

DEVELOPING CULTURAL COMPETENCE AND PROMOTING CULTURALLY
RESPONSIVE TEACHING IN STEM EDUCATORS OF NATIVE HAWAIIAN STUDENTS

Toni Marie Mapuana Kauai

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Jeremy V. Ernst, Chair
Jennifer M. Bondy
Brett D. Jones
John G. Wells

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Keywords: STEM Education, Native Hawaiian, Culture-Based Education, Indigenous Education
Culturally Relevant Teaching, Cultural Competence, Cultural Identity, Cultural Sensitivity,
Cultural Knowledge Belief, Self-Efficacy, Professional Development

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ABSTRACT

The purpose of this study was two-fold. The first was to determine the degree of culturally responsive teaching practices and level of cultural competence of participants who teach upper elementary (grades three through six) STEM educators of predominantly Native Hawaiian students. The second purpose was to identify differences in cultural competence and culturally responsive teaching practices of those same participants identified above. These two participant groups were from the State of Hawai'i Department of Education's Keonepoko and Pāhoā Elementary Schools. Both schools are from the Kea'au-Ka'u-Pāhoā Complex Area. The educators from Keonepoko were afforded knowledge and experiences from a culture-based professional development program known as the Moenahā School Program, while the educators from Pāhoā were not afforded these same knowledge and experiences. Using a quantitative, quasi-experimental design, data were collected via an online survey using three instruments: the Culturally Responsive Teaching Self-Efficacy Inventory (CRTSE), the Cultural Competence Self-Assessment Questionnaire (CCSAQ), and the Cultural Competence Self-Assessment Scale Demographic Information (CCSASDI). The data were analyzed using mean scores and those mean scores were compared for differences using a Mann-Whitney *U* test. The findings indicated the Moenahā participants had a statistically significantly higher level of cultural competence and higher degree of culturally responsive teaching practices than the non-Moenahā participants suggesting the importance of cultural competence professional development

opportunities. These findings are applicable for teachers in schools with an higher Native Hawaiian student population.

Keywords: STEM Education, Native Hawaiian, Culture-Based Education, Indigenous Education Culturally Relevant Teaching, Cultural Competence, Cultural Identity, Cultural Sensitivity, Cultural Knowledge Belief, Self-Efficacy, Professional Development

Dedication

See me.

The characteristics and traits that make me unique.

Hear me.

Speak with conviction of knowledge and experiences I possess.

See me.

The ancestors who stand behind me guiding me on my journey.

Hear me.

Speak my native tongue as I share with you stories of my past.

See me.

The dreams I dream for myself and my people.

Hear me.

Speak of a future thoughtfully shaped by my own hands.

See me and hear me.

By understanding my heart.

For my loves,

Kahua, Hinano, Leiana, Mahina, and Kahea.

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I set sail on this *huaka'i* (journey) four years ago, and throughout that time, my *wa'a* (canoe) has been blessed by countless number of people who have helped me paddle toward my destination. Dr. Jeremy Ernst, a mentor, colleague, and friend, set the pace, kept watching the water, and maintained a steady view of the horizon. My committee, Drs. Jennifer Bondy, Brett Jones, and John Wells, provided the power and balance necessary to stay the course. My husband, Orrin Batalon, and mother, Bertha, vigilantly calmed rough seas and patiently bailed water when necessary. Finally, with God as my steersman, I reached my journey's end through His blessed navigation.

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CHAPTER 1: INTRODUCTION

1.1 Overview

As early as 1928, significant reform of failing programs designed for Native Americans have been entreated (Meriam, 1928). These programs ranged from education to healthcare. Regarding education, John Collier, Commissioner of the Office of Indian Affairs under President Franklin D. Roosevelt, instituted education reforms in “bilingual education, adult basic education, training of Indian teachers, Indian culture, and in-service teacher training” (Senate Committee on Labor and Public Welfare, 1969, p. 13). These reforms, from the early 1940s, were the first to address the inequity of Native American education, but did not affect lasting and continual change. It was not until 1969, when the Senate Committee on Labor and Public Welfare published *Indian Education: A National Tragedy, A National Challenge* and later in 1970 when Havighurst published *The Education of Indian Children and Youth: National Study of American Indian Association*, Native American education was thrust into the spotlight and culture-based education became a national issue that persists till today.

The philosophies and theories of indigenous education, also called multicultural education (Banks & Banks, 2004), culturally responsive teaching (Gay, 2010), and culture-based or indigenous education (Kana‘iaupuni & Kawai‘ae‘a, E Lauhoe Mai Nā Wa‘a: Toward a Hawaiian Indigenous Education Teaching Framework, 2008), formed and slowly began to permeate into the practices of primary and secondary classroom teachers and into the curricula of teacher education classrooms (Banks & Banks, 2004; Demmert & Towner, 2003; Gay, 2000; Kana‘iaupuni & Kawai‘ae‘a, 2008; Klump & McNeir, 2005; Saifer, Edwards, Ellis, Ko, & Stuczynski, 2004). The 1970s brought copious changes at the national level, as professional organizations, such as the American Association of Colleges for Teacher Education (AACTE),

the National Council for Teachers of English (NCTE), and the National Council for Social Studies (NCSS), lobbied for the integration of multicultural curricular content (Banks J. A., 2004). Two significant developments in multicultural education followed in 1977. The first was publications of books on multicultural education by the Association for Supervision and Curriculum Development and AACTE, and the second was the National Council for Accreditation of Teacher Education's (NCATE) inclusion of multicultural education in the *Standards for the Accreditation of Teacher Education*, which "required all member teacher education institutions ... to implement components, courses, and programs in multicultural education (Banks J. A., 2004, p. 13).

Multicultural education advocates for an equitable education for students from diverse racial, ethnic, and socio-economic groups (Banks J. A., 2004). Culturally responsive teaching suggests the implementation of "teaching modes that work best with ethnically diverse students" (Gay, 2010, loc. 383). Culture-based, or indigenous, education supports teacher understanding of indigenous education, the philosophies and practices of indigenous educators, for the promotion and development of pedagogy and practices that benefit "all children, especially indigenous children" (Kana'iaupuni & Kawai'ae'a, E Lauhoe Mai Nā Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework, 2008, p. 69). While the phrases used may differ, from the respective authors' characterizations, two concepts clearly arise – education and students of diverse groups.

1.2 Nature of the Problem

Native American students achieve at lower levels in science and mathematics than their Caucasian counterparts (Cajete, 1988; Cheek, 1984; Germain-McCarthy & Owens, 2013; Gregory, 2012; Nelson, Greenough, & Sage, 2009; Trent & Gilman, 1985). Speculation

regarding reasons behind these achievement gaps includes poverty, family history, academic content without context, students' individualization (Cajete, 1988; Trent & Gilman, 1985), and the lack of teacher culturally responsive teaching practices.

Current classroom demographics are experiencing major shifts in cultural, linguistic, and socioeconomic diversity. Consequently, teachers face greater demands in responding to the changing student population; requiring teachers to employ less traditional pedagogies and practices in their classrooms (Demmert & Towner, 2003; Klump & McNeir, 2005; Saifer, Edwards, Ellis, Ko, & Stuczynski, 2004) in order to support the closing of these achievement gaps specifically in science and mathematics. Integrative STEM education pedagogies align with culturally responsive pedagogies most specifically with regards to providing relevant context around curricular content (California State Polytechnic University, Pomona, 2009; Clark, Badertscher, & Napp, 2013; Cornelius, 1999; Demmert & Towner, 2003; Gay, 1992; Gay, 2010; Germain-McCarthy & Owens, 2013; Isaacs, Wagreich, & Gartzman, 1997; Sanders, 2009; Wells, 2008). Prensky (2001) suggests reflecting and revising teachers' methodology and content to meet the changing landscape of students entering and leaving their classrooms. Therefore, culturally relevant teaching, cultural competence, and integrative STEM education become key methodologies in attending to the changing student landscape.

Historically, there are three critical issues of learning for Native Americans. One, the lack of the inclusion of language and culture; two, the lack of cultural dignity; and three, the loss of Native teachers (Demmert & Towner, 2003). Culture-based education addresses the first two issues of learning by supporting the inclusion of language and culture in the curriculum and the classroom and revitalizing cultural dignity through the inclusion of cultural practices and traditions in the curriculum and the classroom. These two issues underscore the diverse needs of

the Native American learner and how those needs are not met in a traditional American classroom.

While culture-based education cannot directly address the need for more Native teachers, both Native and non-Native teachers can be educated about its philosophy and theory, its practices, and its curriculum (Saifer, Edwards, Ellis, Ko, & Stuczynski, 2004). Thus, creating a work force of teachers better equipped with the knowledge and skills necessary for teaching in a diverse classroom; in other words, teachers with some degree of cultural competence. Native Hawaiians are a subgroup of the broader Native American population (Hammond, 1988) and to date there is only one teacher learning experience designed to target culturally responsive teaching and cultural competence, the Moenahā School Program (MSP).

MSP, a professional development program aimed at supporting teachers' development of cultural competence and providing teachers with the knowledge and skills of and experience with culturally responsive teaching, and it invites teachers to become teacher-leaders of culturally responsive teaching. The program aims to prepare teacher participants to mentor and train new-to-program teachers while continuing to improve their own practices of culturally responsive teaching in their classrooms. The objectives are to “sustain continued growth; create powerful, child centered learning communities, and strengthen partnerships between school and parents and the larger community” (Teacher Support Model).

Currently, teachers participating in MSP become students dedicated to increasing their knowledge, skills, and belief to become more culturally competent in order to transform their practices to demonstrate culturally responsive teaching. However, the next step requires them to transition from student/learner to teacher/trainer. They must apply their newly learned knowledge, skills, and beliefs toward the education and training of new teachers entering the

MSP program. To succeed as trainers and coaches, teachers must possess a degree of self-efficacy as it pertains to culturally responsive teaching and a level of cultural competence that permits them to train others with conviction and certainty.

Understanding these prerequisites, it becomes important for MSP trainers to concretely identify those teachers who possess a degree of culturally responsive teaching self-efficacy and a level of cultural competence that demonstrates their preparedness to become trainers. This translates to teachers who do not need further training in culturally responsive teaching and who possess cultural competence. Teachers with a higher degree of self-efficacy and a higher level of cultural competence enables MSP to focus on providing these teachers with the training and information necessary to become coaches. Unfortunately, at present, MSP has no measures and/or instruments in place to gauge teacher self-efficacy related to culturally responsive teaching or cultural competence. There is a need for the program to determine a way to measure a teacher's culturally responsive teaching self-efficacy and a teacher's level of cultural competence.

1.3 Rationale for the Study

With previous research studies (Banks, 1992; Díaz, 1992; Gay, 2003; Gay, 1992; Guyton & Dangel, 2004; Havighurst, 1970; Kana'iaupuni & Kawai'ae'a, 2008; Klump & McNeir, 2005; Meyer, 1998; Moule, 2012; Saifer, Edwards, Ellis, Ko, & Stuczynski, 2011; & Sleeter, 1992) extolling the benefits of culturally responsive teaching and culturally competent teachers, there is an increasing need to prepare teachers who possess the knowledge, skills, and experience with culturally responsive teaching and to help those same teachers develop cultural competence.

Understanding that there is this tangible need, it becomes important for teachers to be professionally developed by well-qualified trainers. Unfortunately, the number of well-qualified

trainers is not sufficient for the number of teachers who need professional development in cultural competence. Consequently, the need for well-qualified trainers becomes the primary goal when attempting to impact the need for teachers with higher self-efficacy of culturally responsive teaching and a higher degree of cultural competence. Self-efficacy is an important construct of this research study because this study focuses on the confidence a teacher has in enacting culturally responsive teaching practices and training peers and colleagues in those practices.

Secondary to the need for training of the trainer is the need for data-driven professional development. Although, MSP worked tirelessly to operate under best practices of professional development, there was still room for improvement. A research study that utilized instruments that measured teachers' culturally responsive teaching self-efficacy and cultural competence could provide valuable data that could dictate the direction of future professional development opportunities. MSP did not conduct pre-assessments to determine a baseline of self-efficacy and competence. It immediately began training teachers using their developed professional development curriculum. The findings from this study have the potential to provide data that would inform not only the preparedness of teachers to become trainers, but would also inform the curricular iterations for new-to-program teachers.

1.4 Purpose of the Study

With the diversity of classrooms increasing disproportionately to culturally responsive and competent teachers (Mason, 1995), there becomes an imperative to better prepare pre-service, new, and veteran teachers on culturally responsive teaching and to develop culturally competent teachers. However, in order to provide training of this magnitude, there must be trainers who are equipped with the knowledge, skills, and beliefs that coincide with cultural

responsive teaching and cultural competence, as well as the knowledge, skills, and beliefs that correspond with best practices of andragogy and sustained professional development.

This research study allows the researcher to determine the preparedness of teachers in an existing professional development program aimed at training culturally responsive and competent teachers to transition from the learner to the teacher. It focuses on the degree of self-efficacy these teachers currently possess related to culturally responsive teaching and the level these same teachers have regarding cultural competence. A higher degree of culturally responsive teaching self-efficacy and a higher level of cultural competence are two necessary attributes for professional development and teacher learning facilitators with the objective of teach teachers about culture-based education. Additionally, this study will provide MSP trainers and Kauhale Kīpaipai (PAI) with necessary data to inform future curricular and workshop development. It will also provide them with pre- and post-assessment instruments that prove to be vital in developing curriculum.

1.5 Conceptual Underpinnings of the Study

Moenahā was born out of the plight of Native Hawaiian students and their academic underachievement, as demonstrated on the Hawaii Standards Assessment (HSA). When developing Moenahā, Kawai‘ae‘a considered the theories and research of culturally responsive teaching, Hawaiian epistemology, and the Native Hawaiian learning process. PAI’s development of a culturally responsive teacher training program ran parallel to Moenahā. With the community of educators involved in the culturally responsive teaching realm, it became apparent that both Kawai‘ae‘a and PAI were committed to educating teachers for the benefit of Native Hawaiian students.

