of the National Association for Bilingual Education*, 16 (1992), pp. 187-212  
<https://www.tandfonline.com/doi/abs/10.1080/15235882.1992.10162633>

Colorado, Pamela, "'Wayfinding and the New Sun: Indigenous Science in the Modern World'", *Noetic Science Review*, (1992), pp. 1-7

Common Sense Education, *Digital Citizenship*,  
<https://www.commonsense.org/education/digital-citizenship>, 2019 vols  
(Common Sense Media)

Cook, Bud P., Kelley Withy and Lucia Tarallo-Jensen, 'Cultural Trauma, Hawaiian Spirituality, and Contemporary Health Status', *Californian Journal of Health Promotion*, 1 (2003), p. 10

Cornford, Frances M., *From Religion to Philosophy: A Study in the Origins of Western Speculation* (Trinity College, Cambridge, 1912)

Coryn, Chris L. S., Daniela C. Schröter and Robert H. McCowen, 'A Mixed Methods Study of some of the Factors Associated with Successful School Strategies for Native Hawaiian Students in the State of Hawai'i', *Journal of Mixed Methods Research*, 8 (2014), pp. 377-395

Cotton, K., *School Size, School Climate, and Student Performance*, (Portland, OR: Northwest Regional Educational Laboratory, 1996)  
<http://www.nwrel.org/scpd/sirs/10/c020/html>

Cowan, Donald and others, 'Dreamcatcher: IT to Support Indigenous People', *IT Professional*, 14 (2012), pp. 39-47

- Crabbe, Kamana'opono M., 'Kupa'a I Ke Kahua O Hawaii: Stand Firmly Behind the Foundations of Hawaii', *Journal of Pacific Rim Psychology*, 1 (2007), 25-30 <https://doi.org/10.1375/prp.1.2.25>
- Craighill Handy, E. S. and Mary Kawena Puku, 'The Hawaiian Family System', *The Journal of the Polynesian Society*, 59 (1950), p, 170
- Crum, Steven J., 'A History of the First Nations College Movement of Canada, 1969-2000', *Tribal College Journal of American Indian Higher Education*, 26 (2015), pp. 38-41
- Culatta, Richard, 'From Innovation Clusters to Datapalooza: Accelerating Innovation in Educational Technology', *Educause Review*, November/December (2012), p. 26
- Daniel, John, *From the Triangle to the Pentagon: Open Universities in the 21st Century*, Asian Association of Open Universities - Quality Education for all: New Missions and Challenges Facing Open Universities, Shanghai China edn, (Commonwealth of Learning, 2004)  
[http://oasis.col.org/bitstream/handle/11599/1446/2004\\_Daniel\\_Triangle\\_Pentagon\\_Transcript.pdf?sequence=1&isAllowed=y](http://oasis.col.org/bitstream/handle/11599/1446/2004_Daniel_Triangle_Pentagon_Transcript.pdf?sequence=1&isAllowed=y)
- Danyluk, R. C. and J. L. Da Costa, *Identifying and Addressing Challenges Encountered by Educators of Aboriginal Children in an Urban Setting*, Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada edn, (1999)
- Davia, Patricia A., *"Choose Life: A Ceremonial Process Model"*, (Seattle, WA: Center for Creative Change, Antioch University, 2005)
- Dawrs, S., 'A Massive Archiving Initiative Aims to make Millions of Pages of Historic Hawaiian Language Writing Available to the Public', *Hana Hou!*, 6(1) (2003) <https://hanahou.com/6.1/for-the-record>

de Brey, Cristobal and others, *Status and Trends in the Education of Racial and Ethnic Groups 2018*, NCES 2019038 vols (Washington, DC: U.S. Department of Education, 2019) <https://nces.ed.gov/pubs2019/2019038.pdf>

de Waard, Inge and others, 'Using m-Learning and MOOCs to Understand Chaos, Emergence, and Complexity in Education', *The International Review of Research in Open and Distance Learning*, 12 (2011), 94-115

Dee, Thomas S., *The Race Connection*, (Education Next, 2004)  
[https://cepa.stanford.edu/sites/default/files/ednext20042\\_52.pdf](https://cepa.stanford.edu/sites/default/files/ednext20042_52.pdf)

Dee, T. and E. Penner, 'The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum', *American Educational Research Journal*, 54 (2017), 127-166

Deer, Frank, 'Research Perspectives in Indigenous Education: The Legitimacy of Indigenous Knowledge', *WINHEC Journal*, (2006)

Dei, George J. S., 'Rethinking the Role of Indigenous Knowledges in the Academy', *International Journal of Inclusive Education*, 4 (2000), 111-132  
<https://doi.org/10.1080/136031100284849>

—'Spiritual Knowing and Transformative Learning', in *Expanding the Boundaries of Transformative Learning; Essays on Theory and Praxis*, ed. by Edmund V. O'Sullivan, Amish Morrell and Mary Ann O'Connor (New York: Palgrave, 2002), pp. 121-132

Deloria Jr., Vine, 'If You Think about it, You Will See that it is True', *ReVision*, 18 (1996), p. 37

Deloria, Vine, Jr., *A Brief History of the Federal Responsibility for the American Indian* (Washington, D.C. (U.S. Department of Health, Education and Welfare, Office of Education, 1979)



—'Conclusion', in *Indians and Anthropologists: Vine Deloria Jr. and the Critique of Anthropology*, ed. by T. Bilosi and L. Zimmerman (Tucson, AZ: University of Arizona Press, 1997)

—*Custer Died for Your Sins: An Indian Manifesto* (University of Oklahoma Press, 1969)

Deloria, Vine, Jr. and Daniel Wildcat, *Power and Place: Indian Education in America* (Golden, CO: Fulcrum Publishing, 2001)

Demmert, W. and others, 'Preparing Native Children for Academic Success: A Blueprint for Research', *Journal of American Indian Education*, 45 (2006), pp. 92-106

Demmert, William, 'The Influences of Culture on Learning and Assessment among Native American Students', *Learning Disabilities Research and Practice*, 20 (2005), pp. 16-23

Demmert, William, S. Hilberg and N. Rawlins, *Indigenous Culture-Based Education Rubric Training Manual* (Bellingham, WA: Western Washington University, 2008)

Demmert, William and John Towner, *A Review of the Research Literature on the Influences of Culturally Based Education on the Academic Performance of Native American Students* (Portland, OR: Northwest Regional Educational Laboratory, 2003) <http://www.nwrel.org/indianed/cbe.pdf> [accessed January 15, 2010]

Nations at Risk Task Force, *Indian Nations at Risk: An Educational Strategy for Action. Final Report* (Washington, DC: US Department of Education, 1991)

Department of Employment Education and Training, *National Aboriginal and Torres Strait Islander Education Policy: Joint Policy Statement*, (Canberra, Commonwealth of Australia: Australian Government Publishing Service, 1989)

- Descartes, René and John Cottingham, *René Descartes: Meditations on First Philosophy: With Selections from the Objections and Replies* (New York: Cambridge University Press, 2012)
- Devlin, Marcia, 'Indigenous Higher Education Student Equity: Focusing on what Works', *Australian Journal of Indigenous Education*, 38 (2009), pp. 1-8
- DeVoe, Jill F., Kristen Darling-Churchill and National Center for Education Statistics, *Status and Trends in the Education of American Indians and Alaska Natives: 2008. NCES 2008-084*, (Washington, DC: National Center for Education Statistics; Institute of Education Science; U.S. Department of Education, 2008)
- Deyhle, D., 'Constructing Failure and Maintaining Cultural Identity: Navajo and Ute School Leavers', *Journal of American Indian Education*, 31 (1992), pp. 24-47
- 'Learning Failure: Tests as Gatekeepers and the Culturally Different Child', in *Success or Failure*, ed. by H. Trueba (Rowley, MA: Newbury House, 1987), pp. 85-108
- Deyhle, D. and K. Swisher, 'Research in American Indian and Alaska Native Education: From Assimilation to Self Determination', *Review of Research in Education*, 22 (1997), pp. 113-194
- Dodd, Bernard, Max Sime and Harry Kay (1968). *Teaching Machines and Programmed Instruction*, London: Penguin Books.
- Donahue, Patricia L. and others, *NAEP 1998 Reading Report Card for the Nation and the States*, NCES 1999-500 vols (U.S. Department of Education. Office of Educational Research and Improvement. National Center for Education Statistics, 1999)  
<https://nces.ed.gov/nationsreportcard//pubs/main1998/1999500.asp>  
[accessed June 22, 2018]

- Drucker, Peter, 'The Next Decade in Management', *Duns Review and Modern Industry*, 74 (1959)
- Du, Jia T., 'Research on Indigenous People and the Role of Information and Communications Technology in Development: A Review of the Literature', *Journal of the Australian Library & Information Association*, 66 (2017), pp. 344-363
- Dudley, M. K., *A Hawaiian Nation I: Man, Gods and Nature* (Honolulu, HI: Na Kane o Ka Malo Press, 1990)
- 'Introduction: Preface by John D. Holt', in *A Hawaiian Nation I: Man, Gods and Nature* (Honolulu, HI: Na Kane o Ka Malo Press, 1990), pp. vii-viii
- DuFeu, B., 'For an Open Pedagogy', *Francais Dans Le Monde*, 246 (1992), pp. 39-45
- DuFour, R., 'The School as a Learning Organization: Recommendations for School Improvement', *NASSP Bulletin*, 81 (1997), pp. 81-87
- Duponte, Kai and others, 'Ike Hawai'i – A Training Program for Working with Native Hawaiians', *Journal of Indigenous Voices in Social Work*, 1 (2010), pp. 9-12 <http://hdl.handle.net/10125/15115>
- Dussault, Rene and Erasmus Georges, *Report of the Royal Commission on Aboriginal Peoples, Vol. 1: Looking Forward, Looking Back*, (Ottawa: Canada Communication Group - Publishing, 1996)
- Dyson, Laurel E., Max Hendriks and Stephen Grant, eds., *Information Technology and Indigenous People* (Hershey, PA: Information Science, 2007), in *Google Scholar*
- Dyson, Laurel E. and Jim Underwood, 'Indigenous People on the Web', *Journal of Theoretical and Applied Electronic Commerce Research*, 1 (2006), pp. 65-76

- Edelman, Gerald and Giulio Tononi, *A Universe of Consciousness: How Matter Becomes Imagination* (New York: Basic Books, 2000)
- Egalite, Anna J., Brian Kisida and Marcus A. Winters, 'Representation in the Classroom: The Effect of Own-Race Teachers on Student Achievement', *Economics of Education Review*, 45 (2015), pp. 44-52  
<http://doi.org/10.1016/j.econedurev.2015.01.007>
- Elbeck, Matt, 'The Fourth Industrial Revolution's Potential Influence on Marketing Education', *E-Journal of Business Education & Scholarship of Teaching*, 12 (2018), pp. 112-119
- Elbert, Samuel H., 'The Chief in Hawaiian Mythology', *The Journal of American Folklore*, 70 (1957), p. 306
- Emerson, Nathaniel B., 'The Education of Hawaiian Girls', in (Honolulu, HI: Hawaiian Mission Children's Society, 1884), pp. 24-27
- Pele and Hiiaka a Myth from Hawaii* (Honolulu, HI: Star Bulletin Press, 1915)
- Erickson, Frederick, 'Transformation and School Success: The Politics and Culture of Educational Achievement', in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 27-52
- Ermeling, Bradley, James Hiebert and Ronald Gallimore, "'Best Practice"--the Enemy of Better Teaching', *Educational Leadership*, 72 (2015), 48-53
- Facing History and Ourselves, *Stolen Lives: The Indigenous Peoples of Canada and the Indian Residential Schools/The Indian Act and the Indian Residential Schools* (website) <https://www.facinghistory.org/stolen-lives-indigenous-peoples-canada-and-indian-residential-schools/chapter-3/role-churches>.
- Fahd, Kiran and Sitalakshmi Venkatraman, 'Racial Inclusion in Education: An Australian Context', *Economies*, 7 (2019), p. 27

- Faircloth, Susan and John Tippeconnic, '*Issues in the Education of American Indian and Alaska Native Students with Disabilities*', *ERIC Digests*, (2000)  
<http://files.eric.ed.gov/fulltext/ED448009.pdf>
- Falk, D. R. and L. P. Aitkin, 'Promoting Retention among American Indian College Students', *Journal of American Indian Education*, 23 (1984), pp. 24-31
- Felin, Teppo and Karim Lakhani, 'What Problems Will You Solve with Blockchain?', *MIT Sloan Management Review*, (2018)  
<https://sloanreview.mit.edu/article/what-problems-will-you-solve-with-blockchain/>
- Flood, Josephine, *The Original Australians: Story of the Aboriginal People* (Crow's Nest, New South Wales: Allen & Unwin, 2006)
- Fornander, Abraham, *an Account of the Polynesian Race: Its Origins and Migrations and the Ancient History of the Hawaiian People to the Times of Kamehameha I*, Vol. 1-4 vols (Honolulu: Bishop Museum Press, 1882-1904)
- Fox (Comanche), Mary Jo Tippeconnic, Shelly C. Lowe (Navajo) and George S. McClellan, 'Where we have been: A History of Native American Higher Education', *New Directions for Student Services*, 109 (2005), pp. 7-15
- Freeman, Catherine and others, *Status and Trends in the Education of American Indians and Alaska Natives*. 108 vols (Washington, DC: Education Statistics Services Institute, 2005)  
<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED485861>
- Fuchs, Estelle and Robert Havighurst, *To Live on this Earth: American Indian Education* (New York, NY: Anchor Press/Doubleday, 1973)
- The Future of Geospatial Intelligence - Scientific Figure on ResearchGate.  
Available from: [https://www.researchgate.net/figure/the-evolution-of-computing-architecture\\_fig2\\_317987508](https://www.researchgate.net/figure/the-evolution-of-computing-architecture_fig2_317987508)

Gage, N. L. and D. C. Berliner, *Educational Psychology*, 5th edn (Boston: Houghton Mifflin, 1992)