The common factor between the two parties became culturally responsive teaching with the driving force of each differing. Where Kawai‘ae‘a depended on the development of a tool, PAI relied upon professional development. Eventually, the tool, Moenahā, became the primary instrument that drove the professional development. Moenahā provided trainers with a tangible product that they would teach the knowledge, skills, and beliefs of culturally responsive teaching through; rather than training teachers about the theories and principles, PAI would train teachers through the implementation and application of the theories and principles.

Theories and principles of andragogy and professional development (Guskey & Huberman, 1995; Guyton & Dangel, 2004; Learning Forward, 2014; Learning Forward, 2011; Malcolm Knowles and Associates, 1984) provided PAI with best practices of impactful adult learning and training. These theories and principles guided the creation and design of the professional development curriculum and workshop pedagogy.

1.6 Research Questions

This research study focused on the culturally responsive teaching self-efficacy and cultural competence of upper elementary (grades three through six) STEM educators. These educators teach within the State of Hawai‘i’s Ka‘u-Kea‘au-Pāhoa (KKP) complex area, which has a prevalent concentration of Native Hawaiian students. The following research questions guide this study.

RQ1 - What is the degree of culturally responsive teaching self-efficacy of the STEM educator MSP participants?

RQ2 – What differences in the degree of culturally responsive teaching practices are identifiable between MSP participants and non-MSP participants?

RQ3 – To what extent do the STEM educator MSP participants exhibit cultural competence?

RQ4 – What differences are identifiable in the cultural competence exhibited by MSP participants and non-MSP participants?

1.7 Design of the Study

This was a quasi-experimental design with an untreated control group and dependent posttest to analyze the effect of MSP on teachers' culturally responsive teaching self-efficacy and cultural competence. This quantitative research study used a research survey electronically administered via the Internet to collect data. The research participants completed an Appraisal Inventory that measures a teacher's culturally responsive teaching self-efficacy (Siwatu, 2007) and a Cultural Competence Self-Assessment Questionnaire that identifies areas of strength and weakness as it pertains to the cultural competence of school faculty and staff (Mason, 1995). The data collected via both assessments provided descriptive statistics to identify a teacher's degree of self-efficacy and level of cultural competence, and the data was analyzed holistically and categorically to identify areas of strength and weakness. A Mann-Whitney *U* Test was used to calculate differences for culturally responsive teaching self-efficacy between STEM teachers that have been afforded MSP knowledge and experiences and those that have not but serve prevalent concentrations of Native Hawaiian students and a Mann-Whitney *U* Test was computed on differences between the STEM teachers that have been afforded MSP knowledge and experiences and those that have not but serve prevalent concentrations of Native Hawaiian students for cultural competence.

1.8 Limitations and Assumptions

While it is important for teachers to exhibit and/or demonstrate their cultural responsive teaching and cultural competence in order to better serve their students, the knowledge, skills, and beliefs gained through MSP cannot be applied to students homogenously.

The study sample chosen represents a particular group of teachers with specific characteristics, teaching environments, and student characteristics and background making generalizability a limitation. There are identifiable, unique characteristics that separate the study sample from the population based on their individual teaching environment. This group of teachers teach in a State of Hawaii Department of Education complex that has 45.85 percent of the state's Native Hawaiian student population.

The associations between culturally responsive teaching self-efficacy and cultural competence and MSP limits the ability for this study to make causal relationships between culturally responsive teaching, cultural competence, and MSP.

This study is limited by the number of measured studies and the psychometric properties of the measurements instrument used, i.e., the Culturally Responsive Teaching Self-Efficacy Scale (CRTSE) and the Cultural Competence Self-Assessment Questionnaire (CCSAQ). Both instruments, with demonstrated and documented validity and reliability, measure teachers' self-efficacy of culturally responsive teaching and cultural competence.

The Mann-Whitney is a less powerful test because the distribution of the data is ignored.

1.9 Definition of Terms

Andragogy

The formal practices and strategies of adult education (Malcolm S. Knowles and Associates, 1984).

Complex

All State of Hawaii Department of Education "schools are rolled into what's known as a Complex: A high school and the elementary and middle schools that feed into it" (State of Hawaii Department of Education, 2014, para. 1).

Complex Area

Anywhere from two to four Complexes are grouped into a Complex Area, which has its own Complex Area Superintendent (CAS) and support staff” (State of Hawaii Department of Education, 2014, para. 1).

Culture

“...the ways of being, knowing, and doing, including the values, norms, knowledge, beliefs, practices, experiences, and language...” (Kana‘iaupuni, 2007, p. 1).

Culture-based education

The “grounding of instruction and student learning in the ways of being, knowing, and doing, including the values, norms, knowledge, beliefs, practices, experiences, and language that are the foundation of a(n indigenous) culture” (Kana‘iaupuni, 2007, p. 1)

Cultural Competence

The beliefs, knowledge, and skills necessary to work effectively with individuals from different cultures.

Culturally Relevant Teaching

An approach to teaching and learning that uses students’ cultural knowledge experiences, prior knowledge, and individual learning preferences as a conduit to facilitate curriculum and instruction, incorporates students’ cultural orientations to design culturally classroom management, provides students with multiple opportunities to demonstrate understanding, and provides students with the knowledge and skills needed to function in mainstream culture while maintaining students’ cultural identity, native language, and cultural connections (Siwatu, 2007).

Moenahā

A culture-based instructional model grounded in Hawaiian epistemology and supported by research to be effective with Hawaiian learners (Kauhale Kīpaipai, 2011).

Pedagogy

A general designation of the art of teaching, as including “both didactics or the methods of teaching or imparting knowledge or instruction generally on the one hand – all those processes by which information is given – and on the other, education or development from within outward” (Hall G. S., 1905).

Upper Elementary School STEM Teachers

Teachers who teach multi-subject classes at either third, fourth, fifth, or sixth grade.

1.10 Summary

Culturally diverse classrooms demand culturally responsive and competent teachers who possess the knowledge, skills, and beliefs necessary to successfully teach students with varied cultural backgrounds. In the absence of teacher education programs that provide courses that address these topics, there is a need for professional development workshops that offer teachers the essential information and tools to positively impact their classrooms. This research study supports the identification of teachers currently participating in the Moenahā School Program who might be prepared to transition from learner to trainer of new-to-program teachers through the use of self-assessment instruments and existing evaluative artifacts.

The study hypothesizes that the training helps to increase a teacher’s culturally responsive teaching self-efficacy and cultural. Data collection will allow this researcher to determine whether MSP supports that positive development of both, one, or none.

In Chapter 1, the researcher provides an overview and introduction to the problem. It also identifies the nature of the problem, why the problem is important, and how this study attempts to address the problem and issues regarding it. The research questions that drive the study are explicitly expressed. The literature review in chapter 2 begins with a study of beliefs to highlight the relationship between beliefs and self-efficacy. It is followed by a review of self-efficacy and culturally responsive teaching since a main factor of this study is culturally responsive teaching self-efficacy. A review of the literature of the other main factor, cultural competence, follows and the multiple parts of cultural competence, cultural identity, cultural sensitivity, and cultural knowledge are defined and discussed. A review of Hawaiian epistemology provides background for Native Hawaiian cultural competence and makes connections to MSP. The literature review ends with a discussion of professional development in order to provide background on best practices for professional development and the variety of models of professional development. It begins by examining pedagogy and andragogy in order to compare and contrast the two practices and determine the best practices to employ in professional development trainings and/or workshops, and closes with a direct connection made between professional development best practices and models and MSP. Chapter 3 provides detailed descriptions of the methodology employed in the research study and the research study plan, including the instruments utilized, the participants of the study, and the analysis exercised. Chapter 4 presents the findings by interpreting the results of the data analysis, the significance of the results, and the correlation of those results with the study hypothesis. Finally, chapter 5 provides a summary of the results section, identifies the people who would benefit from the research study, and why the research study provided valuable information regarding the culturally responsive teaching self-efficacy and cultural competence.

CHAPTER 2: LITERATURE REVIEW

Teachers who are prepared to create and facilitate a culturally responsive classroom must believe that they have the requisite knowledge and skills to succeed. This belief in their knowledge and skills allows teachers to determine and identify a degree of self-efficacy in culturally responsive teaching practices. Culturally responsive teaching practices are acquired through the understanding and development of cultural competence. Professional development in cultural competence provides teachers with the knowledge and skills necessary to support their development and understanding of cultural identity, cultural sensitivity, and cultural knowledge.

2.1 Belief

The idea of belief is a “many-faceted problem” (Campbell, 1967, p. 204) that is abundant and thriving with research pursuing its meaning, definition, structure, function, and uses. Belief has come under the cover of many synonyms; for example, “attitudes, values, judgments, axioms, opinions, ideology, perceptions, conceptions, conceptual systems, preconceptions, dispositions, implicit theories, explicit theories, personal principles, perspective, repertoires of understanding, and social strategy” (Pajares, 1992, p. 309). Research indicates that “the powerful effects of beliefs are more useful in understanding and predicting how teachers make decisions” (Pajares, 1992, p. 311).

From an epistemological perspective, the procedures for the formation of belief is evaluated, appraised, and criticized (Goldman, 1978, p. 525). Goldman (1978) pursues a definition of belief from epistemology because of attacks on belief concepts that challenges its legitimacy (p. 525). He discusses the relationship of beliefs to consciousness, specifically to one’s attention to a belief at a specific time. The attention one gives to a belief depends on its

structure, specifically its rules and model, as well as its strength, meaning its salience.

Consequently, belief is a salient proposition of associative links between ideas.

Eisenhart, Shrum, Harding, and Cuthbert (1988) discuss the confusion surrounding a definition of belief in educational research. They found the concept of belief used in different ways, similar to the plethora of synonyms indicated above, but more specific to general and/or specific shared and/or individualistic phenomena such as axioms, culture, and constructs (p. 52). They further identify the basis of the confusion due to the different notions surrounding the source of beliefs. With an appreciation for prior research, Eisenhart et al. suggested a definition of belief as “a way to describe a relationship between a task, an action, an event, or another person and an attitude of a person toward it” (p. 53).

Campbell (1967) argues that it is not possible to provide a logical definition of belief, however, based on its common characteristics, “(episodic) belief is a mental attitude (or state...) felt towards a proposition” (p. 216). The author expands on the definition by specifying that the “mental attitude is one felt towards a proposition by a person” (p. 216). The author’s arrival at the suggested definition came through a journey that deconstructed the structure of a belief.

Structure of Belief

In addition to Campbell (1967), Abelson (1979), Nespor (2006), and Pajares (1992) analyzes belief from a structural viewpoint. While each author cited his/her own features, characteristics, and elements of a belief, they were all similar in meaning and nature, and could be classified into four main categories – existential presumption, alternativity, affective and evaluative components, and episodic structure.

Existential presumption. Campbell’s (1967) absolute belief, “belief that excludes all doubt on the part of the believer” (p. 207) loosely describes one part of existential presumption.

Nespor (2006) describes existential presumption as “the reification of transitory, ambiguous, conditional or abstract characteristics into stable, well-defined, absolute and concrete entities” (p. 318). Existential presumption is the belief in the existence or non-existence of entities because to “insist that some entity exists implied an awareness of others who believe that it does not exist” (Abelson, 1979, p. 357). Popular examples of existential presumption include the belief in God, vampires, psychics, and aliens. This particular structure of belief typically plays a central organizing role in the formation of a belief system.

The existence of certain conceptual entities, multiple gods, demigods, and mythic heroes, are a part of the Native Hawaiian culture. Therefore, there should be a clear understanding of the role these entities play in the lives of Native Hawaiian students, their families, and their communities. In order to relate to these students, culturally competent teachers make the effort to increase and/or improve their knowledge of the existential presumptions of their students’ cultures by immersing themselves in the culture through participation in cultural practices, cultural festivals, and cultural experiences. An understanding of the existential presumptions of the multiple cultures within the school supports a teacher’s ability to provide students with relevant context that make connections to content.

Alternativity. Ideology plays a significant role in the concept of alternativity because it represents revolutionary or Utopian dogma. Alternativity presumes that the “world must be changed in order to achieve an idealized state” (Abelson, 1979, p. 357). Beyond the need for change, discussions occur that explicitly isolate the deficiencies of the status quo and how the manipulation of certain factors will eliminate the deficiencies. Current mainstream movies, like *Wall-E*, where surviving humans live on large, full-service space crafts, while drones are sent out

searching for the new growth, and *Minority Report*, where a future society has found a way to prevent murder, typify these types of scenarios.

The search for revolutionary ideology is not new to education, as parents, teachers, school administrators, and government entities are continually looking to provide students with a learning environment and learning conditions that encourage and promote high levels of engagement and a high degree of achievement. Diverse classrooms require the knowledge, skills, and experiences of teachers with a higher level of cultural competence for there to be the creation of a culturally responsive classroom and the implementation of culturally responsive teaching practices. The creation of these types of classrooms are “conceptualizations of ideal situations differing significantly from present realities” (Nespor, 2006, p. 319).

Affective and evaluative components. Affective, relating to moods, emotions, and feelings, and evaluative, “categories of concepts defined in one way or another as themselves ‘good’ or ‘bad,’” (Abelson, 1979, p. 358) components of belief possess both a motivational and cognitive component. Knowledge begins to develop a relationship with belief in that it requires some knowledge, some understanding of objective fact, to be able to make affective and evaluative judgments regarding a concept (Pajares, 1992). Knowledge is necessary to formulate a belief and is something that will be further developed later. When contemplating the polarities of good and bad, personal preference, regarding affective reactions and responses to particular concepts, drive the decision. Based on that decision, an evaluative judgment is made to deem said concept as either good or bad. To a pro-life supporter, abortion is bad, doctors who perform abortion is bad, politicians who support the continued legalization of abortion is bad, devout, practicing Christians are good, the pro-life activist is good, and the conservative Republican neighbor is good. Affect and evaluation also provide a motivational force that regulates the

engagement in and with a concept (Abelson, 1979, Nespor, 2006). Excitement with a particular concept would encourage increased engagement, while anxiety and/or fear might suggest disinterest and lack of participation.