Gallimore, Ronald, And Others and Kamehameha Schools H.H.K.E.E.P., A *Proposal to Build an Education Research and Development Program: The Kamehameha Early Education Project Proposal. Technical Report #3*, (1974) <http://files.eric.ed.gov/fulltext/ED158832.pdf>

Gallimore, Ronald, Joan Whitehorn Boggs and Cathie Jordan, *Culture, Behavior, and Education: A Study of Hawaiian-Americans*, 11 vols (Beverly Hills, Calif.: Sage Publications, 1974)

Gallimore, Ronald, Roland G. Tharp and Kamehameha Schools H.H.K.E.E.P., *An Overview of Research Strategies and Findings (1971-1975) of the Kamehameha Early Education Program. Technical Report #66*, (1976) <http://files.eric.ed.gov/fulltext/ED158865.pdf>

Garber, D., 'Descartes, René (1596–1650)', in *Routledge Encyclopedia of Philosophy*(Taylor and Francis, 1998)

Garrett, M. T. and E. F. Pichette, 'Red as an Apple: Native American Acculturation and Counseling with or without Reservation', *Journal of Counseling and Development*, 78 (2000), pp. 3-13

Gay, Geneva, *Culturally Responsive Teaching: Theory, Research and Practice* (New York: Teachers College Press, 2000)

—'Preparing for Culturally Responsive Teaching', *Journal of Teacher Education*, 53 (2002), pp. 106-116

Gegeo, D. W., *Indigenous Knowledge and Empowerment: Rural Development Examined from Within*, 20th Annual University of Hawaii Pacific Islands Studies Conference, University of Hawaii-Manoa Campus, Honolulu, Hawaii edn, (1995)

George, Maggie and Daniel McLaughlin, 'Re-Framing Mainstream Assessment: Colleges use Native Philosophies of Growth and Reflection', *Tribal College Journal of American Indian Higher Education*, 19 (2008), pp. 18-22

Gilder, George, *Life After Google: The Fall of Big Data and the Rise of the Blockchain Economy* (Washington D.C.: Regenery Publishing, 2018)

Goldenberg, Claude, 'Teaching English Language Learners: What the Research Does—and does Not—Say', *American Educator*, Summer (2008), 8-23, 42-44

<https://claudeg.people.stanford.edu/sites/default/files/goldenberg.pdf>

—'Unlocking the Research on English Learners: What we Know—and Don't Yet Know—about Effective Instruction', *American Educator*, Summer (2013), 4-11, 38

[https://claudeg.people.stanford.edu/sites/default/files/unlocking\\_the\\_research\\_on\\_english\\_learners\\_american\\_federation\\_of\\_teachers.pdf](https://claudeg.people.stanford.edu/sites/default/files/unlocking_the_research_on_english_learners_american_federation_of_teachers.pdf)

Gollapudi, Sunila and V. Laxmikanth, *Practical Machine Learning* (Birmingham, UK: Packt Publishing, 2016)

Gonski, David and others, *Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools*, (Australian Government, March 2018)

[https://docs.education.gov.au/system/files/doc/other/662684\\_tgta\\_accessible\\_final\\_0.pdf](https://docs.education.gov.au/system/files/doc/other/662684_tgta_accessible_final_0.pdf)

Goodsell, Fred F., *You Shall be My Witnesses*. (Boston: American Board of Commissioners for Foreign Missions, 1960)

<https://babel.hathitrust.org/cgi/pt?id=wu.89066429689;view=1up;seq=28>

Goodyear-Ka'opua, Noelani, *The Seeds we Planted: Portraits of a Native Hawaiian Charter School* (Minneapolis, MN: University of Minnesota Press, 2013)

- Goodyear-Ka'opua, Noelani and others, 'Teaching Amid U.S. Occupation: Sovereignty, Survival, and Social Studies in a Native Hawaiian Charter School', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 5 (2008), pp. 155-192
- Gould, John M., *Shifting the Metaphor: Designing 21<sup>st</sup> Century Curriculum Based on the Principles of Living Systems and Sustainability* (unpublished essay shared with the author of this thesis) (2017).
- Gram, John R. and Theodore Jojola, *Conclusion. the Successful Legacy of Assimilations Failure*, (Seattle: University of Washington Press, 2015)
- Grange, Eric, *Mesh World P2P Simulation Hypothesis*, <https://www.delphitools.info/DWSH/>, 2019 vols (2016)
- Graveline, Fyre J., 'IDLE NO MORE: Enough is enough!', *Canadian Social Work Review / Revue Canadienne De Service Social*, 29 (2012), pp. 293-300, <http://www.jstor.org/stable/43486286>
- Grech, Alexander and Anthony F. Camilleri, *Blockchain in Education*, JRC Science for Policy Report, (Luxembourg: Publication Office of the European Union, 2017)  
[https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255\\_blockchain\\_in\\_education%281%29.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC108255/jrc108255_blockchain_in_education%281%29.pdf)
- Greene, J., *A Meta-Analysis of the Effectiveness of Bilingual Education*, (Austin, TX: University of Texas at Austin, Thomas Rivera Policy Institute, 1998)  
<http://www.languagepolicy.net/archives/greene.htm>
- Greer, Jim E., Kenneth R. Koedinger and Rosemary Luckin, *Artificial Intelligence in Education: Building Technology Rich Learning Contexts that Work* (Amsterdam, Netherlands: IOS Press, 2007)
- Gregorcic, Marta, 'Cultural Capital and Innovative Pedagogy: A Case Study among Indigenous Communities in Mexico and Honduras', *Innovations in Education and Teaching International*, 46 (2009), pp. 357-366



- Gu, Xiaoqing, Yuankun Zhu and Xiaofeng Guo, 'Meeting the "Digital Natives": Understanding the Acceptance of Technology in Classrooms', *Educational Technology & Society*, 16 (2013), pp. 392-402
- Gush, Jason & Jackson Smith (2019) The Promise of the New Learning Economy, *Childhood Education*, 95:4, 38-40
- Gutek, G. L., *A History of the Western Educational Experience* (Waveland Press, 1972)
- Gutmanis, J., *Na Pule Kahiko: Ancient Hawaiian Prayers*, 1st edn (Honolulu, HI: Editions Limited, 1983)
- Haag, Marcia and F. Wayne Coston, 'Early Effect of Technology on the Oklahoma Choctaw Language Community', *Language Learning & Technology*, 6 (2002), pp. 70-82  
[https://scholarspace.manoa.hawaii.edu/bitstream/10125/25161/1/06\\_02\\_haag.pdf](https://scholarspace.manoa.hawaii.edu/bitstream/10125/25161/1/06_02_haag.pdf)
- Hajibayova, Lala and Wayne Buente, 'Representation of Indigenous Cultures: Considering the Hawaiian Hula', *Journal of Documentation*, 73 (2017), pp. 1137-1148
- Haliniak, C. L., *A Native Hawaiian Focus on the Hawai'i Public School System, SY2015 (Ho' Ona' Auau (Education) Fact Sheet, Vol. 2017, no. 1)*, (Honolulu, HI: Office of Hawaiian Affairs, Research Division, Special Projects, 2017) <https://19of32x2yl33s8o4xza0gf14-wpengine.netdna-ssl.com/wp-content/uploads/A-Native-Hawaiian-Focus-on-the-Hawaii-Public-School-System.pdf>
- Hall, Leslie D. and Kathryn Gomez-Tatum Powell, 'What Diverse, Rural Communities Need and Want from their Teachers', *Rural Educator*, 21 (1999), pp. 27-31
- Hammersley, M. and P. Atkinson, *Ethnography: Principles in Practice* (London: Tavistock, 1983)

- Hampton, E., 'Toward a Redefinition of American Indian/Alaska Native Education', *Canadian Journal of Native Education*, 20 (1993), 1-24
- Handy, E. S. C., 'Polynesian Religion', *Bishop Museum Bulletin*, No. 34 (1927, Reprinted 1971), pp. 138-143
- Handy, E. S. C. and others, *Ancient Hawaiian Civilization*, (Honolulu: Mutual Publishing, 1999)
- Handy, Elizabeth G. and E. S. C. Handy, 'Native Planters in Old Hawaii: Their Life, Lore and Environment', in *Bernice P. Bishop Museum Bulletin* 233(Honolulu, HI: Bishop Museum Press, 1972), pp. 42-43
- Hanohano, Peter, 'The Spiritual Imperative of Native Epistemology: Restoring Harmony and Balance to Education', *Canadian Journal of Native Education*, 23 (1999), pp. 206-19
- Hanohano, Peter K., Jr., '*Restoring the Sacred Circle - Education for Culturally Responsive Native Families*' (unpublished Ph.D. in First Nations Education, University of Alberta, Department of Educational Policy Studies, 2001)
- Harker, Richard, *Ethnicity and School Achievement in New Zealand: Some Data to Supplement the Biddulph Et Al (2003) Best Evidence Synthesis: Secondary Analysis of the Progress at School and Smithfield Datasets for the Iterative Best Evidence Synthesis Programme*, (Wellington: Ministry of Education, 2007)
- Hart, William D., 'Dualism', in *A Companion to the Philosophy of Mind*, ed. by Samuel Guttenplan (Oxford: Blackwell: Wiley, 1996), pp. 265-267
- Hattie, John A. C., *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (New York, NY: Routledge, 2009)
- Hawaii Guide, Past and Present, Religion, 'With its Diverse Population, the People of Hawaii Practice Many Different Religions: Got Religion?'  
<http://hawaii-guide.info/past.and.present/religion/>

Hawaii State and Department of Education, *2015 Superintendent's Annual Report*, (2016)

<http://www.hawaiipublicschools.org/Reports/SuptReport2015.pdf>

—*Hawaiian Language Immersion Program*, (n.d.)

<http://www.hawaiipublicschools.org/TeachingAndLearning/StudentLearning/HawaiianEducation/Pages/translation.aspx> [accessed April 4, 2017]

Hawaii State, Department of Education, and Office of Education, *The Foundational & Administrative Framework for Kaiapuni Education – Hawaiian Language Immersion Program*, (2015) <https://www.hawaiipublicschools.org/DOE%20Forms/KaiapuniFrameworkFinal.pdf>

Hawaii State, State Public Charter School Commission, *2014-2015 Annual Report*, (2015) <http://bit.ly/AnnRpt-2015>

Hawkins, Augustus F. and Robert T. Stafford, *Summary of the Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988*, trans. by U.S. House of Representatives, H.R.5 vols (102 Stat. 130, 1988)  
<https://www.congress.gov/bill/100th-congress/house-bill/5>

Heckman, Paul E. and Viki L. Montera, 'From School Choice to Student Voice', *School Administrator*, 58 (2001), pp. 40-44, 46

—'School Reform: The Flatworm in a Flat World – from Entropy to Renewal through Indigenous Invention', *Teachers College Record*, 111 (2009), pp. 1328-1351

Heckman, Paul E. and Francine Peterman, 'Indigenous Invention: New Promise for School Reform', *Teachers College Record*, 98 (1996), pp. 307-327

Heibert, A. and D. Hiebert, 'Antiseptic Education: The Myth of Irregularity', *Faculty Dialogue*, 17 (1993), pp. 1-28

- Henrich, Joseph, Steven J. Heine and Ara Norenzayan, 'The Weirdest People in the World?', *Behavioral and Brain Sciences*, 33 (2010), 61-83, in *Cambridge Core* [accessed 2020/04/09]
- Hilberg, R. S. and Roland G. Tharp, *Theoretical Perspectives, Research Findings, and Classroom Implications of the Learning Styles of American Indian and Alaska Native Students. ERIC Digest*, (Charleston, WV: ERIC/CRESS, 2002) <https://eric.ed.gov/?id=ED468000>
- Hill, Frank, Angayuqaq Oscar Kawagley and Ray Barnhardt, *AKRSI Final Report: Phase I, 1995-2000*, (2000)
- Hill, Frank, Oscar Kawagley and Ray Barnhardt, *AKRSI Final Report: Phase II – 2000-2005*, (Alaska Native Knowledge Network, 2006)  
<http://www.ankn.uaf.edu/download/AKRSI2005FinalReport.doc>
- Hill, Zachary B., *Virtual Reality: Advances in Research and Applications* (Hauppauge, New York: Nova Science Publishers, Inc, 2016)
- Hillman, J., *Re-Visioning Psychology* (New York, NY: Harper & Row, 1975)
- Hodgkinson-Williams, Cheryl and Eve Gray, 'Degrees of Openness: The Emergence of Open Educational Resources at the University of Cape Town', *International Journal of Education and Development using Information and Communication Technology*, 5 (2009), pp. 101-116  
[https://open.uct.ac.za/bitstream/handle/11427/8860/CHED\\_article\\_OERemergence\\_HodgkinsonWilliams\\_2009.pdf?sequence=1](https://open.uct.ac.za/bitstream/handle/11427/8860/CHED_article_OERemergence_HodgkinsonWilliams_2009.pdf?sequence=1).
- Hora, Matthew T., 'Beyond the Skills Gap', *NACE Journal, NACE Web*, (2017)  
<https://www.naceweb.org/career-readiness/trends-and-predictions/beyond-the-skills-gap/>
- Horse, P. G., 'Reflections on American Indian Identity', in *New Perspectives on Racial Identity Development: A Theoretical and Practical Anthology*, ed. by C. L. Wijeyesinghe and B. W. Jackson III (New York, NY: New York University Press, 2001), pp. 91-107

Hosoda, Kelsea, 'Native Hawaiian Culture is Science: As with Other Indigenous Cultures, Hawaiian Knowledge Adds a Vital Element to Science', *Hawaii Business Magazine: Arts & Culture, Education*, (2018), p. 21

<https://www.hawaiibusiness.com/native-hawaiian-culture-is-science/>

Huitt, W., *Becoming a Brilliant Star: A Model of Formative Holistic Education*, International Networking for Educational Transformation (iNet) Conference, Augusta, GA (2006)

—*Success in the Information Age: A Paradigm Shift*, (Atlanta, Georgia: 1995)  
<http://chiron.valdosta.edu/whuitt/col/student/scanspap.html> [accessed March 1999]

—'A Systems Model of Human Behavior', *Educational Psychology Interactive*, (2003)

Hummel, John and William Huitt, 'What You Measure is what You Get', *GA, ASCD Newsletter: The Reporter*, (1994), pp. 10-11  
<http://www.edpsycinteractive.org/papers/wymiwyg.html> [accessed June 14, 2009]

Hyperledger, Hyperledger Certified Service Providers: Partnership Support Program at: <https://www.hyperledger.org/resources/hcsp>.

Hyperledger, Linux Foundation's Hyperledger Project Announces 30 Founding Members and Code Proposals to Advance Blockchain Technology, (2016)  
[:https://www.hyperledger.org/announcements/2016/02/09/linux-foundations-hyperledger-project-announces-30-founding-members-and-code-proposals-to-advance-blockchain-technology](https://www.hyperledger.org/announcements/2016/02/09/linux-foundations-hyperledger-project-announces-30-founding-members-and-code-proposals-to-advance-blockchain-technology).

Hyperledger Blockchain Technologies for Business, Business Description Whitepaper: Detailed Explanation of the Hyperledger framework,  
[https://www.hyperledger.org/wp-content/uploads/2018/07/HL\\_Whitepaper\\_IntroductiontoHyperledger.pdf](https://www.hyperledger.org/wp-content/uploads/2018/07/HL_Whitepaper_IntroductiontoHyperledger.pdf).

- Indian Country Today, 'Census Releases Latest Population Numbers, Native Americans are at 2.09%', (2018) Native Hawaiian Statistics Retrieved at <https://newsmaven.io/indiancountrytoday/news/census-releases-latest-population-numbers-native-americans-are-at-2-09-uf7gL2XbP0SRzFmI7jXUXQ/>
- Inglis, Kerri A., *Ma'i Lepera : Disease and Displacement in Nineteenth-Century Hawai'i* (Honolulu: University of Hawaii Press, 2013)
- Iseke-Barnes, Judy M., 'Aboriginal and Indigenous People's Resistance, the Internet, and Education', *Race, Ethnicity and Education*, 5 (2002), pp. 171-198
- Jansen, J., L. Marean and J. Underriner, *Benefits of Indigenous Language Learning*, (No date) [http://pages.uoregon.edu/nwili/wp-content/uploads/2012/07/forwebpageBenefitsL2\\_ECE10\\_17\\_14.pdf](http://pages.uoregon.edu/nwili/wp-content/uploads/2012/07/forwebpageBenefitsL2_ECE10_17_14.pdf)
- Jariya, A.M., Western Cultural Values and Its implications on Management Practices, *South East Asian Journal of Contemporary Business, Economics and Law*, Vol. 1 ISSN 2289-1560  
<https://pdfs.semanticscholar.org/0bc0/73aa9b16044152c9ecd71b7570aa385f9e59.pdf>. (2012).
- Jensen, Bryant, Sara Grajeda and Edward Haertel, 'Measuring Cultural Dimensions of Classroom Interactions', *Educational Assessment*, 23:4 (2018), 250-276
- Jenson, Haskie M. & B. Shreve. 'Remembering Diné College: Origin Stories of America's First Tribal College' *Tribal College Journal*, 30(1), pp. 20–21
- Jeong, Heisawn, Cindy E. Hmelo-Silver and Kihyun Jo, *Ten Years of Computer-Supported Collaborative Learning: A Meta-Analysis of CSCL in STEM Education during 2005–2014*, *Educational Research Review*, 28(100284) (2019).

Jesse, D. and others, *Promising Education Interventions to Improve the Achievement of Native American Students: An Annotated Bibliography*, (West Comprehensive Center at WestEd, 2015)

Johnson, Joseph F., Jr. and others, *Hope for Urban Education: A Study of Nine High-Performing, High-Poverty, Urban Elementary Schools*, (1999)

Jordan, Cathie, 'Creating Cultures of Schooling: Historical and Conceptual Background of the KEEP/Rough Rock Collaboration', *Bilingual Research Journal*, 19 (1995), pp. 83-100

—'Cultural Compatibility and the Education of Hawaiian Children: Implications for Mainland Educators', *Educational Research Quarterly*, 8 (1984), pp. 59-71

—'Translating Culture: From Ethnographic Information to Educational Program', *Anthropology & Education Quarterly*, 16 (1985), pp. 105-123

Joseph, Sam and Maria Uther, *Mobile Language Learning with Multimedia and Multimodal Interfaces*, Fourth IEEE International Workshop on Wireless, Mobile and Ubiquitous Technology in Education, Washington, DC (IEEE, 2006)

Juneau, Stan, *History and Foundation of American Indian Education* (Helena, MT: Indian Education for All Division, Montana Office of Public Instruction, 2001)

Kalakaua, David, *Legends and Myths of Hawaii: The Fables and Folklore of a Strange People*. Reprinted from an anthology of myths collected by King Kalakaua in the 1880s in an effort to preserve Hawaii's oral tradition (New York; Honolulu, HI: Charles L. Webster & Company; Mutual, 1888, Reprinted 1990)

Kamakau, Samuel M., *Ruling Chiefs of Hawaii*, Revised edn (Honolulu, HI: Kamehameha Schools Press, 1992)

—*Tales and Traditions of the People of Old: Na Moololo a Ka Poe Kahiko*,  
trans. by Mary Kawena Pukui (Booklines Hawaii Ltd, 1993)

Kamehameha Schools, *Ka Huaka'i: 2014 Native Hawaiian Educational  
Assessment*, (Honolulu, HI: Kamehameha Publishing, 2014)  
[http://www.ksbe.edu/assets/spi/pdfs/kh/Ka\\_Huakai\\_2014.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/Ka_Huakai_2014.pdf)

—*Native Hawaiian Educational Assessments Update 2009: A Supplement to  
Ka Huaka'i 2005*, (Honolulu, HI: Kamehameha Schools, Research &  
Evaluation Division, 2009)  
[http://www.ksbe.edu/assets/spi/pdfs/kh/KH\\_Supplement09.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/KH_Supplement09.pdf)

—Kamehameha School Strategic Planning and Research Division, reports and  
scholarships, and a list of the broad range of CBE Hawaiian largely  
indigenous-led research., at the following link  
[https://www.ksbe.edu/research/na\\_lau\\_lama\\_community\\_report/](https://www.ksbe.edu/research/na_lau_lama_community_report/).

Kamehameha Schools/Bernice Pauahi Bishop Estate-Office of Program  
Evaluation and Planning, *Native Hawaiian Educational Assessment Project:  
Final Report*, (Honolulu, HI: Kamehameha Schools/Bernice Pauahi Bishop  
Estate-Office of Program Evaluation and Planning, 1993)  
[http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA\\_1993.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA_1993.pdf)

Kamehameha Schools/Bernice Pauahi, Bishop E., *Native Hawaiian Educational  
Assessment Project. Final Report*, (1983)  
[http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA\\_1983.pdf](http://www.ksbe.edu/assets/spi/pdfs/kh/NHEA_1983.pdf)

Kanahele, George H. S., *Ku Kanaka: Stand Tall: A Search for Hawaiian Values*  
(Honolulu, HI: University of Hawaii Press, 1986)

Kana'iaupuni, Shawn M., *A Brief Overview of Culture-Based Education and  
Annotated Bibliography (Culture-Based Education Brief Series)* (Honolulu,  
HI: Kamehameha Schools, Research & Evaluation, 2007)

—'Ka'Akalai Ku Kanaka: A Call for Strengths-Based Approaches from a Native  
Hawaiian Perspective', *Educational Researcher*, 34 (2005), pp. 32-38



- Kana'iaupuni, Shawn M. and Keiki K. C. Kawai'ae'a, 'E Lauhoe Mai Na Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework', *Hūlili: Multidisciplinary Research on Hawaiian Well-being - Online Submission*, 5 (2008) <https://files.eric.ed.gov/fulltext/ED523184.pdf> [accessed September 26, 2018]
- Kana'iaupuni, Shawn M., Brandon Ledward and Umi Jensen, *Culture-Based Education and Its Relationship to Student Outcomes*, (Honolulu, HI: Kamehameha Schools Research and Evaluation, 2010) [http://www.ksbe.edu/assets/spi/pdfs/CBE\\_relationship\\_to\\_student\\_outcomes.pdf](http://www.ksbe.edu/assets/spi/pdfs/CBE_relationship_to_student_outcomes.pdf)
- Kana'iaupuni, Shawn M., Brandon Ledward and Nolan Malone, "'Mohala i Ka Wai": Cultural Advantage as a Framework for Indigenous Culture-Based Education and Student Outcomes', *American Educational Research Journal*, 54 (2017), pp. 311-339
- Kana'iaupuni, Shawn M., N. Malone and K. Ishibashi, *Ka Huaka'i: 2005 Native Hawaiian Educational Assessment*, (Honolulu, HI: Kamehameha Schools, Pauahi Publications, 2005)
- Kana'iaupuni, Shawn M. and Nolan Malone, 'This Land is My Land: The Role of Place in Native Hawaiian Identity', *Hūlili: Multidisciplinary Research on Hawaiian Well-Being*, 3 (2006), pp. 281-307 [https://www.academia.edu/6347427/This\\_Land\\_is\\_My\\_Land\\_The\\_Role\\_of\\_Place\\_in\\_Native\\_Hawaiian\\_Identity](https://www.academia.edu/6347427/This_Land_is_My_Land_The_Role_of_Place_in_Native_Hawaiian_Identity)
- Kaomea, Julie, 'Indigenous Studies in the Elementary Curriculum: A Cautionary Hawaiian Example', *Anthropology & Education Quarterly*, 36 (2005), 24-42 <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c867b01b858b56c3df12d3124f44416bbd0dc2fd421893dc56&fmt=H>
- 'Reading Erasures and Making the Familiar Strange: Defamiliarizing Methods for Research in Formerly Colonized and Historically Oppressed Communities', *Educational Researcher*, 32 (2003), pp. 14-25

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c82da96b9c61f478c125a0af3388ecc2bc37000fb0d09f4415&fmt=H>

Kaomea, Julie, *Education for Elimination in Nineteenth-Century Hawai'i: Settler Colonialism and the Native Hawaiian Chiefs' Children's Boarding School*. 54 vols (GB: Cambridge University Press, 2014)

Kaplan, Andreas M. and Michael Haenlein, 'Higher Education and the Digital Revolution: About MOOCs, SPOCs, Social Media, and the Cookie Monster', *Business Horizons*, 59 (2016), pp. 441-450

Kappler, Charles J., ed., *Indian Affairs: Laws and Treaties, Volume 6 (Laws) - Compiled from February 10, 1939 to January 13, 1971* (Washington, DC: Government Printing Office, 1971)  
<https://dc.library.okstate.edu/digital/collection/kapplers/id/29334>

Kawagley, Angayuqaq O. and Ray Barnhardt, *A Long Journey: Alaska Onward to Excellence in Yupiit/Tuluksak Schools. Case Study*, (1999)

Keengwe, Jared, Terry Kidd and Lydia Kyei-Blankson, 'Faculty and Technology: Implications for Faculty Training and Technology Leadership', *Journal of Science Education and Technology*, 18 (2009), pp. 23-28

Kelly, Edward and others, *Irreducible Mind: Toward a Psychology for the 21st Century* (Lanham, MD: Rowman & Littlefield Publishers, Inc., 2007)

Kelly, M., 'Some Thoughts on Education in Traditional Hawaiian Society', in *To Teach the Children: Historical Aspects of Education in Hawaii. A Publication Accompanying the Exhibition Commemorating the 50th Anniversary of the College of Education and the 75th Anniversary of the University of Hawaii.*, ed. by A. Kali (Honolulu, HI: University of Hawaii - Manoa, Bernice Pauahi Bishop Museum, 1982, Reprinted 1991), pp. 4-14

Kena, G. and others, *The Condition of Education 2016*, NCEES 2016-144 vols (Washington, DC: U.S. Department of Education, National Center for

Education Statistics, 2016)

<https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2016144> [accessed  
December 1, 2016]

Kenny, Martin and John Zysman, *The Rise of the Platform Economy*. Issues in  
Science and Technology. Vol 32 (3) (Spring 2016) Accessed at  
<https://issues.org/the-rise-of-the-platform-economy/>.