The culturally competent teacher can inspire positive affect and evaluation in two ways. First, his/her own excitement over content, concepts, activities, and assignments, can lead students, who have no prior experience with the specific content, concept, activity, or assignment, to mirror the same positive affect and evaluation. Second, through the utilization, implementation, and application of culturally responsive teaching practices, the teacher provides students with positive learning experiences that promote positive affect and evaluation.

Episodic structure. Personal experiences or cultural knowledge provide the material necessary for belief structure (Abelson, 1979). Whereas knowledge is structured from “semantic networks...broken down into logical constituents...and organized in terms of semantic lists or associative networks,” belief is stored episodically, “organized in terms of personal experiences, episodes or events” (Nespor, 2006, p. 320). A pivotal, often termed as “life-changing,” experience tends to drive the formation and development of a belief; the greater the personal effect, the stronger the belief (Abelson, 1979). The twin phenomenon, the belief that twins are somehow connected regardless of being separated at birth, is often reinforced for people of single births when they view reports and documentaries about twins separated at birth who lived the nearly exact same life, possibly in the exact same town.

Episodic structure in a culturally responsive classroom can positively affect the knowledge growth of students by providing students with personal experiences that are meaningful and relevant to their lives. Typically, these classrooms are developed and created by culturally competent teachers who have a strong cultural identity, are culturally sensitive to the

diverse cultures in their classrooms, and have obtained the necessary cultural knowledge to support successful implementation and application of culturally responsive teaching practices.

Development of Belief

Strand (2005) shares three of Peirce's epistemological notions regarding the development of belief – beliefs are “mediated, socially situated and future-oriented” (p. 259). The development of beliefs are mediated because of their constant interaction with former beliefs and experiences. They are also socially situated because belief development unavoidably engages in social discourse. Finally, beliefs are future-oriented because there are outcome expectancies attached to beliefs.

Beliefs are mediated. While beliefs typically remain unchanged (Pajares, 1992), they also typically are not considered to be an “independent entity, or described as something in its own right” (Strand, 2005, p. 259). Instead, a belief is developed from the cognition of earlier beliefs and experiences. Strand (2005) provides an excellent metaphor to describe the mediated development of belief.

If we consider our cognition, as a relational entity, to be the straight line between two points, the length of the line can become the measure of the life-fullness of our cognition. Let us assume that immersing an isosceles triangle through a body of water creates this line. The surface of the water is broken, when the point of the triangle is gradually sunk into the water. The deeper the point is immersed, the longer the line will become. The tip of the triangle represents the object of our thinking, and the line created by the water represents our thoughts about the object. (p. 260)

As the triangle moves in and out of the water, our cognition and reasoning becomes a relational and evolutionary ideology, which in turn mediates one's beliefs.

The choice to increase one's cultural competence in order to implement culturally responsive teaching practices comes through the continual mediation of existing beliefs of best practices, signature pedagogies, and systemic requirements. Consequently, careful mediation through thoughtful discourse surrounding these topics have to occur to motivate teachers to want to improve their cultural competence.

Belief is socially situated. Similar to the theory that knowledge is socially constructed, beliefs are developed through social interaction and are typically identified with community beliefs. Through social discourse, continued development of beliefs supports the formation and reformation of beliefs. Additionally, these discourses can also extend beliefs because of its interaction with and in social situations. Beliefs are not developed in isolation, "our beliefs are inseparable from, in fact based on, and inter-react with the institutionalized norms" (Strand, 2005, p. 274).

For teachers not already a member of an identified classroom culture, cultural competence will not improve and/or increase in isolation; these teachers will need the support and help of the various cultural groups and their communities. Consequently, their knowledge and skills used to develop their educational beliefs will be socially constructed through their multiple interactions with students, parents, and community members.

Belief is future-oriented. As goals and expectations change, beliefs and their focus changes and adjusts to better match new goals and expectations. Therefore, "our beliefs are based on and validated through practical considerations...[and] become meaningful by virtue of

an anticipated future” (Strand, 2005, p. 263). An ideology of future-orientation introduces the idea of hope and striving for something better.

The future-orientation of beliefs provides teachers with the necessary supports for goal development and task definitions. It provides teachers with the information required to achieve goals and meet expectations of school administrators.

Belief is a necessary component of cultural competence because teachers have to believe in its positive effects on student engagement and student achievement in order to desire to increase and/or improve their cultural competence. Optimism in the belief in culturally responsive teaching practices stemming from increased and/or improved cultural competence also promotes its classroom implementation and application. Self-efficacy is one type of belief and it, too, plays a significant role in the development of cultural competence and the implementation and application of culturally responsive teaching practices.

2.2 Self-Efficacy

Bandura (1997) defined perceived self-efficacy as the “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (p. 3) under an assortment of conditions. Culturally responsive teaching has aspirations for teachers who understand that students are “partners to the enterprise,” who create “environments for learning,” and connect “all the dreams, hopes, skills, experiences, and knowledge students bring to class with deeper and wider ways of knowing” (Ayers, 2010, p. 135). Consequently, teachers need to believe they have the ability to succeed in achieving such lofty aspirations, which makes it necessary to study teachers’ culturally responsive teaching self-efficacy.

Social Cognitive Theory

Perceived self-efficacy is an exercise in control (Bandura, 1997). A person continually searches for her ability to exert control over her life and the environment that her life grows, changes, and thrives. In essence, she desires human agency, the idea that “individuals are agents proactively engaged in their own development” (Schunk & Pajares, 2005, p. 86). How a person thinks and what she feels, says, and does is governed by her existing beliefs, actions, and environment, and in turn, her cognitive, biological, and affective functions (P) and her behavior (B), through her interaction with it, change the environment (E). This is a foundational concept of Bandura’s (1997) social cognitive theory called triadic reciprocal causation; where the previously identified determinants influence one another bidirectionally. See Figure 1.

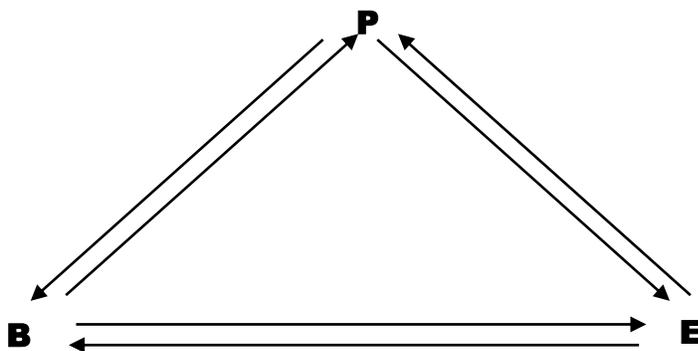


Figure 1 Triadic reciprocal causation

Bandura (1997) also expanded the idea of human agency to include collective agency, “people’s shared belief in their capabilities to produce effects collectively” (p. 7), because “human lives are not lived in isolation” (Schunk & Pajares, 2005, p. 86).

Teachers’ internal personal factors and behavior interacts with the classroom environment, in the sense that both determinants influence and alter the classroom environment, which includes the students. From a triadic reciprocal causation perspective, therefore, the classroom environment, students included, would consequently change and alter the teachers’ internal personal factors and behavior. As such, teachers and schools should attend more to the

students, beyond an acknowledgement of who they are and what they offer. Rather, the knowledge, skills, and experiences of the students should be more actively integrated into the curriculum instead of passively affected the environment. Collectively, teachers and administrators should work collaboratively to advocate and implement reform that makes the most sense for the particular school and its surrounding and supporting community.

Essential to human agency and social cognitive theory is the ideology of what makes a person human; the belief of an individual's capacity to think, to learn, to apply that learning, to experience, and to reflect on that thought, learning, application, and experience. Self-reflection, as a vital ingredient to self-improvement and improvement of ideas, is what Bandura holds as key to a definition of what it means to be human (Bandura, 1997; Bandura, 1977; Schunk & Pajares, 2005).

The Nature of Self-Efficacy

As previously mentioned, perceived self-efficacy is the belief that a person can “exercise control over action with the self-regulation of thought processes, motivation, and affective physiological states” (Bandura, 1997, p. 36). From this perspective, it is important to understand that increasing the level of self-efficacy depends greatly on the existing knowledge, skills, and experiences of the particular person. Therefore, it becomes possible to repurpose existing teacher practices and instructional strategies and methods because these subskills will positively contribute to the addition of new knowledge and skills of cultural competence and culturally responsive teaching practices. By increasing teachers' belief of cultural competence and culturally responsive teaching, it is possible to predict future implementation of specific culturally responsive teaching practices and instructional strategies. Teachers who believe they

have higher levels of cultural competence are more likely to implement culturally responsive teaching strategies.

“Schools develop collective beliefs about the capability of their students to learn, of their teachers to teach and otherwise enhance the lives of their students, and of their administrators and policymakers to create environments conducive to” (Schunk & Pajares, 2005, p. 86) accomplishing specified tasks and goals. Therefore, self-efficacy becomes both a “personal and social construct” (p. 86) since individuals work in groups as well as individually. Professional development allows for schools to work collaboratively to learn and understand new knowledge and skills, while providing opportunities for teachers to apply and reflect on that new knowledge and skills within their individual classrooms. Professional development offers individuals the support necessary for strengthening individual belief in one’s ability to successfully advocate change.

Sources of Self-Efficacy

Individual self-efficacy develops from four main sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. However, merely obtaining information germane to advancing self-efficacy does not provide a comprehensive picture of personal capability. This information becomes “instructive only through cognitive processing...and through reflective thought” (Bandura, 1997, p. 79).

Mastery experiences. Mastery experiences provide the most authentic and influential source of information pertaining to personal capabilities and success (Bandura, 1977, Bandura, 1997, Schunk & Pajares, 2005). Important to mastery experiences is an individual’s self-reflection and interpretation of the events that comprise the mastery experience because it helps determine how these experiences are categorized. Successful experiences support increasing

self-efficacy, while experiences that are classified as failures decrease self-efficacy when “a sense of self-efficacy is [not] firmly established” (Bandura, 1997, p. 80).

These first-hand experiences create resilience and perseverance that build self-efficacy that is not easily swayed by failure. It strengthens a person’s resolve by supporting feelings of capability in accomplishing goals. It also builds an internal resource treasury of knowledge, skills, and dispositions that can be accessed as required.

Mastery experiences also allow a person to use existing knowledge and skills innovatively and purposefully. Repurposing is an innovation where a person applies existing knowledge and skills to a different situation and allows her to retrieve that existing data and information to use in new ways. Such undertakings help to achieve goals and ensures that the engaging tasks and activities are worthwhile and a meaningful commitment.

MSP participants are provided multiple opportunities, guided and solo, throughout the program to apply existing knowledge and skills to the learning and practice of new knowledge and skills. Through guided experiences, participants work collaboratively with trainers to internalize and solidify understandings in order to increase their confidence to move to solo implementation. These mastery experiences scaffold their success and support their increased self-efficacy.

Vicarious experiences. While mastery experiences best support increases in self-efficacy, in the absence of them, individuals can build self-efficacy for specific tasks and activities through vicarious experiences. A vicarious experience places individuals in social comparisons of others who exhibit abilities similar to them (Bandura, 1977; Bandura, 1997). These social comparisons become referential models that vary based on the type of task, activity, and/or experience. These experiences are perception based because individuals make judgments

regarding the strength of their similarity to the significant other, and these perceptions infer success or failure based on how close the identified similarities. Self-perception of existing abilities, knowledge, and skills determines individuals' reliance on vicarious experiences' influence on self-efficacy.

Vicarious experiences are provided within MSP by exposing participants to teachers who are newly implementing culturally responsive teaching practices; new meaning within six months to one year of implementation. One universal similarity can be found in years of classroom teaching since MSP makes concerted efforts to provide implementing teachers who are new and veteran teachers. Some of the vicarious teachers also teach similar mixes of students and teach in publicly-operated schools. Based on this variety, participants' strength of affinity to implementing teachers will differ based on how closely related participants perceive the implementing teachers to be to themselves. However, by providing these vicarious experiences, MSP gives participants another occasion to increase their self-efficacy.

Verbal persuasion. Mastery and vicarious experiences allow an individual to build self-efficacy through experiences, tasks, and/or activities. Verbal persuasion aids in the development of self-efficacy through verbal reinforcement from and by a significant other. It is the belief a credible and knowledgeable other has in an individual's ability, knowledge, and skill. A significant other's credibility is reliant on that individual's perceptions of the abilities, knowledge, and skills of that significant other (Bandura, 1977; Bandura, 1997).

Verbal persuasion most often arrives in the form of feedback from a significant other before, during, and after specific tasks, activities, and/or experiences. Prior to an individual's engagement in an experience, her confidence can be boosted based on positive comments that demonstrate belief in her ability to achieve the expressed goal. Athletic experiences frequently

demonstrate this type of verbal persuasion; for example, before a hitter goes to the plate for an at-bat, a coach reassures him that he has the skills necessary to make the hit required to score a runner. During an experience, feedback from a significant other can stabilize an individual's self-efficacy through continued praise and reassurance. Continuing with the baseball example, after hitting the ball, getting on base, and scoring a runner, the coach congratulates him and reminds him that he knew he could do it. Finally, comments and reflections at the conclusion of the experience continue to increase self-efficacy by reinforcing the achievement of the goal through the proper application of abilities, knowledge, and skills. As with baseball, the player is provided with feedback regarding his offensive contributions during that half-inning.

Verbal persuasion is most readily observed in MSP during participants' practice opportunities. Trainers provide feedback and reflection at all stages leading up to the classroom observation. Participants submit unit plans and lesson plans that receive written feedback that connects back to taught content and relates to the specific goal. Pre-observation meetings are used to reinforce prior practices and methodologies employed that were positive and aligned with the goals. During classroom observations, trainers display genuine engagement in the moment and take the opportunity to engage students. Finally, post-observation meetings provide trainers ample material to be able to have constructive discussions with regards to the experience and the participants' application of knowledge and skills. This process gives participants multiple instances to increase self-efficacy.