Kepelino, Z., *Kepelino's Traditions of Hawaii*, trans. by Martha Warren Beckwith  
(Honolulu, HI: The Bernice P. Bishop Museum Bulletin, Millwood Kraus,  
1932, Reprinted 1978)

Kim, Paul, Talia Miranda and Claudia Olaciregui, 'Pocket School: Exploring  
Mobile Technology as a Sustainable Literacy Education Option for  
Underserved Indigenous Children in Latin America', *International Journal of  
Educational Development*, 28 (2008), pp. 435-445

Kim, Uichol, Kuo-Shu Yang and Kwang-Kuo Hwang, eds., *Indigenous and  
Cultural Psychology: Understanding People in Context*, International and  
Cultural Psychology (New York, NY: Springer, 2006)

King, Ursula, 'Teilhard De Chardin's Vision of Science, Religion and Planetary  
Humanity: A Challenge to the Contemporary World', *Journal for the Study  
of Religion*, 31 (2018), pp. 135-158

Kingdom of Hawai'i, *Constitutional Laws of Hawai'i*, (1842)

Kirkness, Verna J. and Ray Barnhardt, 'First Nations and Higher Education: The  
Four R's – Respect, Relevance, Reciprocity, Responsibility', *Journal of  
American Indian Education*, 30 (1991), pp. 1-15

Klar, Nicholas, *How did European Settlement of South Australia Prove to be so  
Destructive of Aboriginal Society?*  
<http://www.klarbooks.com/academic/aborig.html> (1993)

Kober, Nancy, Alexandra Usher and Center on Education Policy, *A Public  
Education Primer: Basic (and Sometimes Surprising) Facts about the U.S.*

*Educational System. 2012 Revised Edition*, (Center on Education Policy, 2012)

Koulopoulos, Tom and Dan Keldsen, *The Gen Z Effect: The Six Forces Shaping the Future of Business*. [Electronic Resource], 1st edn (Bibliomotion, 2014)

Kral, Inge, 'Plugged in: Remote Australian Indigenous Youth and Digital Culture (CAEPR Working Paper no. 69)', *Center for Aboriginal Economic Policy Research*, (2010)

[https://caepr.cass.anu.edu.au/sites/default/files/docs/WP69\\_0\\_0.pdf](https://caepr.cass.anu.edu.au/sites/default/files/docs/WP69_0_0.pdf)

Kritt, David W. and Lucien T. Winegar, *Education and Technology: Critical Perspectives, Possible Futures* (Lanham, MD: Lexington Books, 2007)

<https://eric.ed.gov/?id=ED498757>

Krueger, Keith, 'Back to the Future: What the Coming Fourth Industrial Revolution Means for Education', *T H E Journal*, 45 (2018), p. 24

Kushman, James W. and Ray Barnhardt, 'Reforming Education from the Inside-Out: A Study of Community Engagement and Educational Reform in Rural Alaska', *Journal of Research in Rural Education*, 17 (2001), pp. 12-26

—*Study of Alaska Rural Systemic Reform. Final Report*, (1999)

<https://eric.ed.gov/?id=ED437251>

Kuykendall, Ralph S., *Hawaiian Kingdom 1778-1854: Foundation and Transformation* (Honolulu, HI: University of Hawaii Press, 1965)

<http://www.ulukau.org/elib/cgi-bin/library?e=d-0kingdom1-000Sec--11en-50-20-frameset-book--1-010escapewin&a=d&p2=book>

Kuykendall, Ralph S. and A. Grove Day, *Hawaii: A History, from Polynesian Kingdom to American State* (Englewood Cliffs, NJ: Prentice-Hall, 1961)

Ladson-Billings, Gloria, "Yes, but how do we do it?" Practicing Culturally Relevant Pedagogy', in *White Teachers Diverse Classrooms: Creating Inclusive Schools, Building on Students' Diversity, and Providing True*

*Educational Equity*, ed. by Julie G. Landsmen and Chance W. Lewis  
(Sterling, VA: Stylus, 2006), pp. 33-46

—'But That's Just Good Teaching! the Case for Culturally Relevant Pedagogy',  
*Theory into Practice*, 43 (1995), pp. 159-165

—*The Dreamkeepers: Successful Teachers of African American Children* (San  
Francisco, CA: Jossey-Bass, 1994)

—'Toward a Theory of Culturally Relevant Pedagogy', *American Educational  
Research Journal*, 32 (1995), pp. 465-491

LaFromboise, T. D. and W. Rowe, 'Skills Training for Bicultural Competence:  
Rationale and Application', *Journal of Counseling Psychology*, 30 (1983),  
pp. 589-595

Laimana, John K., Jr., *The Phenomenal Rise to Literacy in Hawai'i: Hawaiian  
Society in the Early Nineteenth Century (Master's Thesis)* (2011)  
<http://hdl.handle.net/10125/101531>

Lanauze, Milagros and Catherine Snow, 'The Relation between First and  
Second Language Writing Skills: Evidence from Puerto Rico Elementary  
School Children in Bilingual Programs', *Linguistics and Education*, 1 (1989),  
pp. 323-339  
<https://www.sciencedirect.com/science/article/pii/S0898589889800051>

Laozi, *Tao Te Ching: On the Art of Harmony: The New Illustrated Edition of the  
Chinese Philosophical Masterpiece*, trans. by Chad Hansen, 1st edn  
(London: Duncan Baird Publishers, 2009)

LeCompte, M. D. and D. Deyhle, 'Cultural Differences in Child Development:  
Navajo Adolescents in Middle Schools.', *Theory into Practice*, 33 (1994),  
156-166 [accessed March 12, 2007]

Ledward, B., B. Takayama and K. Elia, *Hawaiian Cultural Influences in  
Education (HCIE): Culture-Based Education among Hawaii Teachers*

(*Culture-Based Brief Education Series*). (Honolulu: Kamehameha Schools, Research, & Evaluation, 2009)

Ledward, B., B. Takayama and W. Kahumoku III, *Hawaiian Cultural Influences in Education (HCIE): 'Ohana and Community Integration in Culture-Based Education (Culture-Based Education Brief Series)*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation, 2008)  
[https://www.ksbe.edu/assets/research/collection/08\\_0128\\_ledward.pdf](https://www.ksbe.edu/assets/research/collection/08_0128_ledward.pdf)

Ledward, Brandon and others, *Why Hawai'i Needs Public Charter Schools: The Positive Effects of Hawaiian-Focused Charter Schools on Student Outcomes*, (2010)

Ledward, Brandon, Brennan Takayama and Walter Kahumoku III, *Kikī Nā Wai: Swiftly Flowing Streams. Examples of 'Ohana and Community Integration in Culture-Based Education*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation Division, 2008)  
[https://www.ksbe.edu/assets/research/collection/08\\_0201\\_ledward.pdf](https://www.ksbe.edu/assets/research/collection/08_0201_ledward.pdf)

Lee, Harry, David Gabbard and Jon Reyhner, 'A Specialized Knowledge Base for Teaching American Indian and Alaska Native Students', *Tribal College*, IV (1993), p. 26  
<http://proquest.umi.com/pqdweb?did=625182471&Fmt=3&clientId=1673&RQT=309&VName=PQD>

Lee, Jinwook and Paul Moon Sub Choi, *Chain of Antichains: An Efficient and Secure Distributed Ledger Technology and its Applications*, (2018)

Lee, Kai-Fu, *AI Superpowers: China, Silicon Valley, and the New World Order* (Houghton Mifflin Harcourt, 2018)

Levy, Pierre, 'Education and Training: New Technologies and Collective Intelligence', *Prospects*, 27 (1997), pp. 248-263

Lewis, Antony, *A Gentle Introduction to Self-Sovereign Identity*, Bits on Blocks: Thoughts on Blockchain Technology, (2017)

<https://bitsonblocks.net/2017/05/17/a-gentle-introduction-to-self-sovereign-identity>

- Li, F., 'Developing a Credit Recognition System for Chinese Higher Education Institutions', *Journal of Higher Education Policy and Management*, 37 (2015), pp. 424-431
- Lilic, John, 'uPort: A Glimpse into a Next Generation Self Sovereign Identity System', *LinkedIn*, (2015)
- Lind, A. W., *Hawaii's People*, 4th edn (Honolulu, HI: University of Hawaii Press, 1980)
- Linknovate, *Top 10 Emerging Technologies' Leaders & Trends*, <https://www.linknovate.com/view-resource/top-emerging-technologies/?key=5dcd732800f65d071fe28a8e> [accessed 2019]
- Lipka, J., N. Sharp and B. Brenner, 'The Relevance of Culturally Based Curriculum and Instruction: The Case of Nancy Sharp', *Journal of American Indian Research*, 44 (2006), pp. 31-54
- Lipka, Jerry, 'Language, Power, and Pedagogy: Whose School is it?', *Peabody Journal of Education*, 69 (1994), pp. 71-93  
<http://www.jstor.org/stable/1492746>
- Liss, Jerald M., 'Creative Destruction and Globalization: The Rise of Massive Standardized Education Platforms', *Globalizations*, 10 (2013), pp. 557-570  
<https://doi.org/10.1080/14747731.2013.806741>
- Little Soldier, Lee, 'Language Learning of Native American Students', *Educational Leadership*, 46 (1989), pp. 74-75
- Locke, John, 'Two Treatises of Government', in *Texts in the History of Political Thought*, ed. by Peter Laslett (Cambridge University Press, 1991), pp. 14-49

- Loizzo, Jamie, *10 Tips for using Social Tools with Students*, International Society for Technology in Education (ISTE), (2015)  
<https://www.iste.org/explore/In-the-classroom/10-tips-for-using-social-tools-with-students>
- Looi, Chee-Kit and others, 'Leveraging Mobile Technology for Sustainable Seamless Learning: A Research Agenda', *British Journal of Educational Technology (BJET)*, 41 (2010), pp. 154-169
- Looi, Chee-Kit, L-H Wong and Y. Song, 'Mobile Computer Supported Collaborative Learning', in *The International Handbook of Collaborative Learning*, ed. by Cindy E. Hmelo-Silver and others (2013), p. 420
- Looi, Chee-Kit and others, 'Anatomy of a Mobilized Lesson: Learning My Way', *Computers & Education*, 53 (2009), pp. 1120-1132
- Lorenzo, Manuel F. and Cristian Machado Trujillo, 'Cognitive Processes, ICT, and Education: A Critical Analysis', *Computers in the Schools*, 35 (2018), p. 186
- Lockett, Kathy and Thembi Lockett, 'The Development of Agency in First Generation Learners in Higher Education: A Social Realist Analysis', *Teaching in Higher Education*, 14 (2009), pp. 469-481
- The LuxTag Project, Private vs. Public Blockchain: What are the Major Differences? <https://medium.com/luxtag-live-tokenized-assets-on-blockchain/private-vs-public-blockchain-what-are-the-major-differences-d92a504f3a4a>.
- Lyman, F. S., 'The Hilo Boys Boarding School', *The Friend LIX*, December (1902), p. 25
- Mai, Robert P., 'Open Education: From Ideology to Orthodoxy', *Peabody Journal of Education*, 53 (1978), pp. 231-237



- Maina, Charles K., 'Traditional Knowledge Management and Preservation: Intersections with Library and Information Science', *International Information & Library Review*, 44 (2012), pp. 13-27
- Malo, David D., *Hawaiian Antiquities (Moolelo Hawaii)*, trans. by Nathaniel B. Emerson (Honolulu, HI: Hawaiian Gazette Col, Ltd.; Bishop Museum Press, 1898, Reprinted 1971)
- Mantle-Bromley, Corinne, Carol A. Wilson and Ann M. Foster, 'Context Matters: Improving Schooling for Native Hawaiian Children', *Equity & Excellence in Education*, 36 (2003), pp. 259-269  
<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=c84804dfd2d2953e988f1b44482541676b195ac76180c525513f583680d97dfc&fmt=C>
- Maori Education Strategy, *Ka Hikitia - Accelerating Success 2013-2017*, (New Zealand Government) <http://www.education.govt.nz/our-work/overall-strategies-and-policies/ka-hikitia-accelerating-success-20132017/the-maori-education-strategy-ka-hikitia-accelerating-success-2013-2017/>
- Maori Education Strategy, *Ka Hikitia – Managing for Success 2008-2012*, (New Zealand Government) <http://www.education.govt.nz/assets/Documents/Ministry/Strategies-and-policies/Ka-Hikitia/KaHikitia2009PartOne.pdf>
- Martin, Andrew J., 'A Motivational Psychology for the Education of Indigenous Australian Students', *Australian Journal of Indigenous Education*, 35 (2006), pp. 30-40
- Maryboy, Nancy C., David H. Begay and Lee Nichol, 'Paradox and Transformation', *World Indigenous Nations Higher Education Consortium Journal* 200, 2 (2006)
- Matreaux, Alfred, *Ethnology of Easter Island* (Honolulu, HI: Bernice P. Bishop Museum Bulletin 160; Bishop Museum Reprints, 1940 Reprinted 1971)
- May, S., 'Bilingual/Immersion Education: What the Research Tells Us', in *Encyclopedia of Language and Education*, ed. by J. Cummins and N. H.

Hornberger, 2nd edn , *Bilingual Education vols* (Springer Science+Business Media LLC, 2008), pp. 19-34

McCarty, Teresa L., 'American Indian, Alaska Native, and Native Hawaiian Education in the Era of Standardization and NCLB—An Introduction', *Journal of American Indian Education*, 47 (2008), pp. 1-9

McCubbin, Laurie D. and Anthony Marsella, 'Native Hawaiians and Psychology: The Cultural and Historical Context of Indigenous Ways of Knowing', *Cultural Diversity and Ethnic Minority Psychology*, 15 (2009), pp. 374-387, 377

McGough, David J., *Exploring the Foundations of Philosophy of Natural Education*, (1992)

<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED353110>

McGregor, Davianna P. and others, 'An Ecological Model of Native Hawaiian Well-Being', *Pacific Health Dialog*, 10 (2003), pp. 106-128

McNeill, William H., 'History and the Scientific Worldview', *History and Theory*, 37 (1998), p. 1

McWilliam, Erica, *Teaching Gen Z*, Erica McWilliam. Com.Au, (2015)

<http://www.ericamcwilliam.com.au/teaching-gen-z/>

McWilliams, Tennant S., 'James H. Blount, the South, and Hawaiian Annexation', *Pacific Historical Review*, 57 (1988), 25-46, in JSTOR

<http://www.jstor.org/stable/3639673>

Meadows, Donella H., *Thinking in Systems: A Primer* (Chelsea Green Pub, 2008) <https://wtf.tw/ref/meadows.pdf>

Medin, Douglas L. and Megan Bang, *Who's Asking? Native Science, Western Science and Science Education* (Cambridge, MA, USA: MIT Press, 2014)

Merner, Laura and John Tyler, *Native American Participation among Bachelors in Physical Sciences and Engineering: Results from 2003-13 Data of the*

*National Center for Education Statistics, Focus On*, (College Park, MD: AIP Statistical Research Center, 2017)

<http://files.eric.ed.gov/fulltext/ED578986.pdf>

Meyer, Hester W. J., 'The Influence of Information Behaviour on Information Sharing Across Cultural Boundaries in Development Contexts', *Information Research: An International Electronic Journal*, 14 (2009)

<http://files.eric.ed.gov/fulltext/EJ837280.pdf>

Meyer, Manulani A., 'Acultural Assumptions of Empiricism: A Native Hawaiian Critique', *Canadian Journal of Native Education*, 25 (2001), pp. 188-98

—*Ho'oulu - our Time of Becoming - Hawaiian Epistemology and Early Writings* (Honolulu, Hawai'i: 'Ai Pohaku Press - Native Books, 2003)