Physiological and affective states. The final source of self-efficacy is internal to the individual and involves how a person's "physical state affects activities and events requiring physical ability, health functioning, and coping with stress" (Bandura, 1997, p. 106) and the development of affective responses that dictates future self-efficacy for tasks, activities, and/or

experiences. Positive physical markers, e.g., calmness or relaxation, indicate higher self-efficacy and probable successful attainment of goals; while negative physical markers, e.g., anxiety, or tension, dictate lower self-efficacy and probable failure. The scenario is equivalent for positive and negative emotional states.

MSP provides participants with a safe and positive learning environment that encourages teachers to produce at their optimal levels. Additionally, trainers create an atmosphere that promotes inspiring and supportive camaraderie amongst the participants in order to provide a competition-free setting. Trainers stress the ideology of them being partners in learning to foster positive feelings of collaboration and cooperation.

Cognitive Functioning

Teacher. Teacher instruction and practice is determined by one's self-efficacy (Bandura, 1997, p. 240). This self-efficacy controls the capacity to utilize existing abilities, knowledge, and skills to produce instruction and implement practices conducive to student learning and achievement. It provides opportunities for a teacher to create mastery experiences and effective instructional practices, curricular decisions, and classroom management. Beliefs regarding student ability and intelligence are also shaped by self-efficacy. Higher self-efficacy contributes to the belief of reaching all types of learners, whereas lower self-efficacy deems the problem to be with the lack of accountability on the part of the students. Consequently, a teacher's self-efficacy directly impacts the self-efficacy of students. A teacher becomes students' significant other who provides the faith and belief in their abilities and gives them the verbal persuasion necessary to guide them to success.

Although MSP was school mandated, by demonstrating the relevance and importance of culturally responsive teaching practices to student engagement and student achievement, trainers

were able to commit teachers to developing and/or increasing their cultural competence.

Participants understood the process of increasing culturally responsive teaching self-efficacy came from first developing and/or increasing their cultural competence, which would eventually lead them to implementing and employing culturally responsive teaching practices that ultimately benefit their students.

Teacher as student. Bandura (1997) understood that there is a “causal contribution of efficacy beliefs to cognitive functioning” (p. 215) that is linked to resilience and perseverance, organizational skills, time management, and the ability to move on when one idea is not producing results. Likewise, professional development is designed to capitalize on the research findings by creating and incorporating tasks, activities, and experiences that promote higher self-efficacy.

Goals provide opportunities for development of cognitive competencies, as long as they are relevant to the individual’s goals and provides cognitive nourishment that is valuable. There is a need being fulfilled for the person and eventually leads to building intrinsic interest. These goals will lead to the development of cognitive and personal self-efficacy. Therefore, successful professional development must cooperatively create goals that meet the needs of the participants and builds intrinsic interest.

School as collective self-efficacy. A positive school climate focused on academic learning is created by teachers with a strong sense of instructional self-efficacy. Instructional self-efficacy is born from cognitive and personal self-efficacy. Therefore, schools start with a small group promoting multiple mastery experiences that increase self-efficacy throughout the group members. In the absence of trained professionals, it will provide the necessary support for

continued professional development. Throughout, the school will increase and sponsor an academic learning environment and atmosphere.

Veteran teachers tend to flat line after many years of service and need to be provided with opportunities for renewal in order to continue to grow their self-efficacy. New teachers need consistent and multiple occasions to increase and build upon their existing knowledge base in order to increase their self-efficacy. Schools need to promote school change and increase student engagement through relevance. This can be achieved through culturally responsive teaching.

2.3 Culturally Responsive Teaching

Culturally responsive teaching teaches culturally diverse students through their culture and cultural strengths. It uses the “cultural knowledge, prior experiences, frames of reference, and performance styles” (Gay, 2010, p. 31) of all students because it recognizes the importance of the knowledge, beliefs, and values of culture in students’ learning. In this capacity, teachers become cultural brokers (Gentemann & Whitehead, 1983) who must organize, mediate, and orchestrate the culture and cultural practices of students.

As cultural brokers, teachers need to organize, mediate, and orchestrate four groups, students, families, curriculum, and community, by focusing on relationships and relevance. The first, and most important, are the students. As previously mentioned, teachers play a direct role in determining self-efficacy of students, which indicates that teachers should implement strategies and acquire knowledge, skills, beliefs, and dispositions that promote students’ self-efficacy. Culturally responsive teaching incorporates teaching to the whole child by not only developing students’ intellect, but also supporting their social, emotional, moral, and political development (Gay, 2010). To do so necessitates the teacher’s advocating for the maintenance of

their cultural identity and language and validating of the students' existing knowledge. This existing knowledge requires the input and participation of the family.

Students' families provide a wealth of knowledge, what Moll, Amanti, Neff, & Gonzalez (2005) termed funds of knowledge, and should be viewed as producers of knowledge. By validating the family's cultural knowledge and incorporating that cultural knowledge and practices into the classroom and curriculum, teachers begin to provide congruence between school and home by building a bridge. This bridge helps students to access the learning taking place in the classroom by creating relevance and providing context.

The curriculum used by culturally responsive teachers provides rigorous, standards-based content that requires students to think critically to solve problems that are placed within a relevant context. Key to a culturally relevant curriculum is the context within which the content is placed. The content is taught through the culture and is rooted in its cultural practices. By placing learning within the context of relevance and utilizing the cultural knowledge of students, it eliminates the deficit approach of teaching with culturally diverse students and focuses on a strengths-based approach (Gay, 2010). Teachers begin to recognize and tap the "intellectual ability and many other kinds of intelligences" (p. 20) to radically improve student achievement through the "transformative effects of sociocultural contextual factors" (p. 15). Strengths-based perspectives provide social supports of personal caring, mutual aid and assistance, use of cultural anchors and mediators in instruction, and creating a sense of community.

This sense of community advocates for educating students to become healthy and complete functioning members of society by contributing and engaging in a shared responsibility. This shared responsibility is also distributed within the community as a means of holding schools and school districts accountable for student achievement (Henderson & Mapp,

2002). Teachers form associations with community leaders to engage in collective action to provide human and equipment resources that can enhance classroom learning.

As cultural brokers, teachers build relationships with students, their families, and the school community in order to engage students and increase student achievement. They are the cultural organizers that “understand how culture operates in daily classroom dynamics, create learning atmospheres that radiate cultural and ethnic diversity, and facilitate high academic achievement for all students” (Gay, 2010, p. 44). Teachers must mediate cultural identities to advocate individual student identities and cultural sensitivities to “celebrate and affirm one another and work collaboratively for their mutual success” (p. 45) making a teacher’s cultural competence an important factor.

2.4 Cultural Competence

Successfully educating students of diverse groups requires teachers who are culturally competent. Culturally competent teachers have the beliefs (awareness of one’s own heritage, values, limitations, and biases, as well as respect and sensitivity to differences), knowledge (understanding of sociopolitical history of minorities in the *U.S.*, the role of cultural racism, and specific details about the group with whom one is working), and skills (ability to send and receive information verbally and nonverbally, to understand and be understood, in a variety of cultural styles) necessary to work effectively with individuals different from one’s self; that cultural competence includes all forms of difference; and that issues of social justice cannot be overlooked (Krentzman & Townsend, 2008, pp. 8-9).

Cultural Identity

Voicu and Ioan (2013) define cultural identity in two parts – the ipse identity, which represents the first person perspective, or the unique sense of self an individual constructs, and

the idem identity that is the third person perspective formed by the influences of the more objective third person perspective (pp. 161-162). The ipse identity gives an individual the ability to create and re-create oneself based on the reinterpretation and reimagining of one's past in order to inform the decisions and actions of one's present and future. This identity is fluid and dynamic, possessing the ability to adapt and adopt as one moves around and between various social groups. An individual controls the impact of the idem identity based on the depth of one's affiliation with particular social groups. Voicu and Ioan ascertain that collectively, ipse and idem identity convey an individual's cultural identity, and said cultural identity is synonymous with the term diaspora referring to:

Social groups which share a common ethnic and national origin, but live outside the territory of origin. These groups have a strong feeling of attachment to their "homeland", making no specific reference to ethnicity, or to a particular place of settlement. All diasporas, either independent of national and ethnic background or treated as a single group in which ethnical boundaries are crossed are considered as being hybrid and globally oriented (Voicu & Ioan, 2013, p. 161).

For Voicu and Ioan (2013) identity is personally constructed based on the actions and interactions with a specific social group. However, an individual has the power to move between social groups which creates a hybrid individual cultural identity.

Hall (1996) supports Voicu and Ioan's argument that identification is socially constructed "on the back of a recognition of some common origin or shared characteristics with another person or group" (p. 2). Identity then becomes a construction through an individual's interaction with social groups, its history and, as Blumer (1986) posits, its institutions, through discourse of similarities and differences.

Collier and Thomas (1988) also espouse the importance of negotiating the similarities and differences between an individual and the cultural group he/she belongs, as a means of interpreting identity. Within these constructions, an individual's primary identity emerges based on situational context and experiences and through communication within and without these cultural groups. However, one's cultural identity can, and does, change over time and produce multiple identities that individual's utilize depending on time and place (Collier & Thomas, 1988; Hall, 1996; Jameson, 2007).

Therefore, an individual constructs his/her cultural identity through interaction and communication with the cultural group that he/she belongs. The individual's cultural identity is a dynamic entity that changes as he/she moves between and among different cultural groups and situational contexts. This identity is influenced by the interaction and communication of others from the cultural group through the discovery of similarities and differences. An individual can possess multiple cultural identities that are situationally employed (Moore & Barker, 2012) that make him/her multicultural.

As with individual's, an institution can construct its identity through similar means (Blumer, 1986), which suggests the potential for a nurturing relationship between a school's identity and the numerous individual's who attend the school. Successful relationships between schools and students reinforce the various student cultural groups (Fryberg, et al., 2013). Schools find a balance between the diverse groups and construct its mission and vision to promote their identity and to have a unifying ideology that teachers can promote. Individual teachers assimilate the school identity with their personal cultural identity and teach from that multicultural perspective.

Teachers, regardless of content or discipline area, integrate cultural identity into their classroom through communication. Teachers share their individual cultural identity and candidly discuss their identity development through formal and informal conversations with individuals, small groups, and the whole class. Through sharing, teachers build relationships that allow two-way, open communication that encourages students to share their cultural identities with the teacher and the class (Clark, Badertscher, & Napp, 2013; Fryberg, et al., 2013; Kana‘iaupuni & Kawai‘ae‘a, 2008; Kawai‘ae‘a, 2011; Native Hawaiian Education Council, 2002). Relationship building becomes a first step for all teachers committed to integrating cultural identity into the classroom by opening lines of communication and sharing personal stories that illuminate teachers’ own cultural identity.

Ethnomathematics concerns itself with “how mathematics is perceived, learned, and taught in the amazing array of cultures that human being have formed” (Kenschaft, 2011), and for the past 25 years, mathematics professors around the world have worked tirelessly on associating cultural practices with mathematics. This approach to mathematics has worked to make math more appealing and relevant to culturally diverse students by incorporating specific cultural practices that are familiar to them.

In conjunction with ethnomathematics, mathematics professors and teachers also concern themselves with student development of a mathematics identity (Nasir, Hand, & Taylor, 2008), using students’ cultural identity as a starting point (Clark, Badertscher, & Napp, 2013). By engaging students in mathematics that is relevant and has an existing relationship with students, it helps students develop a positive domain identification with mathematics. Positive domain identification have demonstrated increased academic success and achievement (Osborne, 1997) and motivated students to continue to achieve in mathematics courses.

Cultural Sensitivity

Recognizing similarities and differences in another's cultural identity, respecting those similarities and differences, admitting biases, either to oneself or publicly, and equitable treatment characterize cultural sensitivity (Bender, 2000; Frengley, 2002; Isaacs, 2013). The American Association of Diabetes Educators (2012) refers to cultural sensitivity as similar to cultural humility, which is in alignment with cultural practices and values of not individualizing oneself and making one greater, or better than the collective (Cornelius, 1999). "Cultural humility is defined as a process that requires humility as individuals continually engage in self-reflection and self-critique as lifelong learners and reflective practitioners ... [and] brings into check the power imbalances that exist within the dynamics ... [of a] mutually respectful and dynamic partnership" (AADE Position Statement, 2012, p. 138).

The AADE pinpoints one important aspect of cultural sensitivity, namely power, and where there is power, often politics is not far away. The addition of power to the definition of cultural sensitivity allows for a discussion around social justice because social justice is one aspect of cultural sensitivity that cannot be left out. For most of the Western hemisphere, multiple cultures populate the various countries of the world, and among these multiple cultures, there tends to be a dominant culture who retains all the power (Hernandez & Kose, 2012). This imbalance of power prevents understanding and awareness necessary for cultural sensitivity, which indicates that for cultural sensitivity to exist, the appearance of a balance of power between parties must be present. Therefore, the dominant culture must make valiant efforts to assuage the perceived feelings of power of the less dominant culture.

About three weeks ago, a student the researcher had when she was a freshman (she is currently a senior) in high school, contacted the researcher to share a story about something that

happened one day in her math class. This former student did not go into detail about the conversation, but it concluded with her not being able to listen and learn because of some extremely culturally insensitive remarks made by her teacher. This example exemplifies the importance of cultural sensitivity in any classroom, although the specific example comes from a mathematics classroom. The former student contacted the researcher because she needed a way to make sure that she could still learn the content without having to listen in class. The teacher's insensitivity prevented learning from occurring. Had this teacher demonstrated cultural sensitivity toward this former student, she would have maintained power in the classroom and allowed learning to continue.

Another important aspect of cultural sensitivity is bias – personal admission of bias and removal of bias in curricular materials. Recognizing one's own personal bias can be a difficult, but necessary process because it helps an individual determine cultural biases and/or cultural stereotypes he/she may be harboring; both characteristics harmful to cultural sensitivity. By acknowledging one's personal biases and stereotypes, he/she prevents those biases and stereotypes from infiltrating into the classroom (Dennis & Giangreco, 1996).

Teachers have a responsibility for providing a high-quality education and therefore must recognize that cultural sensitivity breeds successful interactions with students and illustrates to them that they care for and understand the importance of their students' cultural identity. Continuing to work with culturally diverse students will support teachers' ability to gain a better perspective on their personal biases (Dennis & Giangreco, 1996, p. 111). Through that increased understanding of personal biases, teachers will be better equipped to recognize cultural biases in the curricular resources and learn to eliminate them completely or use them to teach cultural awareness and respect for the differences of others.

Cultural Knowledge

Attempts at defining cultural knowledge have been numerous, but somewhat unsuccessful with the rapidly changing world and worldview of the world population. As with the previous definitions, what seems most appropriate is the determination of common characteristics of cultural knowledge as identified in current research.

- Knowledge unique to a given culture. This knowledge is shared with members of the cultural group and can be used to identify said group;
- Knowledge existing within and developed around a cultural group from a specific geographic area. Geography plays an important role in the development of cultural knowledge. From a Native Hawaiian perspective, a man born at or near the shore will possess extremely different knowledge and skills than a man born in the mountains, even if they lived in the same *ahupua'a*, land division. Furthermore, in Hawai'i, persons born to different *ahupua'a* will possess distinctly different knowledge and skills;
- Knowledge is temporal, and people of a given community continually develop its knowledge (Sillitone, Dixon, & Barr, 2005, p. 3);
- Students' lived experiences in their homes, their communities, with their immediate and extended families (Gonzalez N. , 2005);
- A reflection of the "dynamic way in which the residents of an area have come to understand themselves in relation to their natural environment" (Semali & Kincheloe, 1999);
- An understanding of the sociopolitical history of colonized races. Honest and truthful knowledge of colonized nations help one to create cultural knowledge.

For example, some schools in Virginia do not teach the true version of events regarding the overthrow of the Kingdom of Hawai‘i, and therefore, the lack of correct knowledge creates cultural bias (Krentzman & Townsend, 2008); and

- The role of cultural racism and its effect on the development of one’s cultural knowledge (Colvin-Burque, Davis-Maye, & Zugazaga, 2007).

Cultural knowledge, also described as Indigenous knowledge and Native ways of thinking, develops outside of the educational environment, while interacting with one’s family and cultural community. In the past, Western education has always operated from a deficit perspective (Ladson-Billings, 2006) deeming local cultural knowledge as “the primitive, the wild, the natural ... [evoking] condescension from Western observers and [eliciting] little appreciation for the insight and understanding indigeneity might provide” (Semali & Kincheloe, 1999, p. 3). A celebration and honoring of students’ cultural knowledge encourages students’ positive cultural identification and regaining of their cultural dignity and motivates teachers to increase their cultural sensitivity and cultural knowledge about the students they teach.

Hawaiian Epistemology

Culture and cultural experiences drive the development of indigenous knowledge (Meyer, 1998, p. 22), and Hawaiian epistemology begins with seven themes identified by Meyer (2001) as:

- Spirituality and knowledge, the cultural contexts of knowledge;
- That which feeds, physical place and knowing;
- Cultural nature of the senses, expanding notions of empiricism;
- Relationship and knowledge, notions of self through other;
- Utility and knowledge, ideas of wealth and usefulness;

- Words and knowledge, causality in language; and
- The body-mind question, the illusion of separation.

Spirituality and knowledge: the cultural contexts of knowledge. Hawaiian epistemology is shaped by the environment, *‘aumakua* (deceased family members), gods, and God (Meyer, 2001, p. 127). These entities are links of a chain that extends back to the beginning and identifies the origins of knowledge, understanding that “[knowledge] is not something that is reinvented every generation” (Meyer, 2001, p. 127). Reinvention does not infer a lack of innovation, but rather, provides a kind of immortality for the knowledge originator and a starting point for the knowledge recipient. It identifies the linear alignment of knowledge that is passed from one generation to the next and the evolution of the knowledge being passed forward.

That which feeds: physical place and knowing. The *‘aina hānau* (birth place) demonstrates the significance of metaphor in Hawaiian epistemology (Meyer, 2001). It is the origin, the mother, the inspiration for an individual because it begins one’s “description of who [he/she] is, and how it shaped [his/her] differences and values” (Meyer, 2001, p. 128). *‘Aina* means land, which literally feeds a person, sustains him/her, and also figuratively allows that person to grow intellectually and spiritually through his/her connection with the land and his/her ancestors that lived there. The *‘aina* designs and provides an experience that is shaped by the environment.

Cultural nature of the senses: expanding notions of empiricism. Humans engage with the world through multiple and multi-sensory experiences, and that engagement is defined by one’s culture. Culture defines the engagement and experience. It also mediates the context and the expectations. Knowledge forms through physical participation through five physical senses – sight, hearing, taste, touch, and smell – and a sixth intuitive sense – awareness. Awareness is the

ability for one to cause understanding, in Hawaiian, *ho'omaopopo*. Consequently, “our bodies become instruments of knowing, and instruments for cultural expression (Meyer, 2001, p. 133).

Relationship and knowledge: notions of self through other. Through interdependence, Hawaiians “practice reciprocity, exhibit balance, develop harmony ... and generosity with others” (Meyer, 2001, p. 134). Relationships provide a necessary context that shapes experiences and underscores the importance of experiences when shaping understanding. Through dialogue, developed relationships provide validation and perspective that supports reciprocity, harmony, and balance with others and those who might be dependent on you.

Utility and knowledge: ideas of wealth and usefulness. “Knowledge is valued when it is applied” (Meyer, 2001, p. 137), which indicates that there must be usefulness and functionality with gained knowledge and information. Knowledge and skills were passed down through successive generations because they proved to be useful for their way of life and ensured the continuation and evolution of knowledge passed through each year.

Words and knowledge: causality in language. Words and language describe culturally situated contexts. It allows listeners to know who is talking and how the content gets incorporated into what is learned. In *‘ōlelo Hawaii* (the Hawaiian language) words have multiple meanings and provides a different context and content depending on their format and their speaker. Therefore, the choice of words also shapes one’s experiences (Meyer, 2001, pp. 140-141).

The body-mind question. “The separation of mind from body is not found in a Hawaiian worldview...it is the *feeling* of something that constitutes part of *knowing* something” (Meyer, 2001, p. 141, emphasis in original). *Na‘au* literally means guts or intestines, but it is the place in the body where *na‘auao* (intelligence) is found. For the Hawaiian, there can be no

separation because knowing comes from a triangulation of information, experience, and feelings. Knowledge development requires all three things.

Moelahā. *Moelahā* (Kawai‘ae‘a, 2011), a framework for creating culture-based lessons and curricula, is an excellent example of how cultural knowledge has been applied in the classroom, regardless of content and discipline area. The *Moelahā* framework requires teachers to understand the Native Hawaiian methods and strategies of thinking and learning and to be able to take that understanding and transform it into instructional practices. Additionally, the *Moelahā* framework also emphasizes the inclusion of cultural practices as it relates to the concepts being taught. There are four parts to the *Moelahā* framework:

- Relationship: teachers provide an interactive, hands-on activity that introduces a cultural practice that directly relates to the new concept being taught. This supports the construction of a relationship between the student and the new content;
- Relevance: teachers use the cultural practice to make the content personally relevant;
- Rigor: teachers continue to use the cultural practice to promote autonomous learning from the student; and
- Responsibility: teachers provide students with multiple and diverse opportunities to apply their learning in a way that benefits their community.

Relationship between epistemology and framework. There is a clear relationship between Hawaiian epistemology and the *Moelahā* framework. *Moelahā* begins with the culture and cultural contexts in order to provide meaningful and purposeful learning experiences that acknowledges the union of mind and body. It begins with a teacher’s investigation of self and

ends with a teacher's investigation of his/her students in order to build relationships and identify students' prior learning to better engage and motivate.

Cultural Competence

Culturally competent teachers have the beliefs (awareness of one's own heritage, values, limitations, and biases, as well as respect and sensitivity to differences), knowledge (understanding of sociopolitical history of minorities in the *U.S.*, the role of cultural racism, and specific details about the group with whom one is working), and skills (ability to send and receive information verbally and nonverbally, to understand and be understood, in a variety of cultural styles) necessary to work effectively with individuals different from one's self; that cultural competence includes all forms of difference; and that issues of social justice cannot be overlooked (Krentzman & Townsend, 2008, pp. 8-9). The definition itself is inclusive of cultural identity (awareness), cultural sensitivity, and cultural knowledge. Therefore, to achieve cultural competence, one must have an understanding of cultural identity, sensitivity, and knowledge.

"Gaining cultural competence is a long-term, developmental process" (Advocates for Youth, 1994, p. 3) and allows "professionals to work effectively in cross-cultural situations" (Cross, Bazron, Dennis, & Isaacs, 1989, p. 12). Since cultural competence is viewed as a developmental process on the level of effectiveness of an individual, a model that measures the achievement level along a continuum seems most appropriate in addressing classroom disparities. The cultural competency continuum (Figure 2) provides teachers with clear descriptions of one's level of competence ranging from Culturally Destructive to Cultural Proficiency with four intermediate levels. However, such a continuum cannot operate in isolation because it does not indicate measurable attributes, knowledge areas, and skills essential to the development of cultural competence (Cross et al, 1989, p. 35).

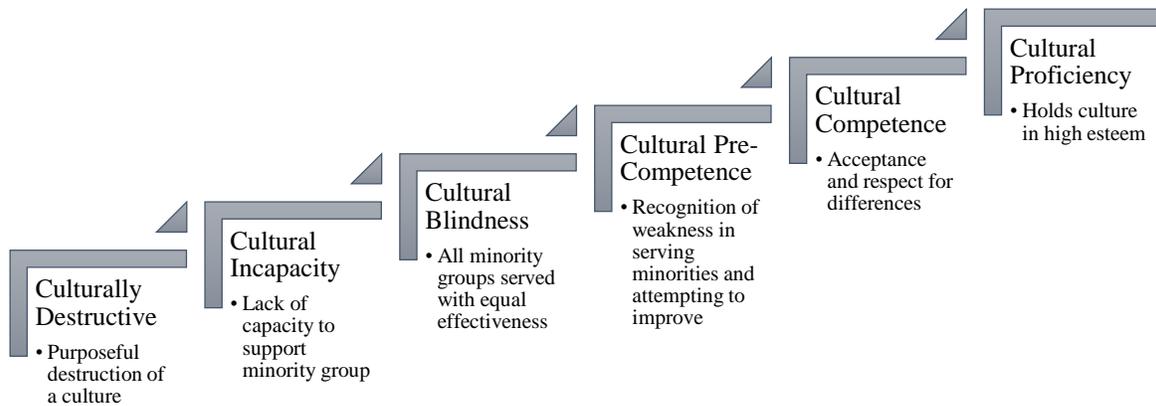


Figure 2 The cultural competence continuum

Therefore, the continuum needs to be used in conjunction with Wilson’s (1982 as cited in Cross et al, 1989, p. 35) 24 attributes, knowledge areas, and skills.

Personal Attributes include:

- Personal qualities that reflect “genuineness, accurate empathy, nonpossessive warmth” (Traux and Mitchell, as cited in Cross et al, 1989, p. 35) and a capacity to respond flexibly to a range of possible solutions.
- Acceptance of ethnic differences between people.
- A willingness to work with students of different ethnic minority groups.
- Articulation and clarification of the teacher’s personal values, stereotypes, and biases about their own and others’ ethnicity and social class, and ways these may accommodate or conflict with the needs of the ethnic minority student.
- Personal commitment to change racism and poverty.
- Resolution of feelings about one’s professional image in fields which have systematically excluded people of color.

Knowledge Areas include:

- Knowledge of the culture (history, traditions, values, family systems, artistic expressions) of ethnic minority students.
- Knowledge of the impact of class and ethnicity on behavior, attitudes, and values.
- Knowledge of the helpseeking behaviors of ethnic minority clients.
- Knowledge of the role of language, speech patterns, and communication styles in ethnically distinct communities.
- Knowledge of the impact of social service policies on ethnic minority students.
- Knowledge of the resources (agencies, persons, informal helping networks, research) that can be utilized on behalf of ethnic minority students and communities.
- Recognition of the ways that professional values may conflict with or accommodate the needs of ethnic minority students.
- Knowledge of power relationships within the community, agency, or institution and their impact on ethnic minority clients.

Skills include:

- Techniques for learning the cultures of ethnic minority student groups.
- Ability to communicate accurate information on behalf of ethnic minority students and their communities.
- Ability to openly discuss racial and ethnic differences and issues and to respond to culturally-based cues.
- Ability to assess the meaning ethnicity has for individual students.
- Ability to differentiate between symptoms of intrapsychic stress and stress arising from the social structure.

- Interviewing techniques reflective of the teacher's understanding of the role of language in the student's culture.
- Ability to utilize the concepts of empowerment on behalf of ethnic minority students and communities.
- Capability of using resources on behalf of ethnic minority students and their communities.
- Ability to recognize and combat racism, racial stereotypes, and myths in individuals and in institutions.
- Ability to evaluate new techniques, research, and knowledge as to their validity and applicability in working with ethnic minorities.

These attributes, knowledge areas, and skills can be measured using an inventory metric expressly developed for assessing cultural competence. There are numerous inventory metrics available, however, there is not a single inventory metric that adequately measures cultural competence in a K-12 classroom setting. Mason (1995) developed a self-assessment metric that closely resembles the attributes, knowledge areas, and skills presented by Cross et al, which educational institutions have utilized. Possessing a clear understanding of a teacher's existing level of cultural competence as it relates to his/her specific classroom, teachers might better address their individual deficiencies through professional development in order to better serve their students and their families and their school community.

A Cultural Competence Framework

The above definitions and descriptions advocate a framework of cultural competence that can be employed by teachers regardless of content area. Based on these definitions and descriptions, this researcher presents this proposed framework involving four levels.

Level 1: Cultural identity. There would be two parts to this level. The first requires teachers to form their personal cultural identity by learning more about their ethnicity and community. The second part requires teachers to learn about the cultural identities of their students. While it would be most beneficial for teachers to have prolific knowledge of students' cultural identities, it is also unrealistic, given the number of possible cultural identities that would populate their classrooms. To gain cultural identity, teachers must take the time to learn about the different cultures within their classroom in order to understand its breadth, details, and nuances.