—'Native Hawaiian Epistemology: Exploring Hawaiian Views of Knowledge', *Cultural Survival Quarterly*, 22 (1998), pp. 38-40

—'Native Hawaiian Epistemology: Sites of Empowerment and Resistance', *Equity & Excellence in Education*, 31 (1998), pp. 22-28

Meyer, Manulani A., 'Ekolu Mea Nui: Three Ways to Experience the World', *The Canadian Journal of Native Studies*, 31 (2011), pp. 11-16,188

—'Hawaiian Hermeneutics and the Triangulation of Meaning: Gross, Subtle, Causal', *Social Justice, Thomas Gale*, 30 (2003), pp. 54-62

—'Holographic Epistemology: Native Common Sense', *China Media Research*, (2013), p. 94

—'Our Own Liberation: Reflections on Hawaiian Epistemology', *The Contemporary Pacific*, 13 (2001), p. 124

Milrad, M. and others, 'Seamless Learning: An International Perspective on Next Generation Technology Enhanced Learning', in *Handbook of Mobile Learning*, ed. by Z. L. Berge and L. Y. Muilenburg (New York: Routledge, 2013), pp. 95-108

- Mohatt, G. and F. Erickson, 'Cultural Differences in Teaching Styles in an Odawa School: A Sociolinguistic Approach', in *Culture and the Bilingual Classroom: Studies in Classroom Ethnography*, ed. by Henry T. Trueba, G. P. Guthrie and Kathryn H. Au (Rowley, MA: Newberry House, 1981), pp. 105-119
- Moore, Carla, Michael D. Toth and Robert J. Marzano, *The Essentials for Standards-Driven Classrooms: A Practical Instructional Model for Every Student to Achieve Rigor* (West Palm Beach, FL: Learning Sciences International, 2017)
- Morey, Stephanie and Jodi Mouratis, *New Adobe Study Shows Gen Z Students and Teachers See Creativity as Key to Success*, Adobe Press Release, <https://news.adobe.com/press-release/creative-cloud/new-adobe-study-shows-gen-z-students-and-teachers-see-creativity-key>, (Anaheim, CA: 2016)
- Nagel, Thomas, 'What is the Mind-Body Problem?', in *Experimental and Theoretical Studies of Consciousness*, ed. by Gregory R. Bock and Joan Marsh (Chicester, England: John Wiley, 1993), pp. 1-13
- National Advisory Committee on Creative and Cultural Education, *All our Futures: Creativity, Culture, and Education*, (London: DFEE, 1999)
- National Advisory Council on Indian Education, *Indian Education: A Federal Entitlement. 19th Annual Report to the U.S. Congress for Fiscal Year 1992* (1993)
- National Center for Education Statistics, *Table 1. Public High School 4-Year Adjusted Cohort Graduation Rate (ACGR), by Race/Ethnicity and Selected Demographics for the United States, the 50 States, and the District of Columbia: School Year 2013–14*, (Washington, D.C.: Department of Education, 2015)  
[https://nces.ed.gov/ccd/tables/ACGR\\_RE\\_and\\_characteristics\\_2013-14.asp](https://nces.ed.gov/ccd/tables/ACGR_RE_and_characteristics_2013-14.asp)

- National Congress of American Indians – <http://www.ncai.org/about-tribes/demographics>.
- National Indian Education Association and National Education Association, *Native Education 101: Basic Facts about American Indian, Alaska Native, and Native Hawaiian Education*, (Washington, D.C.: National Indian Education Association, 2008)
- National Society for the Study of Education Yearbook Committee, *Learning and Teaching the Ways of Knowing*, National Society for the Study of Yearbooks, Eighty-fourth Yearbook of the National Society for the Study of Education - Part II vols (Chicago, IL: University of Chicago Press, 1985)
- Native Hawaiian Education Council, *Vision Statement of the Native Hawaiian Education Council*, <http://www.nhec.org/about-nhec/the-native-hawaiian-education-act> [accessed June 22, 2018]
- Native Hawaiian Education Council and others, *Na Honua Maui Ola: Hawai'i Guidelines for Culturally Healthy and Responsive Learning Environments*, trans. by Keoni Kelekolio, Keiki Kawai'ae'a and William H. Wilson, Statewide Review Meetings Sponsored by the Native Hawaiian Education Island Councils (Honolulu and Hilo, Hawai'i: Native Hawaiian Education Council, 2002)
- Nelson-Barber, S. and E. Estrin, 'Bringing Native American Perspectives to the Teaching of Mathematics and Science', *Theory into Practice*, 34 (1995), pp. 174-185
- Nelson-Barber, S. and E. Trumball, 'Making Assessment Practices Valid for Indigenous American Students', *Journal of American Indian Education*, 6 (2007)
- Neri, Rebecca C., Maritza Lozano and Louis M. Gomez, '(Re)Framing Resistance to Culturally Relevant Education as a Multilevel Learning Problem', *Review of Research in Education*, 43 (2019), 197-226  
<https://doi.org/10.3102/0091732X18821120>

- New Mexico Higher Education Department, *Native American and Hispanic Students: Recruitment, Enrollment, Retention and Graduation Trends; Institutional Performance Measures and Targets; Institutional Action Plans*, (New Mexico Higher Education Department, 2005)  
<http://files.eric.ed.gov/fulltext/ED500286.pdf>
- New Zealand - Ministry of Education, *Education Counts*,  
<https://www.educationcounts.govt.nz/home> (New Zealand Government)
- Nikirk, Martin, 'Today's Millennial Generation: A Look Ahead to the Future they Create', *Techniques: Connecting Education and Careers*, 84 (2009), pp. 20-23 <https://eric.ed.gov/?id=EJ840445>
- Nixon, Richard, *President Nixon, Special Message on Indian Affairs*, (U.S. Environmental Protection Agency, 1970)  
<https://www.epa.gov/sites/production/files/2013-08/documents/president-nixon70.pdf>
- Oakes, J., 'Tracking, Inequality, and the Rhetoric of School Reform: Why Schools Don't Change.', *Journal of Education*, 168 (1986), pp. 61-80
- Oakes, Abner, Traci Maday and Center for Comprehensive School Reform and Improvement, *Engaging Native American Learners with Rigor "and" Cultural Relevance. Issue Brief*, (Center for Comprehensive School Reform and Improvement, 2009)
- Ogata, Veronica F., Patricia H. Sheehey and Mary Jo Noonan, 'Rural Native Hawaiian Perspectives on Special Education', *Rural Special Education Quarterly*, 25 (2006), pp. 7-15
- Ogbu, John U., 'Variability in Minority School Performance: A Problem in Search of an Explanation', in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 83-112

- Oliver, Christopher, *The Internal Colonialism Model: What the Model has done to the Education of Native Americans*, (1996)
- Ondarza, Rico G., 'Enhancing Blockchain Innovation Via Regulation: The Case for an E-Corporation' (Masters of Public Policy, Harvard Kennedy School of Government, 2019), p. 10  
[https://issuu.com/medauras/docs/blockchain\\_regulation\\_study\\_-\\_april](https://issuu.com/medauras/docs/blockchain_regulation_study_-_april)
- Oneha, M. F., 'Ka Maui O Ka 'Oina a He Maui Kanaka: An Ethnographic Study from An Hawaiian Sense of Place', *Pacific Health Dialog*, 8 (2001), pp. 299-311
- Open Automation Software – IIoT Edge Computing vs. Cloud Computing  
<https://openautomationsoftware.com/blog/iiot-edge-computing-vs-cloud-computing/>
- Open University UK, Open Blockchain: Researching the Potential of Blockchains, <https://blockchain.open.ac.uk>  
(<http://kmi.open.ac.uk/projects/name/open-blockchain>).
- Orellana, Anymir and Vanaja Nethi, 'RESEARCH IN DISTANCE EDUCATION: Trends in the Quarterly Review of Distance Education from 2002 to 2017', *Quarterly Review of Distance Education*, 20 (2019), pp. 1-14
- Ortiz, A. and I. Heavyrunner, 'Student Access, Retention, and Success: Models of Inclusion and Support', in *the Renaissance of American Indian Higher Education*, ed. by Maenette K. P. Ah Nee-Benham and W. Stein (Mahwah, NJ: Lawrence Erlbaum Associates, 2003)
- Osorio, Jonathan, *I Ulu I Ka 'Aina : Land* (Honolulu: University of Hawaii Press, 2014)
- Ovando, Carlos J. and Mary Carol Combs, *Bilingual and ESL Classrooms: Teaching in Multicultural Contexts*, Sixth edn (Lanham, MD: Rowman & Littlefield, 2018)

Overholt, Thomas W. and Baird J. Callicott, *Clothed-in-Fur and Other Tales: An Introduction to an Ojibwa World View*, A Selection of Twenty-Two Narratives Reprinted from William Jones' Ojibwa Texts (Washington, D.C.: University Press of America, 1982)

Oxford University, University College Oxford Blockchain Research Centre,  
<https://blockchain.univ.ox.ac.uk/>  
[https://georythmikigr.s3.amazonaws.com/uploads/file\\_attachment/file\\_name/448/oxford\\_blockchain\\_strategy\\_programme\\_prospectus.pdf](https://georythmikigr.s3.amazonaws.com/uploads/file_attachment/file_name/448/oxford_blockchain_strategy_programme_prospectus.pdf)

Pacific Policy Research Center, *Successful Bilingual and Immersion Education Models/Programs*, (Honolulu, HI: Kamehameha Schools, Research & Evaluation Division, 2010)  
[http://www.ksbe.edu/assets/spi/pdfs/Bilingual\\_Immersion\\_full.pdf](http://www.ksbe.edu/assets/spi/pdfs/Bilingual_Immersion_full.pdf)

Parker, Brett, 'Maori Access to Information Technology', *The Electronic Library*, 21 (2003), pp. 456-460

Parker, Geoffrey G., Marshall W. Van Alstyne and Sangeet Paul Choudary, *Platform Revolution: How Networked Markets are Transforming the Economy - and how to make them Work for You* (New York: W.W. Norton & Company, Inc., 2016)

Pearce, Charles E. M. and Frances M. Pearce, 'Oceanic Migration: Paths, Sequence, Timing and Range of Prehistoric Migration in the Pacific and Indian Oceans', in (Dordrecht Heidelberg London New York: Springer Science & Business Media, 2010), p. 167

Pewewardy, C. and B. Frey, 'American Indian Students' Perceptions of Racial Climate, Multicultural Support Services, and Ethnic Fraud at a Predominantly White University', *Journal of American Indian Education*, 43 (2004), pp. 32-60

Pietersen, H. J., *The Four Types of Knowing: Metaphysical, Scientific, Narrative, and Pragmatic: A Meta-Epistemology of Mind* (Lewiston, N.Y.: Edwin Mellon Press, 2011)



- Pink, Daniel H., *A Whole New Mind: Why Right-Brainers Will Rule the Future* (New York: Powerhead Books, 2006)
- Pukui, Mary K., 'Songs (Meles) of Old Ka'u, Hawaii', *The Journal of American Folklore*, (1949), 247
- Pukui, Mary K., E. W. Haertig and Catherine A. Lee, *Nānā i Ke Kumu (Look to the Source). Vol. II* (Honolulu, HI: Hui Hanai, 1972)
- Ramsey, Paul J., *The Bilingual School in the United States: A Documentary History* (Charlotte, N.C.: Information Age Publishing, 2012)
- Reddy, M. A., *Statistical Record of Native Americans*, (Washington, D.C.: Gale Research, 1993)
- Reinhardt, Martin and Traci Maday, *Interdisciplinary Manual for American Indian Inclusion*, (Ed Options, Inc., 2006)
- Renfro, Adam, 'Meet Generation Z', *GettingSmart.Com*, (2012)
- Reyes, Raymond, *A Native Perspective on the School Reform Movement: A Hot Topics Paper*, (Portland, OR: Northwest Regional Educational Laboratory, 1998) <https://eric.ed.gov/?id=ED423101>
- Reyhner, J., 'Changes in American Indian Education: A Historical Retrospective for Educators in the United States', *ERIC Clearinghouse on Rural Education and Small Schools - ERIC Digest*, (1989) <https://files.eric.ed.gov/fulltext/ED314228.pdf>
- Reyhner, J. and D. S. Hurtado, 'Reading First Literacy, and American Indian/Alaska Native Students', *Journal of American Indian Education*, 47 (2008), pp. 82-95
- Rezentes, William C., III, *Ka Lama Kukui - Hawaiian Psychology: An Introduction*, 1st edn (Honolulu, HI: A'ali'i Books, 1996)

Richardson, Jayson W. and Scott McLeod, 'Technology Leadership in Native American Schools', *Journal of Research in Rural Education*, 26 (2011)

Rifkin, Jeremy, *The Third Industrial Revolution – how Lateral Power is Transforming Energy, the Economy, and the World* (New York and London: Palgrave Macmillan, 2011)

Rigney, Lester I., 'Indigenous Education and Treaty: Building Indigenous Management Capacity. [Paper in: Treaty - Let's Get it Right.]', *Balayi: Culture, Law, and Colonialism*, 4 (2002), pp. 73-82

Rivers, Christine and Ian Kinchin, 'Dynamic Learning: Designing a Hidden Pedagogy to Enhance Critical Thinking Skills Development', *Management Teaching Review*, 4 (2019), pp. 148-156

<https://doi.org/10.1177%2F2379298118807224>

Robinson, Ken, *Out of our Minds: Learning to be Creative* (Chicester, West Sussex, England, Oxford, U.K.: Capstone Publishing Ltd. (a Wiley Company), 2001)

Rogers, Donna and Karen Swan, 'Self-Regulated Learning and Internet Searching', *Teachers College Record*, 106 (2004), 1804-1824

[https://www.itma.vt.edu/courses/tel/resources/rogers\(2004\)\\_self-regulated\\_internet.pdf](https://www.itma.vt.edu/courses/tel/resources/rogers(2004)_self-regulated_internet.pdf)