Level 2: Cultural sensitivity. By learning about the diversity of and between cultures and cultural practices, teachers are able to build cultural sensitivity toward their students' cultures and cultural practices. It will allow them to know appropriate behavior, emotion, and cognition as it pertains to their students.

Level 3: Cultural knowledge. From Level 1 and throughout this entire framework, teachers are continually gaining cultural knowledge, however, at Level 3, this is the point where teachers will gain specific knowledge pertaining to relevant cultural practices of their students as it relates to the classroom content and teacher practices. This requires teachers learning from primary sources and practicing these cultural practices and ways of thinking outside of the classroom in order to comprehend the applicative aspects of said cultural practices.

Level 4: Cultural competence. The final level of the framework is continuing to achieve for higher degrees of cultural competence. Understanding that student demographics in classrooms constantly change, it will prove difficult for teachers to remain at the highest degrees of cultural competence, if ever attained. While Level 4 is the final stage of the framework, due to the fluctuating classroom landscape, it will be a stage that will need consistent achievement.

Consequently, this cultural competence framework should be viewed as cyclical as demonstrated in Figure 3.

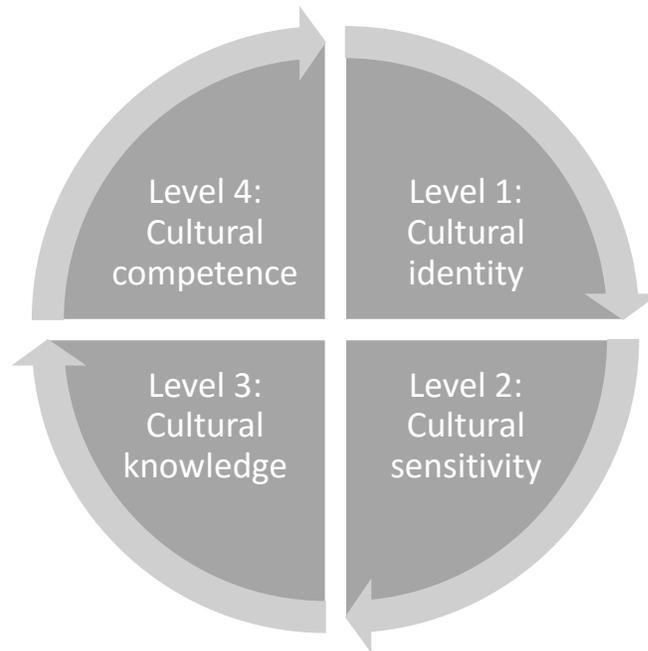


Figure 3: A cultural competence framework

2.5 Professional Development

A culturally responsive teacher “overlaps 100 percent with characteristics and actions of educators who have developed...cultural competence” (Cooper, He, & Levin, 2011, p. 158) and by developing cultural competence, a teacher brings culturally responsive teaching practices into her classroom. Acquiring and/or increasing levels of cultural competence requires professional development. Therefore, in this particular context, one must explore practices of instruction necessary to accommodate the maturation of cognition.

A Definition of Pedagogy

Hall (1905) describes pedagogy as including “both didactics or the methods of teaching or imparting knowledge or instruction generally on the one hand – all those processes by which information is given – and on the other, education or development from within outward.” He

recognized the evolutionary and humanistic nature of education, understanding that education should propel the individual to “maximal maturity and strength and is essentially cultural” (p. 375), capitulating to the need for pedagogy to be effective, even if that meant that the older and wiser persons were not imparting their knowledge on the younger and more ignorant. Hall was revolutionary with his pedagogic ideas and championed the idea of the value of education, advocating for an education that “can do for the high school and the college pupil” (p. 380).

Etymologically, pedagogy can be broken down to “*paid*, meaning ‘child’, and *agogos*, meaning ‘leader of.’ So pedagogy literally means ‘the art and science of teaching children’” (Malcolm S. Knowles and Associates, 1984, pp. 5-6). The art and science of teaching children evolved over the years as the study of thought to be one-sided, with a more knowledgeable other imparting information on a dependent, inexperienced learner. The dependency of the learner forces him/her to rely on the wisdom of the more knowledgeable other to inform him/her when he/she is ready to learn, or possesses the necessary knowledge and skills to learn. The learner arrives at his/her subject-centered place of learning extrinsically motivated to learn what is being taught (Malcolm S. Knowles and Associates, 1984).

Developing Pedagogies

Adhering to the philosophy of Skinner’s (1904-1990) behavioral conditioning, teachers practiced behavioristic pedagogy in their classroom to elicit appropriate responses from students regarding the multiple concepts taught in the K-12 classroom. Behavioristic pedagogy amounts to the demonstration, practice, and drill of behaviors deemed appropriate and necessary by schools (Roback, 1937). From the conventional stimulus-response psychology of Watson (1878-1958), Skinner identified two behavioral types, respondent and operant, understanding that responses can occur in the absence of stimuli (Hilgard, 1948). Respondent behavior follows as a

response to exterior stimuli; crying when cutting an onion and the excessive accumulation of saliva when inhaling pleasant food aromas are two examples. Responses emitted in the absence of stimuli, “an event contingent upon behavior without identifying, or being able to identify, a prior stimulus” (Skinner, 2014, p. 64), characterizes operant behavior.

Operant conditioning lies at the heart of traditional pedagogy because “Education is the establishing of behavior which will be of advantage to the individual and to others at some future time” (Skinner, 2014, p. 402). In traditional classroom teaching, teachers focus on the acquisition of behaviors, emitted responses based on no apparent stimuli; sitting quietly at desks transcribing information from the board to their notebook. Teachers tend to repeat this time proven method of teaching because that was how they learned (Humphreys, Post, & Ellis, 1981) regardless of its effectiveness. Mathematics teachers provide students with appropriate theorems and postulates, written verbatim on the board, and students transfer those concepts to their notebooks. The teacher reinforces these aforementioned theorems and postulates through specifically chosen related examples. Students complete these examples by following the teacher in his/her precise, step-by-step process in their notebooks. This process continues every day for the entire school year in a traditional classroom.

As the example illustrates, the teacher imparts his/her knowledge on the student, without reference or inclusion of student knowledge. Consequently, the mathematic identity born by the student is the teacher’s. The teacher determines when new concepts are presented and old concepts are assessed without input from students, ensuring that a teacher remains ignorant of the degree of challenge each student faces with regards to concepts taught. In addition, because traditional pedagogy is subject-centered, teachers miss opportunities of responsive teaching that occurs spontaneously based on what is presently happening in the classroom.

These traditions summarize the practices of cultural knowledge. The Native Hawaiian teaching methods subscribe to a teacher-apprentice model, as demonstrated by the *kahuna-haumāna* relationship.

Learning skills and developing gifts are fundamental for native youth. By developing talents, a person is able to become an active participant in the community. It also usually means that young people need to be in a relationship with a mentor or teacher who has such skills. Such relationships allow the student to take risks and make mistakes in a protected and controlled situation. The mentor-student relationships ensure that no one will get hurt and that persons are encouraged instead of discouraged. (Chun, 2011, p. 3)

A convenient illustration arises from *hālau hula* (hula school) and canoe clubs, where *kumu* (teachers) impart knowledge through demonstration, practice, and drill. Chun (2011) identifies five parts of traditional patterns of education.

1. Observational skills were used to help in the art of deduction. “Observation, or ‘*nānā*’ or ‘*ike*,’ is crucial to island life” (p. 85).
2. “Listening, or ‘*ho’olohe*,’ is another important aspect of learning. As with observation, listening requires one to be attentive and patient” (p. 86).
3. “Reflection, or to consider what has been done, is a polite way to translate *pa’a ka waha*, literally to ‘shut one’s mouth.’ Instead of jumping to conclusions, it is better for one to reflect on all of the options, putting the experiences of observing and listening together” (p. 87).
4. “Actually doing the task, or *hana ka lima*, literally ‘the hands create or do,’ was the next step. Having seen the stages necessary to create something, having heard the instructions and reflected on them, the time came to actually do it by one’s self.

Mistakes can be experiences and corrected as part of the learning process without harm” (p. 87).

5. Questioning, or ‘*nīnau*,’ encouraged from the start in many cultures, is thought of as something a person would consider almost as the last expression of learning. Having experienced seeing, listening, reflecting, and doing, a student may have answered many of the trivial questions, leaving only the most important to be asked of one’s teacher or mentor” (p. 87).

Looking at all five parts together, we see how this process can work: Through discerning and careful observation ‘*nānā*, *ho’olohe*, and *pa’a ka waha*’ a child learns under the tutelage of a master, a concept similar to mentorship. This system allows for the careful transmission of knowledge and skills from generation to generation as well as for the development of interpersonal relationship wherein a child may experience the care and guidance of a mature adult. (pp. 87-88)

Finally, traditional cultural practices allow for learning to occur when the student is ready based on a self-assessment and teacher observations and assessment. For example, Papa Mau Piailug, a *Pwo* (master) navigator from the Solomon Islands, listens to and observes his trainees in order to determine their preparedness for moving forward with the training. He does not move on simply because he already taught the previous lesson (Baybayan, 2011).

A Definition of Andragogy

These pedagogic practices directly conflict with andragogic practices, identified by Knowles (1984). Andragogy is the formal practices and strategies of adult education. Through research, Knowles acknowledged the differences in learning between adults and children, which prompted his detailed description of an adult learner. An adult learner is self-directed; which

Knowles believes is derived from an adults need for autonomy. An adult learner is automatically credited for his/her existing knowledge, skills, and experiences (cultural identity and cultural knowledge) simply for having lived longer and having had more opportunities to accumulate knowledge. An adult learner fulfills a personal desire to learn something, he/she chooses when he/she is ready to learn. Choosing to learn something is typically due to a specific context, work related or task oriented, which means that the learning for the adult is life-centered rather than subject-centered. The adult learner is learning for a reason that typically arises due to a life event. Therefore, the adult learner tends to be more intrinsically motivated to learn, although he/she can be extrinsically motivated to learn in order to earn a promotion or salary raise (pp. 9-12).

Clearly, when comparing the two, “the pedagogical model is a content model concerned with the transmitting of information and skills ... By contrast, the andragogical model is a process concerned with ... helping learners acquire information and skills” (Holmes & Abington-Cooper, 2000, p. 3 of 6), and while the models appear different, they are similar in that they involve the passing of knowledge between at least two people. Additional similarities include the use of repetitive practice of particular concepts, where drilling is required to ensure attainment of the concept.

Postmodernism and the advance of a constructivist pedagogy has championed the implementation and application of andragogic strategies in the P-16 classroom. Constructivist pedagogy advocates for student-centered learning that transpires when the student(s) are ready to move forward, while students construct their own learning which is facilitated by their teacher (Brooks & Brooks, 2001). Being a life-centered model, andragogy promotes experiential

education, common to integrative learning that focuses on connections between seemingly diverse concepts (Wells, STEM education: The potential of technology education, 2008).

Teacher Knowledge

What teachers should know depends on their purpose of education. Dewey (1859-1952) understood that social progress and reform come from students in full control of their capacities. Steiner (1861-1925) espoused the importance creating a totally integrated individual. Montessori (1870-1952) professed creating self-motivated responsible learners who are socially conscious. Neill (1883-1973) suggested that individual happiness and fulfillment is expressed through free will. Adler (1902-2001) required personal development and individual responsibility. Finally, Freire (1921-1997) believed in the freeing of individuals so that they can think and reflect in order to transform society. While each philosopher promotes a slightly different purpose of education, there are still commonalities to how they are achieved.

Shulman (2004) identified seven types of teacher knowledge:

- Content knowledge;
- General pedagogical knowledge, with special reference to those broad principles and strategies of classroom management and organization that appear to transcend subject matter;
- Curriculum knowledge, with particular grasp of the materials and programs that serve as ‘tools of the trade’ for teachers;
- Pedagogical content knowledge, that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding;
- Knowledge of learners and their characteristics;

- Knowledge of educational contexts, ranging from the workings of group or classroom, the governance and financing of school districts, to the character of communities and cultures; and
- Knowledge of educational ends, and values, and their philosophical and historical grounds. (p. 227)

Shulman (1986) identified two types of content knowledge: content and pedagogical content. Effective teaching of mathematics requires a teacher to possess both types of content knowledge identified by Shulman. Mathematics teachers must possess mathematic content knowledge, which is to say that they must understand the substantive and syntactic structures (Shulman, 1986, p. 9) of mathematics. In order to create hands-on, design-based, student-led investigation, and instructional practices that allow “purposeful design and inquiry” (Sanders, 2009), a comprehension of the substantive and syntactic structures are imperative. It would prove difficult to design any type of math project if one has an incomplete understanding of each part of a mathematic concept and the relationships between each part to all the other parts. For example, all mathematics teachers should understand and know how to identify patterns and how they manifest itself at all levels of K-12 mathematics. For example, think back to the game of

“What comes next?” (Figure 4)



Figure 4 What comes next?

It is a pattern recognition game that most kindergarteners can play using simple shapes, and it has the ability to get more complex by adding a color element. This understanding and connection of patterns escalates to recursive and geometric patterns in algebra and fractals, and

culminates in students' understanding of the patterns of areas under the curve. A teacher must possess the substantive structure knowledge to recognize these connections between the vertical levels of mathematics (how the patterns move from concrete to more abstract), as well as the horizontal levels of mathematics (solving linear equations with a variable on one side, then a variable on both sides, etc.).

Cultural knowledge becomes important in content knowledge. A teacher with higher content knowledge and higher cultural knowledge is able to observe a cultural practice and immediately recognize the substantive structures of mathematics within and among a given cultural practice. This skill is one of the most difficult skills for teachers to gain because it is the difference between teaching what is in the textbook and teaching the content of the textbook. A teacher who fully comprehends the content of a textbook is able to apply that content knowledge outside of the classroom and relate and make connections in the real-world. For example, returning to the "What comes next?" game, a master teacher could easily connect the game with cultural practices of weaving, tattooing, or lei making because he/she is able to recognize the substantive structure of the patterns in those practices and connect those patterns with specific mathematic concepts. That same teacher would be able to revise the "What comes next?" game to include cultural practices.