Rogers, Y. and S. Price, 'Using Ubiquitous Computing to Extend and Enhance Learning Experiences', in *Ubiquitous Computing in Education: Invisible Technology, Visible Impact*, ed. by M. van Hooft and K. Swan (Lawrence Erlbaum Associates, Inc., 2006), pp. 329-347

Rogoff, Barbara and others, 'Firsthand Learning through Intent Participation', *Annual Review of Psychology*, 54 (2003), 175-203

<https://doi.org/10.1146/annurev.psych.54.101601.145118>

- Ross, Terris and others, *Higher Education: Gaps in Access and Persistence Study. Statistical Analysis Report. NCES 2012-046*, (National Center for Education Statistics, 2012) <https://eric.ed.gov/?id=ED534691>
- Roth, Wolff-Michael and Yew-Jin Lee, "'Vygotsky's Neglected Legacy': Cultural-Historical Activity Theory', *Review of Educational Research*, 77 (2007), pp. 186-232
- Rothman, Darla, 'A Tsunami of Learners Called Generation Z', *Public Safety: A State of Mind*, 1 (2014), <https://mdle.net/journal.htm>
- Russell, Gale L. and Egan J. Chernoff, *Incidents of Intrusion: Disruptions of Mathematics Teaching and Learning by the Traditional Western Worldview*, (North American Chapter of the International Group for the Psychology of Mathematics Education, 2013) <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED584481>
- Ruth, Alison and Luke Houghton, 'The Wiki Way of Learning', *Australasian Journal of Educational Technology*, 25 (2009), pp. 135-152 <https://ajet.org.au/index.php/AJET/article/view/1147>
- Sanchez, John and Mary E. Stuckey, 'From Boarding School to Multicultural Classroom: The Intercultural Politics of Education, Assimilation, and American Indians', *Teacher Education Quarterly*, 26 (1999), 83-95
- Sanders, D., 'Culture Conflicts: An Important Factor in the Academic Failures of American Indian Students', *Journal of Multicultural Counseling and Development*, 15 (1987), pp. 81-90
- Sang, Kau'i and Jessica Worchel, 'A Place-Based Process for Reimagining Learning in the Hawaiian Context', *Voices in Urban Education*, (2017), pp. 26-32
- Schachter, Judith, *The Legacies of a Hawaiian Generation: From Territorial Subject to American Citizen* (New York: Berghahn Books, 2013)

- Scharmer, C. O., *Theory U: Leading from the Future as it Emerges*, First edn (San Francisco, CA: Berrett-Koehler Publishers, Inc., 2009)
- Scharmer, Otto & Kaufer, Katrin, *Leading from the Emerging Future: From Ego-System to Eco-System Economies*, First edn (San Francisco, CA: Berrett-Koehler Publishers, Inc, 2013)
- Schawbel, Dan, *Gen Y and Gen Z Global Workplace Expectations Study*, <http://millennialbranding.com/2014/geny-genz-global-workplace-expectations-study/> (Millennial Branding and Randstad US, 2014)
- Schissel, B. and T. Wotherspoon, *The Legacy of School for Aboriginal People: Education, Oppression, and Emancipation* (Don Mills, ON: Oxford University Press Canada, 2003)
- Schoem, David, 'Modeling a Diverse and Democratic America: The Michigan Community Scholars Program', *About Campus*, 10 (2005), pp. 18-23
- Schopenhauer, Arthur and others, *Schopenhauer: 'The World as Will and Representation': Volume 1*, The Cambridge Edition of the Works of Schopenhaur (Cambridge: Cambridge University Press, 2010)
- Schwab, Klaus, *The Fourth Industrial Revolution*, 1st edn (New York: Crown Business, 2017)
- Shaping the Future of the Fourth Industrial Revolution: A Guide to Building a Better World* (New York: Currency Books, 2018)
- Schwieger, Dana and Christine Ladwig, 'Reaching and Retaining the Next Generation: Adapting to the Expectations of Gen Z in the Classroom', *Information Systems Education Journal*, 16 (2018), pp. 45-54
- Scoon, A. R., 'Affective Influences on English Language Learning among Indian Students', *TESOL Quarterly*, 5 (1971), p. 285
- Searle, John R., 'Can Computers Think?', in *Minds, Brains, and Science*(Cambridge, MA: Harvard University Press, 1984), pp. 28-41

- 'Consciousness, Explanatory Inversion, and Cognitive Science', *Behavioral and Brain Sciences*, 13 (1990), pp. 585-642
- 'Minds, Brains, and Programs', *Behavioral and Brain Sciences*, 3 (1980), pp. 417-457
- Seddon, G. M., 'The Properties of Bloom's Taxonomy of Educational Objectives for the Cognitive Domain.', *Review of Educational Research*, 48 (1978), pp. 303-323
- Seldon, Anthony, *The Fourth Education Revolution: Will Artificial Intelligence Liberate or Infantilize Humanity* (United Kingdom: University of Buckingham Press, 2018)
- Sellars, Maura and others, 'Conversations on Critical Thinking: Can Critical Thinking Find its Way Forward as the Skill Set and Mindset of the Century?', *Education Sciences*, 8 (2018)
- Senate Special Subcommittee on Indian Education, *Indian Education: A National Tragedy - A National Challenge*, (Washington, DC: U.S. Senate Committee on Labor and Public Welfare, 1969)  
<https://eric.ed.gov/?id=ED034625>
- Senge, P. M., *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday, 2006)
- Senge, P. M. and others, *Schools that Learn: A Fifth Discipline Fieldbook for Educators, Parents, and Everyone Who Cares about Education*, updated and revised edn (New York: Crown Publishing Group, 2012)
- Sharpley, M., 'Methods for Evaluating Mobile Learning', in *Researching Mobile Learning: Frameworks, Tools and Research Designs*, ed. by G. N. Vavoula, N. Pachler and A. Kukulska-Hulme (Oxford: Peter Lang Publishing Group, 2009), pp. 17-39
- 'Mobile Learning: Research, Practice and Challenges', *Distance Education in China*, 3 (2013), pp. 5-11

- Sharples, M., J. Taylor and G. Vavoula, 'A Theory of Learning for the Mobile Age', in *The Sage Handbook of E-Learning Research*, ed. by R. Andrews and C. Haythornwaite (London: Sage, 2007), pp. 221-247
- Sheehey, Patricia H., 'Parent Involvement in Educational Decision-Making: A Hawaiian Perspective', *Rural Special Education Quarterly*, 25 (2006), pp. 3-15 <http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c862613111d5526759abfe2088e7030faf0ff348396eaae00c&fmt=H>
- Siasoco, Ricco V., *Aboriginal Australia: History and Culture of Australia's Indigenous Peoples*, <http://www.infoplease.com/spot/aboriginal1> edn, (Pearson Education, Inc., 2007)
- Siep, Ludwig, *Hegel's Phenomenology of Spirit* (New York: Cambridge University Press, 2014)
- Silva, Noenoe K., *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham, NC: Duke University Press, 2004)
- Simpson, L. R., 'Anticolonial Strategies for the Recovery and Maintenance of Indigenous Knowledge', *American Indian Quarterly*, 28 (2004), pp. 373-384
- Sing, David K., Alapa Hunter and Manulani Aluli Meyer, 'Native Hawaiian Education: Talking Story with Three Hawaiian Educators', *Journal of American Indian Education*, 39 (1999), pp. 4-13
- Sleeter, C., 'Confronting the Marginalization of Culturally Responsive Pedagogy', *Urban Education*, 47 (2012), pp. 562-584
- Smith-Mohamed, K., 'Role Models, Mentors, and Native Students: Some Implications for Educators', *Canadian Journal of Native Education*, 22 (1998), pp. 238-250
- Snyder, Thomas D. and Sally A. Dillow, *Digest of Education Statistics 2010*, (National Center for Education Statistics, 2011)  
<https://nces.ed.gov/programs/digest/d10/>

- Soares, Louis, Patricia Steele and Lindsay Wayt, *Evolving Higher Education Business Models: Leading with Data to Deliver Results*, (Washington, DC: American Council on Education, 2016)
- Sokolow, Jayme A., *The Great Encounter: Native Peoples and European Settlers in the Americas, 1492-1800* (Florence: Routledge, 2015)
- Sovrin Foundation, *Sovrin: A Protocol and Token for Self-Sovereign Identity and Decentralized Trust*, A White Paper from the Sovrin Foundation V 1.0, (2018) <https://sovrin.org/wp-content/uploads/2018/03/Sovrin-Protocol-and-Token-White-Paper.pdf> [accessed 5 April 2019]
- The Sovrin Solution, Control Your Digital Identity, [www.sovrin.org](http://www.sovrin.org) accessed 5 April 2019.
- Stahl, G., *Contributions to a Theoretical Framework for CSCL*, CSCL '02 Proceedings of the Conference on Computer Support for Collaborative Learning: Foundations for a CSCL Community, Boulder, Colorado edn, (Hillsdale, NJ: Lawrence Erlbaum, 2002)
- Stensaker, B. and P. Maassen, 'A Conceptualisation of Available Trust-Building Mechanisms for International Quality Assurance of Higher Education', *Journal of Higher Education Policy and Management*, 37 (2015), pp. 130-140
- Stetser, M. C. and R. Stillwell, *Public High School Four-Year on-Time Graduation Rates and Event Dropout Rates: School Years 2010-11 and 2011-12. First Look (NCES 2014-391)*, (Washington, DC: National Center for Education Statistics; Institute of Education Sciences; U.S. Department of Education, 2014)
- Stiggins, R. J., E. Rubel and E. Quellmalz, *Measuring Thinking Skills in the Classroom (Revised Edition)* (Washington, DC: National Education Association, 1988)

Stoll, Amy, *Reclaiming Native Education: Activism, Teaching and Leadership*,  
22 vols (Cambridge, MA: Cultural Survival, 1998)

<https://eric.ed.gov/?id=ED455980>

Stonechild, Blair, *The New Buffalo: The Struggle for Aboriginal Post-Secondary Education* (Winnipeg: University of Manitoba Press, 2006)

Stueber, R., 'An Informal History of Schooling in Hawaii', in *To Teach the Children: Historical Aspects of Education in Hawaii*, ed. by A. Kali (Honolulu, HI: University of Hawaii - Manoa and the Bernice Bishop Museum, 1982, Reprinted 1991), pp. 16-36

Sunil, Abhijit and others, 'Predictions 2020: Edge Computing - New Form Factors, Partnership Strategies, and the Promise of 5G Will Converge to Catapult Edge Toward Mainstream', *Forrester Research Report*, (2019)  
<https://www.forrester.com/report/Predictions+2020+Edge+Computing/-/E-RES157595>

Swisher, K. and J. W. Tippeconnic III (Eds), *Next Steps: Research and Practice to Advance Indian Education* (Charleston, WV: Clearinghouse on Rural Education and Small Schools, 1999)

Tapscott, Don and Alex Kaplan, *Blockchain Revolution in Education and Lifelong Learning: Preparing for Disruption, Leading the Transformation*, (Blockchain Research Institute; IBM Institute for Business Value, 2019)  
<https://www.ibm.com/downloads/cas/93DDVAKE>

Teilhard de Chardin, Pierre, *The Phenomenon of Man*, trans. by Bernard Wall (Harper & Row; Harper Perennial; Harper Perennial, 1959 Reprinted 1976 2008)

Tharp, R. G., 'The Effective Instruction of Comprehension: Results and Description of the Kamehameha Early Education Program', *Reading Research Quarterly*, 71 (1982), pp. 503-527



- Tharp, R. G. and others *Teaching Transformed: Achieving Excellence, Fairness, Inclusion and Harmony*. (Boulder, CO: Westview, 2000)
- Tharp, Roland G., 'Four Hundred Years of Evidence: Culture, Pedagogy and Native America', *Journal of American Indian Education*, 45 (2006), pp. 6-26
- From At-Risk to Excellence: Research, Theory, and Principles for Practice*, (1997) <http://files.eric.ed.gov/fulltext/ED409717.pdf>
- Tharp, Roland G. and Stephanie Stoll Dalton, 'Orthodoxy, Cultural Compatibility, and Universals in Education', *Comparative Education*, 43 (2007), pp. 53-70
- Tharp, Roland G. and Susan Entz, 'From High Chair to High School: Research-Based Principles for Teaching Complex Thinking', *Young Children*, 58 (2003), pp. 38-44
- Tharp, Roland G. and Ronald Gallimore, 'Rousing Schools to Life', *American Educator: The Professional Journal of the American Federation of Teachers*, 13 (1989), pp. 20-25,46-52
- Tharp, Roland G. and Lois A. Yamauchi, *Effective Instructional Conversation in Native American Classrooms. Educational Practice Report: 10*, (1994) <http://files.eric.ed.gov/fulltext/ED372896.pdf>
- 'Instructional Conversations in Native American Classrooms: Rural, Urban and Minority Education', *Journal of Early Education and Family Review*, 7 (2000), pp. 33-37
- Thomas, Wayne and Virginia Collier, *A National Study of School Effectiveness for Language Minority Students' Long-Term Academic Achievement: Final Report, Executive Summary*, (Santa Cruz, CA and Washington, DC: Center for Research on Education, Diversity & Excellence., 2002) <https://escholarship.org/content/qt65j213pt/qt65j213pt.pdf?t=krnd6g>

- Tibbetts, Kathy and others, *Pathways To prosperity through Linked Learning for Native Hawaiians*, (Honolulu, HI: Kamehameha Schools– Research & Evaluation, 2012)
- Tierney, W. G., *Official Encouragement, Unofficial Discouragement: Minorities in Academe - the Native American Experience* (Norwood, NJ: Ablex, 1992)
- Tippeconnic, John, 'The Use of Academic Achievement Tests and Measurements with American Indian and Alaska Native Students', *Eric Digest*, (2003)
- Titus, Dale, *High Stakes Down Under for Indigenous Peoples: Learning from Maori Education in New Zealand; an Outsiders Perspective*, The 11th Annual Meeting of the National Association for Multicultural Education , Las Vegas, NV edn, (2001)
- Tonelli, Roberto and others, *Implementing a Microservices System with Blockchain Smart Contracts*, 2019 IEEE International Workshop on Blockchain Oriented Software Engineering (IWBOSE), (IEEE, 2019)  
<https://doi.org/10.1109/IWBOSE.2019.8666520>
- Trafzer, C. E., J. A. Keller, & L. Sisquoc, 'Boarding School Blues: Revisiting American Indian Educational Experiences'. Lincoln, Nebraska: University of Nebraska Press, (2006)
- Trask, Haunani-Kay, 'Lovely Hula Lands: Corporate Tourism and the Prostitution of Hawaiian Culture', *Border/Lines*, (Winter 1991/1992), pp. 22-34 <https://journals.lib.unb.ca/index.php/bl/article/view/24958>
- Tyler, S. L., *A History of Indian Policy* (Honolulu, HI: University Press of the Pacific, 2001)
- U.S. Department of Education and National Center for Education Statistics, *The Condition of Education 2002, NCES 2002-25*, (Washington, DC: U.S. Government Printing Office, 2002)

- United Nations Educational, Scientific and Cultural Organization (UNESCO),  
*Indigenous Peoples: Partnership for Cultural Diversity*, (2006)  
<https://unesdoc.unesco.org/ark:/48223/pf0000135656?posInSet=3&queryId=acdd24c1-167e-4317-b2eb-676d9a9da9b2>
- University of Edinburgh, Blockchain Technology Laboratory Home,  
<https://www.ed.ac.uk/informatics/blockchain>
- Van Eijck, Michiel and Nicholas Xumthout Claxton, 'Rethinking the Notion of Technology in Education: Techno-Epistemology as a Feature Inherent to Human Praxis', *Science Education*, 93 (2009), pp. 218-232
- Vaughn, Kehaulani and Noelani Goodyear-Ka'opua, 'A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty', *American Indian Culture and Research Journal*, 39 (2015), pp. 151-153
- Vogt, Lynn A., Cathie Jordan and Roland G. Tharp, 'Explaining School Failure, Producing Success: Two Cases', in *Minority Education: Anthropological Perspectives*, ed. by Evelyn Jacob and Cathie Jordan (Norwood, NJ: Ablex, 1993), pp. 53-65
- Vygotsky, Lev S., *Mind in Society: The Development of Higher Psychological Processes* (Cambridge, Massachusetts: Harvard university press, 1980)
- Walton, Marion and Arlene Archer, 'The Web and Information Literacy: Scaffolding the use of Web Sources in a Project-Based Curriculum', *British Journal of Educational Technology*, 35 (2004), pp. 173-186
- Washington, Christopher, *Virtual Learning Ecosystems: A Proposed Framework for Integrating Educational Games, E-Learning Methods, and Virtual Community Platforms*, (Online Submission, 2015)  
<http://files.eric.ed.gov/fulltext/ED560265.pdf>
- Waterman, S. J., 'A Complex Path to Haudenosaunee Degree Completion', *Journal of American Indian Education*, 46 (2007), pp. 20-40

Watras, Joseph, 'Progressive Education and Native American Schools, 1929-1950', *Educational Foundations*, 18 (2004), pp. 81-105

White House Conference on Indian Education, *The Final Report of the White House Conference on Indian Education: Executive Summary*, (Washington, DC: White House Conference on Indian Education, 1992), in *ERIC Document Reproduction Service No. ED353124*  
<https://files.eric.ed.gov/fulltext/ED353124.pdf>

Whitehead, Alfred N., *Process and Reality. an Essay in Cosmology. Gifford Lectures Delivered in the University of Edinburgh during the Session 1927–1928* (New York, NY; Cambridge, UK: Macmillan; Cambridge University Press, 1929)

Wikipedia, 'Heiau' Retrieved from <https://en.wikipedia.org/wiki/Heiau>

Wiley, David and John Levi Hilton III, 'Defining OER-Enabled Pedagogy', *International Review of Research in Open & Distance Learning*, 19 (2018), pp. 133-147

Wiley, David and others, 'A Preliminary Exploration of the Relationships between Student-Created OER, Sustainability, and Student Success', *International Review of Research in Open and Distributed Learning*, 18 (2017)  
[http://scholar.google.com/scholar\\_url?url=http://www.irrodl.org/index.php/irrodl/article/download/3022/4198&hl=en&sa=X&scisig=AAGBfm2kDrFqL8MpFoVXL7MgrzAilPNhpg&nossl=1&oi=scholar](http://scholar.google.com/scholar_url?url=http://www.irrodl.org/index.php/irrodl/article/download/3022/4198&hl=en&sa=X&scisig=AAGBfm2kDrFqL8MpFoVXL7MgrzAilPNhpg&nossl=1&oi=scholar)

William, Pat, Rep., *Equity in Educational Land-Grant Status Act of 1994*, trans. by 103rd Congress, [Part C of Title V of the Improving America's Schools Act of 1994]. Public Law 103–382; 108 Stat. 4048; 7 U.S.C. 301 Note; as Amended through P.L. 113–79, Enacted February 7, 2014. H.R.4806 vols (1994) [http://www.aihec.org/what-we-do/docs/govRel/laws/7USCsec301\\_2-7-2014.pdf](http://www.aihec.org/what-we-do/docs/govRel/laws/7USCsec301_2-7-2014.pdf)

- Williams, Peter, 'Does Competency-Based Education with Blockchain Signal a New Mission for Universities?', *Journal of Higher Education Policy and Management*, 41 (2019), 104-117  
<https://doi.org/10.1080/1360080X.2018.1520491>
- Willig, Ann C., 'A Meta-Analysis of Selected Studies on the Effectiveness of Bilingual Education', *Review of Educational Research*, 55 (1985), pp. 269-317
- Willingham, Daniel T., Elizabeth M. Hughes and David G. Dobolyi, 'The Scientific Status of Learning Styles Theories', *Teaching of Psychology*, 42 (2015), 266-271
- Wilmshurst, Janet M. and others, 'High-Precision Radiocarbon Dating shows Recent and Rapid Initial Human Colonization of East Polynesia', *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, (2010) <https://doi.org/10.1073/pnas.1015876108> [accessed 05/15/2018]
- Wilson, Shawn, *Gwitch'in Native Elders: Not just Knowledge but a Way of Looking at the World* (Fairbanks, AK: Alaska Native Knowledge Network, 1996)
- Research is Ceremony: Indigenous Research Methods* (Winnipeg, Manitoba, Canada: Fernwood Publishing, 2008)
- Wilson, William H., Kauanoe Kamana and Namaka Rawlins, 'Nawahi Hawaiian Laboratory School', *Journal of American Indian Education*, 45 (2006), 42-44  
<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c862613111d5526759d0bbc40a241dd3963bcb76a2c15e4bdc&fmt=H>
- Wilson, William H. and Keiki K. C. Kawai'ae'a, 'I Kumu; I Lala: "Let there be Sources; Let there be Branches": Teacher Education in the College of Hawaiian Language', *Journal of American Indian Education*, 46 (2007), pp. 37-53

<http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ed7480b6bfd1e03c8b6a49b7662a8539b36142fe2e2156b969c676adfff93a03b&fmt=H>

- Winstead, T. and others, 'Language, Sovereignty, Cultural Contestation, and American Indian Schools: No Child Left Behind and a Navajo Test Case', *Journal of American Indian Education*, 47 (2007), pp. 46-64
- Wist, Benjamin O., *A Century of Public Education in Hawaii: October 15, 1840-October 15, 1940* (Honolulu, HI: Hawaii Educational Review, 1940)
- Wong, L-H and others, 'Towards a Seamless Language Learning Framework Mediated by the Ubiquitous Technology', *International Journal of Mobile Learning and Organization*, 6 (2012), pp. 156-171
- Wong, Lung-Hsiang, 'A Brief History of Mobile Seamless Learning', in *Seamless Learning in the Age of Mobile Connectivity*, ed. by Lung-Hsiang Wong, Marcelo Milrad and M. Specht (Springer, 2015), pp. 3-40
- 'A Learner-Centric View of Mobile Seamless Learning', *British Journal of Educational Technology (BJET)*, 43 (2012), pp. E19-E23
- Wong, Lung-Hsiang and Chee-Kit Looi, 'What Seams do we Remove in Mobile Assisted Seamless Learning? A Critical Review of the Literature', *Computers & Education*, 57 (2011), pp. 2364-2381
- Wong, Helen and Ann Rayson, 'Chapter 6: Captain Cook in Hawaii, A.D. 1778-1779.', in *Hawaii's Royal History* (US: Bess Press, Inc, 1997), pp. 40-49
- Woods, Eric T., 'A Cultural Approach to a Canadian Tragedy: The Indian Residential Schools as a Sacred Enterprise', *International Journal of Politics, Culture, and Society*, (2013), 173 <https://doi.org/10.1007/s10767-013-9132-0>
- Woolfolk, A. E., *Educational Psychology*, 5th edn (Boston: Allyn and Bacon, 1993)

Yamauchi, Lois A. and Andrea K. Purcell, 'Community Involvement in a Place-Based Program for Hawaiian High School Students', *Journal of Education for Students Placed at Risk*, 14 (2009), pp. 170-188

Young, I. M., 'Polity and Group Difference: A Critique of the Ideal of Universal Citizenship', *Ethics*, 99 (1989), pp. 250-299

**APPENDIX A – The Hawaiian Indigenous Education Rubric (HIER)**

TABLE 1 The Hawaiian Indigenous Education Rubric (HIER): Full detail

	None	Emerging	Developing	Enacting
<b>I. Language: Use of Heritage Language in Teaching</b>				
<b>Critical indicators</b>				
(a) integration of Hawaiian language in class	i do not have use for Hawaiian language in my class.	i use simple Hawaiian words and/or songs to expose my students to Hawaiian language.	i speak and display Hawaiian language in the learning environment, using phrases and simple language exchanges.	i teach and communicate with my students in ʻōlelo Hawaiʻi (Hawaiian language).
(b) Hawaiian language materials and resources (e.g., books, electronic media, audio/visual technology, kūpuna, community members)	i have no Hawaiian language materials or resources in my classroom.	i occasionally use Hawaiian language materials in my teaching.	i use Hawaiian language materials in my teaching fairly often.	i use Hawaiian language materials in my teaching all the time.
<b>Philosophy on language</b>	Hawaiian language is less relevant to core academic subjects like math, English, science, and social studies.	i believe it is important for all students to be exposed to Hawaiian language.	My teaching is grounded in the belief that all students should have a basic level of competency in the Hawaiian language.	My teaching is grounded in the belief that all students should be proficient in Hawaiian language to achieve our vision for a Hawaiian-speaking community.



ii. 'Ōhāna and Community involvement		None	Emerging	Developing	Enacting
Critical indicators		i don't expect families to actively contribute to my class or my students' learning.	i provide students' family members with information about ways they can support their child's learning at home.	i develop homework assignments and activities that require the active participation of family members.	i integrate ōhāna, community members, and kūpuna into the learning experience.
(a) integration of ōhāna/community in curriculum					
(b) Communication between ōhāna and teachers		Most of my contact with students' families occurs through open houses and school events.	i contact family members (e.g., by phone, in person, by e-mail) when their children are having problems in my class.	i frequently contact family members about a variety of student matters, both good and bad.	i work closely with ōhāna to support their children's growth and success in and out of school.
(c) Relationship between ōhāna and teachers		As a teacher, my relationship with students does not extend beyond the classroom.	i talk with my students about their home lives but maintain appropriate physical and emotional boundaries.	i invite students' family members into the learning environment to create a sense of ōhāna.	i work hard to get to know my students, their families, and their community through interactions outside of school.

	None	Emerging	Developing	Enacting
III. Content: Culture- and Place-Based				
Culture-based	i use vendor-developed textbooks and materials for my class to ensure that the content and quality meet state standards or other benchmarks and guidelines.	i use readily available curricula and materials and try to interject Hawaiian or "local" examples where relevant.	i use culturally appropriate curricula and materials that include some Hawaiian cultural content.	i embed Hawaiian knowledge, practices, values, behaviors, language, and spirituality into the content and materials of my class.
Critical indicators				
(a) Curriculum				
(b) Content				
Place-based	i use textbook-based lectures and discussions in my class.	i use hands-on learning activities outside the classroom.	i relate my coursework and content to the local (but not necessarily Hawaiian) community and my students apply what they have learned to community settings.	i use the community as a setting for student learning that is responsive to community needs and grounded in the Hawaiian knowledge, practices, and history associated with a place.
Critical indicators				
(c) Experiential				
(d) Community-based				
(e) Place-based				
Philosophy on culture in class	i try to keep my class neutral and free of cultural references so that no students feel left out.	i design my class to support the diverse cultural backgrounds of my students.	i incorporate Hawaiian culture in my teaching to better engage students.	My ultimate goal in working with students is to preserve and perpetuate Hawaiian culture for generations to come.

IV. Context		None	Emerging	Developing	Enacting
Critical indicators					
(a) Culturally grounded context	My teaching methods and delivery have little to do with Hawaiian culture, practices, values, or beliefs.	In my teaching, I incorporate universal values, couched in Hawaiian terms such as <i>yōhana</i> and <i>lōkahi</i> (unity, harmony).	I integrate Hawaiian practices, rituals, and protocols as part of the learning experience for my students.	The learning environment and daily practices of my class grow from my fundamental Hawaiian beliefs and native spirituality.	
(b) Culturally relevant community of learners	I lead class discussions that give individuals students a chance to be heard when called on.	I facilitate student discussions and group interactions using a free-flowing, "talk story" structure that is collaborative in nature.	I encourage students to teach and learn from each other.	I create opportunities for intergenerational learning, where students learn from each other, from teachers, and from <i>kūpuna</i> .	
(c) Community well-being, <i>kūleona</i> (responsibility)	I define and direct my students' roles and responsibilities.	I teach my students to recognize their responsibilities and the importance of their roles.	I expect my students to recognize and carry out their roles and responsibilities on their own.	I encourage my students to initiate and lead community projects to promote greater community well-being.	
Philosophy on the role of teacher					
	My primary goal in teaching is to improve my students' academic achievement.	I am just as responsible for my students' social and emotional growth as I am for their academic achievement.	As a teacher, building cultural identity and self-worth in my students is as important to me as increasing their academic achievement.	I am responsible for ensuring that my students have a strong cultural identity, a sense of place, and academic achievement.	