Simply having content knowledge without pedagogical content knowledge prevents a teacher from facilitating the acquisition of knowledge by his/her students, which is why it is important for a teacher to know how to employ the "most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations" (Shulman, 1986, p. 9). Teachers' pedagogical content knowledge helps them find multiple ways, strategies, and methods to explain a singular concept; a skill necessary when students are

struggling to proficiently understand a specific concept. Teachers must be expected to differentiate in their classrooms and be prepared for diverse learners, which is why being culturally competent also means knowing how math was used by the various cultures represented in his/her classroom. While it is not necessary to understand each different culture, it helps to have a general idea of the math employed in the different cultural representations of his/her classroom (an understanding of the history of mathematics).

Curricular knowledge, from an integrative STEM approach, requires more than knowledge of materials and programs that teachers can use as resources for teaching and learning. It requires learning that was greater than the sum of its parts (Doolittle, 1997; Huber & Hutchings, 2004), which means teachers who are able to articulate the larger role mathematics plays in the world and to make student learning of mathematics necessary (Piaget, 1976). Integrative learning, especially as it pertains to mathematics, provides practicality of abstract content (Isaacs, Wagreich, & Gartzman, 1997), as Plato himself said, “Now, when all these studies reach the point of inter-communion and connection with one another, and come to be considered in their mutual affinities, then, I think, but not till then, will the pursuit of them have a value for our objects; otherwise there is no profit in them” (as cited in Isaacs et al, 1997, p. 179). Consequently, integrative learning requires comprehensive curricular content knowledge for teachers to find and make connections between and with other content areas.

Additionally, a teacher also needs to know the variety of resources, “alternative texts, software, programs, visual materials” (Shulman, 1986, p. 10), etc. available when teaching a particular concept, which constitutes curricular knowledge. When attempting to differentiate for diverse learners, it often helps to have multiple examples that can be shared and immediately

used by the student to reinforce a newly learned concept because it provides them with the opportunity to apply his/her new skills and knowledge in a different but similar context.

Integrative STEM instructional strategies

The purpose of education is the critical mission of a teacher's philosophy and pedagogy. If, as Skinner purports, education is simply an acquisition of behaviors, than the choice of philosophy and pedagogy would lead one toward conditioning. However, if as Piaget (1976) believes, "to understand is to discover, or reconstruct by rediscovery, and such conditions must be complied with in the future individuals are to be formed who are capable of production and creativity and not simply repetition" (p. 20), then one would be better educated as a constructivist.

Shulman (2004) said, "To teach is first to understand" (p. 235) and Piaget (1976) said *To Understand Is To Invent*. Therefore, producing students with creativity and imagination harnessed and honed, ready for application, a teacher must understand his/her knowledge base to support student understanding of content which in turn will advocate invention. Invention partnered with critical thinking has given birth to project-based learning, "viewing the work of the classroom as a site for inquiry" (Huber & Hutchings, 2005, p. 1). Two types of project-based learning that categorically align with integrative STEM education are problem-based learning and design-based learning.

Problem-based learning, while used in K-12 classrooms, prevails in medical education. It entails the use of existing problems and/or scenarios that students use to stimulate their learning and understanding of concepts (Colliver, 2000; Wirkala & Kuhn, 2011; Wood, 2003). Typically occurring in small groups, this type of learning promotes critical thinking and cooperative and collaborative learning. This methodology effectively integrates multiple disciplines and content

areas depending on the complexity of the problem. Students need to learn the given material as it pertains directly to their teaching (Doolittle, 1997), which relates to the realism of the content learned.

Design-based learning applies concepts of and philosophies from the engineering and technology industries to teaching and learning (Apedoe, Reynolds, Ellefson, & Schunn, 2008; California State Polytechnic University, Pomona, 2009; Li, 2008; Strobel, Wang, Weber, & Dyehouse, 2013). Similar to problem-based learning, students work cooperatively and collaboratively in small groups to design a model that addresses a given problem limited by specific constraints. Design projects can successfully integrate multiple disciplines and content areas based on the project requirements. Through these projects, students acquire intellectual and social skills including:

- Thinking critically and asking thoughtful questions;
- Independently locating relevant information;
- Creatively adapting information to a specific need;
- Testing the validity of an idea;
- Learning from mistakes and coming up with fresh solutions; and
- Working cooperatively with others and democratic decision-making. (California State Polytechnic University, Pomona, 2009)

In indigenous education, a design-based approach is employed after the learner becomes proficient at specific and known knowledge and skills and can demonstrate that. At that moment in his training he/she is given the opportunity to create his/her personal and unique weave patterns.

Master craftspersons understood the importance of perpetuating cultural practices through the innovation of learners, allowing learners who achieve proficiency to be creative and innovative in their design and their techniques employed. One limitation of indigenous teaching is the lack of differentiation in the process. Most master craftspersons do not possess curricular knowledge that would allow them to differentiate the learning for different learning styles and learners. This limitation can be detrimental to those learners who have difficulty learning by watching. He/she would do his best to obtain the necessary skills through observing and trying, and if unsuccessful, asking questions. For example, the researcher’s grandmother, a master weaver, taught each of us one way of preparing the medium and of weaving because she only learned and used that one method of weaving. However, the researcher’s aunt, herself a master weaver, given the chance to experiment and be creative has innovated different weave patterns and styles.

The “What comes next?” game is conducive to explaining integrative culture-based STEM approaches to teaching and learning. The researcher could present students with the image in, and ask them to tell the researcher what comes next. The researcher could then connect pattern recognition to recursive behaviors of the weave pattern.

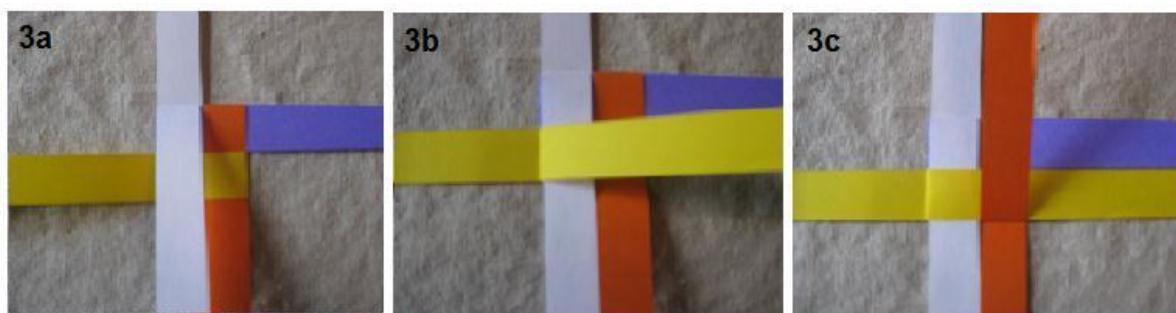


Figure 5 What comes next? with weaving

Weaving requires the use of natural materials, from a Native Hawaiian perspective, the most predominantly used medium is called *lauhala*, or the leaf of the pandanus tree. Therefore,

this unit can also incorporate plant and soil biology, sun travel patterns, energy gained from the sun, and material fatigue. Similar to this unit on weaving, a master farmer could teach learners using the same teaching methods and expecting the learners to acquire knowledge, skills, and experiences about farming in a similar fashion to weaving.

This illustrates another limitation to indigenous teaching, which is the lack of note taking on the part of the learner. All learners, from a Native Hawaiian perspective, are expected to retain information mentally rather than making note and diagrams because many master teachers follow the practice of oral traditions.

Theoretical Foundation of Professional Development

Eun (2011) condenses Vygotsky's theory of human development to two key concepts, mediation and internalization. He also characterizes each as why development occurs and how development occurs, respectfully. Vygotsky's (1978) theory posits that all development occurs as social interaction that requires mediating, and learning develops because of internalization. These two tenets, mediation and internalization, are clearly expressed in Vygotsky's general genetic law of cultural development and the zone of proximal development (ZPD).

Through the general genetic law of cultural development, Vygotsky claims that higher mental processes derive from social interaction (mediation) and then become individual cognitive function (internalization) (Eun, 2011). A person's ZPD is the difference between what can be learned autonomously and what can be learned with the aid of a more knowledgeable other. In other words, a more knowledgeable person will mediate a learner's interaction with symbolic mediators, such as knowledge and skills, and external mediators, such as tools, and sustain that learner's use of these mediators until the knowledge, skills, and tools are internalized. The internalization of the mediators are done in such a way that the learner can

now perform the new learning independently, so that a person's ZPD is constantly changing as she comes to master development.

Standards for Professional Development

The National Staff Development Council's (NSDC) Standards for Professional Learning provide seven "characteristics of professional learning that leads to effective teaching practices, supportive leadership, and improved student results" (Learning Forward, 2014). Additionally, NSDC identifies four prerequisites for effective professional development that are "so fundamental that the standards do not identify or describe them" (Learning Forward, 2011, p. 42). The first prerequisite, "educators' commitment to students, *all* students, is the foundation of effective professional learning" (p. 42) supports multicultural education (Banks J. A., 2004; Nieto, 2004), culturally responsive teaching (Gay, 2010; Klump & McNeir, 2005), and culture-based education (Kana'iaupuni & Kawai'ae'a, E Lauhoe Mai Nā Wa'a: Toward a Hawaiian Indigenous Education Teaching Framework, 2008) and their commitment to the education of culturally diverse students regardless of race, ethnicity, and socioeconomic status. The second prerequisite is that "each educator involved in professional learning comes to an experience ready to learn" (p. 42). Guskey (1995) emphasizes the need for "finding the optimal mix" (p. 116) regarding professional development, meaning that for teachers to come to a professional learning experience ready to learn, leadership must make efforts to provide "professional development processes and technologies that work best in a particular setting" (p. 117). The third prerequisite states that "because there are disparate experience levels and use of practice among educators, professional learning can foster collaborative inquiry and learning that enhances individual and collective performance" (p. 42). This third prerequisite complements the Native Hawaiian education cycle which is a lifelong process and a community endeavor

because “a healthy and responsive learning community is the ultimate goal” (Native Hawaiian Education Council, 2002, p. 3), which places everyone in the learning community into a community of learners. Native Hawaiian education engages all learners in “activities independently or collaboratively with community members to perpetuate traditional ways of knowing (feeling, speaking, and doing), learning, teaching, and leading to sustain cultural knowledge and resources within the learning community” (p. 7). Likewise, Guskey (1995) recognizes the importance and necessity of collaborative learning as a means of support and a way to share the workload. The final prerequisite, like all learners, educators learn in different ways and at different rates, emphasizes andragogical practices of learner autonomy and differences in experiences (Malcolm S. Knowles and Associates, 1984). Additionally, culturally responsive teaching recognizes the differences between learners’ style and rate of learning (Saifer et al, 2004).

“Professional learning that increases educator effectiveness and results for all students occurs within learning communities committed to continuous improvement, collective responsibility, and goal alignment” (p. 42). This first standard reiterates the importance of community and collaborative learning. From the State of Hawai‘i Department of Education’s (HIDOE) perspective, learning communities are integral to continued professional learning and time should be given to professional learning communities to meet and discuss pertinent issues relating to students’ development, curricular decisions, and professional development. Consequently, the HIDOE schools with the Zones of School Innovation, namely the Nānākuli-Wai‘anae and KKP complexes, have created professional learning communities that meet weekly to discuss and resolve issues surrounding student achievement, curriculum, instruction, and assessment, and teacher professional development. At these meetings, teachers can request for

relevant and timely professional development in order to immediately address issues that might affect student learning.

“Professional learning that increases educator effectiveness and results for all students requires skillful leaders who develop capacity and advocate and create support systems for professional learning” (p. 42). Similarly, in the Native Hawaiian community, leaders are identified as leaders based on their commitment to the *Lāhui* (Native Hawaiian Nation) and the perpetuation of Native Hawaiians, their culture, and their cultural practices, their specific expertise, and their ability to act *pono*, with righteousness. Existing leadership, including complex area supervisors, principals, and vice principals, within the two HDOE complexes targeted by the researcher’s proposed research, would need increased focus on this professional learning standard because they failed to create relationships that honor the existing knowledge, skills, and experiences of their faculty, that respects the teachers’ work and the labor process of teaching (Smyth, 1995), and that “recognizes change as both an individual *and* organizational process” (Guskey, 1995, p. 119). Past KKP professional learning opportunities were scheduled simply to meet compliance or lacked the support necessary to sustain change in teacher practices. The lack of leadership support would prove detrimental to professional learning opportunities surrounding culture-based education and integrative STEM education for the following reasons:

- Without leadership support, professional learning would be completely voluntary and past experiences shows that when practices need to be dropped to accommodate non-negotiable initiatives, it is easiest to drop the voluntary development.
- Should leadership make professional learning mandatory, there will be no motivation on the part of the teachers because they were denied empowerment, lacked intrinsic and extrinsic motivation, and are not feeling cared for (Jones, 2009).

“Professional learning that increases educator effectiveness and results for all students requires prioritizing, monitoring, and coordinating resources for educator learning” (p. 42).

From a cultural perspective, educators who “maintain practices that perpetuate Hawaiian heritage, traditions, and language to nurture one’s *mauli*, life, and perpetuate the success of the whole learning community” (Native Hawaiian Education Council, 2002, p. 4), impacts student learning and engagement by:

1. Allowing students to engage in relevant cultural activities that they typically have an existing relationship;
2. Associating with friends who can provide healthy role models that will make a positive contribution to their cultural growth and development toward adulthood;
3. Interacting with *kūpuna*, elders, in a loving and respectful way that demonstrates an appreciation of their role as culture-bearers and educators in the community;
4. Gathering oral and written historical information from the local community and providing appropriate interpretation of its cultural meaning and significance; and
5. Engaging themselves regularly in appropriate cultural projects and experiential learning activities within the community (Native Hawaiian Education Council, 2002, p. 4).

These cultural practices demonstrate the Native Hawaiians’ understanding of community resources and the value of nurturing those community relationships as it pertains to student learning and achievement.