V. Assessment and Accountability		None	Emerging	Developing	Enacting
indigenous assessment	use multiple-choice and other paper-and-pencil tests to assess students.	assess my students by having them engage in projects or performances that:	assess my students by having them engage in projects or performances that:	assess my students by having them engage in projects or performances that:	assess my students by having them engage in projects or performances that:
Critical indicators					
(a) Demonstrate knowledge/skills		(1) Require a range of knowledge and skills.	(1) Require a range of knowledge and skills, AND	(1) Require a range of knowledge and skills, AND	(1) Require a range of knowledge and skills, AND
(b) Application					
(c) Value to community, culture			(2) Demonstrate meaningful understanding of the material including the ability to problem-solve and creatively adapt knowledge to different situations.	(2) Demonstrate meaningful understanding of the material including the ability to problem-solve and creatively adapt knowledge to different situations, AND	(2) Demonstrate meaningful understanding of the material including the ability to problem-solve and creatively adapt knowledge to different situations, AND
					(3) Are culturally purposeful and useful (i.e., have real value to the community and to Hawaiian culture).

**CREDE Standards (Revised by the University of Hawaii – School of Education (ECE-7 revised, 11/18/2011))**  
An Instrument to Measure Use of the CREDE Standards

<b>Standard</b>	<b>Not Observed (0)</b>	<b>Emerging (1)</b>	<b>Developing (2)</b>	<b>Advancing (3)</b>	<b>Enacting (4)</b>	<b>Exemplary (5)</b>
<i>Joint Productive Activity</i>	Not observed	A pair or small group of children contributes individual work (e.g.: turn-taking), not requiring collaboration to a joint product*. Children work independently without teacher involvement.	The teacher and children collaborate on a joint product in a whole-class setting	The teacher collaborates with individuals on a joint product.	The teacher and a small group of children collaborate* on a joint product. The majority of the children participate in the product's* creation. The teacher assists collaboration using multiple forms of assistance*.  Collaboration may mainly be between teacher and children, rather than among child peers.	The teacher and a small group of children collaborate on a joint product. The teacher encourages collaboration between peers working towards a joint product.
<i>Language &amp; Literacy Development</i>	Not observed	The teacher designs and enacts an activity where children engage in brief, repetitive, or drill-like reading, writing, or speaking activities (e.g.: flashcards).	The teacher provides opportunities for children to express themselves through verbal or non-verbal communication*.	The teacher engages children in an activity where one of the goals* is to generate language expression and/or literacy development.	The teacher designs and enacts an activity where one of the goals* is to generate language expression and/or literacy development. The teacher develops language expression and/or literacy development using multiple forms of assistance.	The teacher designs and enacts an activity with a clear goal*. These activities are designed using developmentally appropriate pre-literacy* methods that focus on developing language within the topic of the activity. The teacher develops language expression and/or literacy development using multiple forms of assistance and adjusts his/her forms of assistance based on children's feedback.

Standard	Not Observed (0)	Emerging (1)	Developing (2)	Advancing (3)	Enacting (4)	Exemplary (5)
<i>Contextualization</i>	Not observed	The teacher (a) connects classroom activities by theme or builds on current unit, OR (b) includes parents or community members in activities, OR (c) uses familiar items during lesson but may not explicitly connect the items to home, school, or community.	The teacher includes some aspect of children's everyday experience in instruction through incidental* connections OR responds to an incidental connection made by children.	The teacher designs and enacts instructional activities that integrate* the new activity/information with what children know from home, school or community AND invites children to think about how the activity relates to their personal experiences.	The teacher designs and enacts instructional activities that integrate* the new activity/information with what children know from home, school or community AND assists children in making a connection to their personal experiences.	The teacher integrates* the new activity/information with what children already know from home, school or community AND assists children in making a connection to their personal experiences. The goal is to help children reach a conceptual understanding.
<i>Complex Thinking</i>	Not observed	The teacher prompts children to use or elaborate on information provided*. These elicitation are unplanned.	The teacher designs and enacts activities that require children to use or elaborate on information provided*.	The teacher designs and enacts activities that require children to use or elaborate on information provided* AND assists with those processes.	The teacher connects activities to broader concepts and abstract ideas. The teacher assists children with a focus on advancing children's thinking to higher levels.	The teacher designs and enacts instructional activities and assists children as they use complex thinking* strategies. The teacher's focus is on concept development and uses probing questioning techniques that focus on uncovering the <i>why</i> , not just the "how" and "what" of the activity.

Standard	Not Observed (0)	Emerging (1)	Developing (2)	Advancing (3)	Enacting (4)	Exemplary (5)
<i>Instructional Conversation</i>	Not observed	The teacher converses* with a child or the whole class AND uses questioning, listening, or rephrasing to elicit communication.	The teacher converses* with a small group of children AND uses questioning, listening, or rephrasing to elicit communication.	The teacher designs and enacts an instructional conversation (IC) with a small group of children with a clear learning goal* AND elicits communication with questioning, listening, rephrasing, or modeling.	The teacher designs and enacts an instructional conversation (IC) with a small group of children on a clear learning goal*. The teacher listens carefully to assess and assist understanding toward the goal.  The verbal and non-verbal communication ratio of teacher-child turn-taking is approx. 1 to 1.	The teacher designs and enacts an instructional conversation (IC) with a clear learning goal*; listens carefully to assess and assist understanding toward the goal AND questions children on their views*, judgments or rationales in reaching the goal.  The verbal and non-verbal communication ratio of teacher-child turn-taking is approx. 1 to 1.
<i>Modeling</i>	Not observed	The teacher, or child, models a process but does not provide an opportunity for children to practice.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice OR the teacher or child provides a model of a finished product that children use for inspiration.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher instructs children while they practice or create their own products.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher assists children while they practice or create their own products.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher provides examples that children use for inspiration that show the step by step process or final product AND the teacher assists or facilitates peer-assistance while they practice or create their own products.

Standard	Not Observed (0)	Emerging (1)	Developing (2)	Advancing (3)	Enacting (4)	Exemplary (5)
<i>Child Directed Activity</i>	Not observed	The teacher designs an activity and allows children to have choice within that activity.	The teacher designs activity centers and allows children to choose from among them.	The teacher designs activity centers and allows children to choose from among them AND the teacher engages in an activity with the children.	The teacher encourages children to generate their own ideas or creations within the activity AND assists with further development or expansion of the activity.	The teacher engages children in an activity generated by children's own ideas or creations AND assists with further development or expansion of the activity.

### Glossary of Terms

**Goal:** In an Instructional Conversation, the goal is the development of thematic or conceptual understanding.

**Assistance:** Assistance is a two part process in which the teacher first assesses children's knowledge and skills, then responsively assists development. Types of assistance may include: (a) Modeling -- Providing a demonstration; (b) Feeding Back -- Providing information about children's performances as compared with a standard; (c) Contingency Management: -- Providing rewards or punishments contingent on children's performance; (d) Questioning -- Providing questions that guide children to advance their understanding; (e) Instructions -- Providing clear verbal directions for performance; (f) Cognitive Structuring -- Providing explanations or rules for proceeding; or (g) Task Structuring -- Providing assistance by segmenting or sequencing portions of the task.

**Collaboration:** Joint activity that results in shared ownership, authorship, use, or responsibility for a product. It can also include division of labor for coordinated sub-sections. However, mere turn taking does not constitute division of labor and, to be considered collaboration, an activity must include interaction between participants. Coordinated activities such as morning calendar, round robin reading, choral responses or callisthenics are rated at the Emerging level for JPA.

**Communication:** Communication includes verbal and nonverbal forms such as gaining proximity, facial expression, laughing, touching, giving, pulling or pushing away, showing, reaching, waving, pointing, head shaking or nodding, vocalizing, gazing, speaking or repeating words, using pictures, and listening.

**Conversation:** At least two turn-taking cycles (teacher-children-teacher-children on the same topic/point).

**Instructional Conversation (IC):** ICs are inclusive of all participants whose contributions are connected to, or extend, the comments and ideas of other participants. In contrast, directed-discussions focus less on developing conceptual understanding and more on known-answer questions and skill development. Instructional conversation focuses on broad topics, main ideas, themes or concepts, is responsive to child contributions, includes participation structures that are familiar to children, and includes open-ended questions and sustained dialogue on a single topic.

**Incidental connections:** The teacher (a) makes connections between children's experience or knowledge from home, school, or community and the new activity/information on an ad hoc basis to assist understanding, or (b) prompts children to make connections.



**Use or elaboration of information provided:** Complex thinking can involve children's use or elaboration of information provided that includes processes such as applying, interpreting, categorizing, ordering, evaluating, summarizing, synthesizing, analyzing, exploring, experimenting, determining cause and effect, formulating and solving problems, exploring patterns, making conjectures, generalizing, justifying, and making judgments.

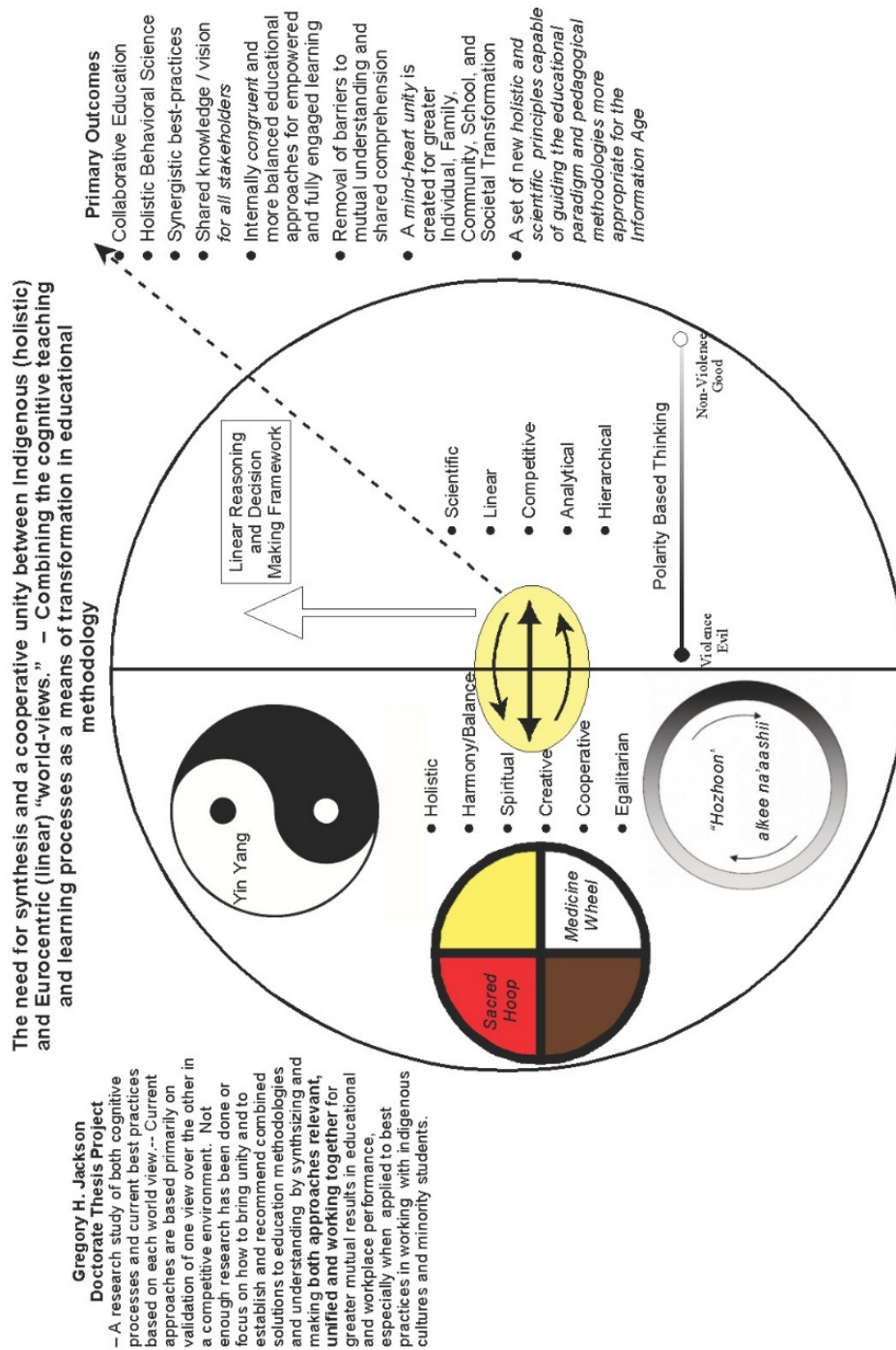
**Integrates the new activity/information with what children already know from home, school, or community:** (a) children's knowledge or experience is integrated with new information, (b) the basis of the activity is personally relevant to children's lives; or (c) children apply school knowledge in an authentic activity.

**Pre-literacy methods:** Pre-literacy methods are strategies used to teach children skills and behaviors that lead to successful reading. They include methods such as: vocabulary development, print awareness, letter knowledge, phonological awareness, phonemic awareness, etc.

**Product:** Products may be tangible or intangible. Examples of tangible products: food made together, a letter, a collage, or the reenactment of a story. Intangible products include the theme of a story, a concept, idea, procedure, or a plan of action. Intangible products are an achieved physical, psychological, or social state that integrates a series of actions.

**Questions children on their views:** In an Instructional Conversation, teachers' questioning of children's views is related to children's prior knowledge or experiences relevant to the goal of the conversation.

## APPENDIX C – Original Thesis Proposal Diagram



**Both world views and cognitive processes are correct and relevant.** Using both views will bring about more complete and balanced educational processes. – A congruent and balanced synergistic approach=Unity=Understanding=Success

**Key Assumption or Approach:**