“Professional learning that increases educator effectiveness and results for all students uses a variety of sources and types of student, educator, and system data to plan, assess, and evaluate professional learning” (p. 42). Proven improvement to student outcomes occurs with

teachers' understanding of data and professional learning of how to implement and apply data in the classroom and in classroom instruction (Data Quality Campaign, 2014). The use of data is not only about student assessment data; it is about using all available data – student learning data, administrative data, and other classroom performance data – to “identify aggregate and individual student needs” (Data Quality Campaign, 2014, p. 2).

“Professional learning that increases educator effectiveness and results for all students integrates theories, research, and models of human learning to achieve its intended outcomes” (p. 42). These theories, research, and models of human learning do not only pertain to Western methods of instruction and instructional strategies. They also relate to Native Hawaiian ways of teaching and learning, as expressed earlier. Professional learning experiences should include cultural methods of teaching and learning based on the cultural groups students identify with in order to support students making connections with new concepts and new understandings (Kawai‘ae‘a, 2011). This professional learning standard is an important initiative in the Zones of School Innovation (ZSI), which makes the need for HIDOE to provide proficient professional development in the area of culturally responsive learning design (Gay, 2010; Saifer et al, 2004) immediate, especially when taking into account the demographics of the teachers typically assigned to the ZSI schools.

Traditionally, the Nānākuli-Wai‘anae complex area is the hardest to staff area in the HIDOE due to geographic location and preceding reputation regarding the behavior and demeanor of the students of this particular complex area. Consequently, Nānākuli-Wai‘anae is typically staffed with new to service teachers and Teach for America teachers. While the researcher does not have exact statistics, based on the researcher’s participation in providing this complex area with professional development surrounding teacher induction for new to service

teachers born and raised in Hawai‘i and culture acclimation training for Teach for America teachers and new to service teachers not born and raised in Hawai‘i, the researcher would estimate that at least 20 percent of the teachers in the Nānākuli-Wai‘anae complex would be categorized as new to service or Teach for America teachers. Also, based on the researcher’s discussion with faculty and staff at the complex offices, the complex finds it difficult to retain teachers, typically losing teachers after their three year probation period.

However, it is interesting to note that the KKP complex does not manage the same problems. Their teachers, on average, have at least seven years of service. Based on an informal survey the researcher conducted during the researcher’s professional learning experiences, it would seem that these teachers like remain with the complex for two reasons, they appreciate the *‘ano*, character, of the students and/or they live in the complex area. These observations and data amplifies the researcher’s conclusion that although the state is maintained by a single administration, the character of each complex area varies greatly.

Mathematics and science teachers are the hardest to fill in the HDOE, which is not an unusual statistic and trend in the nation (Sterling, 2004). Consequently, in the ZSI complexes the mathematics and science teachers tend to have the least number of years of service. Through the researcher’s experiences presenting for the Hawai‘i Council for Teachers of Mathematics, the Hawai‘i Science Teachers Association, and the Native Hawaiian Education Association, the researcher had the pleasure of meeting many of these mathematics and science teachers. Being newer teachers, they lack the knowledge, skills, and experience to teach the required content to a cultural group known for its poor performance. This amounts to the students with the greatest need being taught by teachers with the least amount of experience who are unable to appropriately differentiate while maintaining administrative requirements of assessing and

evaluating students, creating pacing guides, and developing lesson plans. These teachers require the most attention when it comes to receiving timely and relevant professional learning that will sustain change in their teaching practices.

“Professional learning that increases educator effectiveness and results for all students applies research on change and sustains support for implementation of professional learning for long-term change” (p. 42). Sustained change to teacher practice is the goal of professional learning because sustained change is what supports increases in student achievement and learning. For one school in the HDOE Zones of School Innovation, teachers’ greatest complaint is the lack of support for sustained change in teacher practice, as evidenced by the researcher’s work with the faculty of said school. The work that the researcher did within the complex areas provided the support these teachers expected and needed to be effective, regardless of the fact that providing this support was not related to our own program and purposes. However, to motivate teachers to participate in our programs, MSP provided them with the support they sought from their administration but did not receive.

“Professional learning that increases educator effectiveness and results for all students aligns its outcomes with educator performance and student curriculum standards” (p. 42). Teachers write student-friendly, measureable, and achievable learning outcomes that align with student curriculum standards to gauge student achievement. Shared learning outcomes provide students with definitive expectations and, using those expectations, can plan a course of action on attempting to fulfill those expectations (Chappuis, Stiggins, Chappuis, & Arter, 2012). Students who are provided learning outcomes prior to a given activity will have higher student achievement than students who are not privy to the learning outcomes (Raghubir, 1979). When student outcomes are created in collaboration with students, students’ achievement increases and

their accountability and responsibility for their own learning increases (Jones, 2009; Kinzer & Taft, 2012). Similar to the work teachers expend on creating meaningful learning outcomes aligned with student curriculum standards, professional learning opportunities should be created with learning outcomes aligned with educator performance standards, as well as student curriculum standards in order to increase educator effectiveness, which will result in increased student achievement. In addition, professional learning providers can increase teacher motivation by empowering teachers to collaboratively determine the professional learning outcomes. When teachers are invited to participate in the process, they can find the usefulness in the content and realize that the provider cares about their learning (Jones, 2009). When creating culture-based and integrative STEM content, because of its design-based nature, teachers could opt to create the overall learning outcome and have students collaboratively create the intermediate learning outcomes that must align with the overall learning outcome. Doing so empowers students and allows the teacher to retain control of some aspects of the project. Achieving this type of collaborative classroom requires teachers to invest time teaching their students how to create outcomes, how to work collaboratively, and how to create assessments that align with the learning outcomes. Activities, such as these, engages students in higher order thinking because they are analyzing the overall learning outcome, evaluating the knowledge and skills necessary to achieve the overall learning outcome, and creating learning outcomes of their own.

Models of Professional Development

Standards of professional development provide characteristics of effective professional development, and these characteristics help to determining different models of professional development. While there a many different models of professional development, research and

dissection of these different models show that all professional development models can be placed in one of three different classifications – standardized, site-based, and self-directed (Gaible & Burns, 2005).

Standardized models of professional development can be described as being for large groups of people learning one idea and/or theory and being taught by a more knowledgeable trainer. These types of professional development tend to be the model of choice because it is cost-effective since it can touch a large number of people at one time. Standardized models are typically completed in one session (length of the single session varies) which does not allow for individualization of the content and does not allow for follow up support. One variation of a standardized model is a cascade model, also known as a “train-the-trainer” model. This variation typically takes one or two champions of the content who will then train other members of the school.

The site-based model is similar to the standardized model in that it can work with large groups, in this case an entire school. However, it can also be used with smaller groups, such as professional learning communities. The differences between the two have to do with location, length of training, and content. As the name indicates, this model provides on-site training at the school, and therefore, affords the luxury of extended periods of training. Content provides the greatest difference because it can be dictated by the school, which means that administrators have the ability to allow the professional development to meet the needs of the teachers, students, and school.

The final model, self-directed is characterized by its name. It provides training and professional development that meets the needs of the individual. It offers little formal structure

or support, but requires individual metacognitive reflection and analysis. Action research is a typical self-directed professional development undertaking.

Professional Development Program. In September of 2011, Kauhale Kīpaipai (PAI), the Department of Public Education of Kamehameha Schools, introduced Keonepoko Elementary (KEO), a state of Hawai‘i Department of Education K-6 School located in Pāhoa, Hawai‘i and belonging to the Ka‘u-Kea‘au-Pāhoa (KKP) Complex, to the Moenahā School Program. The Moenahā School Program (MSP) is a professional development program aimed at supporting teachers’ development of cultural competence and providing teachers with the knowledge and skills of and experience with culturally responsive teaching. Focused on improving Hawaiian learner outcomes, Moenahā is a culture-based curriculum design and instructional method developed by Dr. Keiki Kawai‘ae‘a. It is “grounded in Hawaiian epistemology and supported by research to be effective with Hawaiian learners” (Kauhale Kīpaipai, 2011) and organizes and aligns curriculum, instruction, and assessment with standards and benchmarks.

MSP is organized around five phases as illustrated in Figure 6. Phases 1 and 2 encompass three parts – planning, implementing, and reviewing. In the planning portion, trainers focus on helping teachers develop a curriculum that “allows teaching and learning through the culture” (Kauhale Kīpaipai, 2011) and incorporates Hawaiian ancestral methods and strategies of learning using two Moenahā organizational templates – the *Kumu Kukui* and the *Lau Kukui*. The *Kumu Kukui* is a conceptual framework that describes how the intent of the teaching and learning reveals itself in the concept and content of the curriculum. The *Lau Kukui* is a specific template that incorporates and adapts 4MAT developed by Bernice McCarthy and is used for planning and preparing unit lessons aligned with the *Kumu Kukui*. The goal of the

planning portion is to provide teachers with the knowledge and skills to develop curriculum and instruction that teaches through Hawaiian culture, cultural practices, and language. During this phase, the teachers work closely with trainers to develop curricular units that they will implement in the second portion of Phases 1 and 2. This work entails teachers best applying their knowledge and skills learned in this initial workshops to the curricular units. These curricular units are then reviewed and evaluated by the MSP trainers against Moenahā curriculum development guidelines. Comments and suggestions are forwarded to the teachers, who then make necessary adjustments. This process continues until a unit is developed according to the Moenahā guidelines.

Teacher Support Model

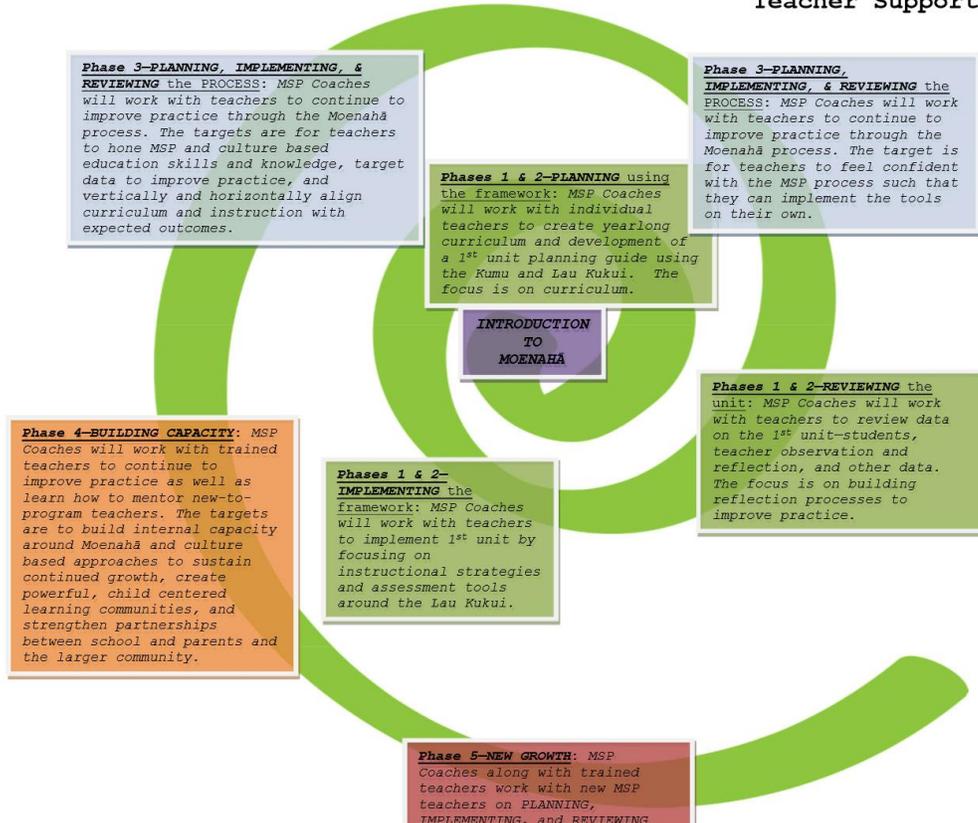


Figure 6 Moenahā Teacher Support Model

The implementing portion provides teachers with instructional strategies and assessment tools necessary for implementing the curriculum developed in the planning phase. McCarthy (2000) developed a method for learning called 4MAT that helps learners understand how they perceive and process information. Using 4MAT as a base, the *Lau Kukui* adapts 4MAT research to incorporate Hawaiian cultural stages of learning summarized as relationships, relevance, rigor, and responsibility. Teachers learn how to allow learning to be experienced, make learning meaningful by building on prior learning, create a supportive, yet challenging learning environment, and help students understand the importance of contributing their learnings and understandings to society in the hopes of improving it. Through observed implementation of developed units and lessons, teachers have the opportunity to experiment with and practice instructional strategies and assessment tools.

The final portion of Phases 1 and 2, reviewing, focuses on building reflection processes to improve teacher practice. In this portion, teachers and trainers work collaboratively to evaluate and assess developing cultural competence, as demonstrated by teachers' ability to apply the instructional strategies and assessment tools to the curriculum developed in planning and implement those strategies and tools in the observed lesson. Reflection and evaluation meetings typically occurs immediately after implementation and allows trainers to share with teachers their observations and to offer suggestions on next steps. In the days that follow, teachers might enact any suggestions made for next steps, or they might make note of them for future instruction. At the same time, trainers complete an evaluation rubric that is then shared with the corresponding teacher. Teachers review their evaluation and schedule a time to discuss the formal evaluation, typically via telephone conference.

Phase 3 incorporates all three parts – planning, implementing, and reviewing – to help teachers increase their self-efficacy in planning, implementing, and reviewing culturally responsive pedagogy and practices and to continue the development of their cultural competence. During this phase, teachers continue to improve their knowledge and skills at using and implementing Moenahā through continuing education via training workshops, repetitive practice with the process, multiple opportunities to implement instructional strategies and assessment tools, and systematic review of targeted data.

In Phase 4, MSP works with trained teachers to build capacity. While continuing to help teachers improve their practice, these teachers also train to become mentors and coaches to new-to-the program teachers. The goal for Phase 4 is to build internal capacity in order to continue to develop cultural competence of school-based teachers and to increase the culturally responsive teaching occurring within the school.

2.6 Summary

This research study focuses on the effects of a professional development program on culturally responsive teaching self-efficacy and cultural competence. As such, key to both culturally responsive teaching self-efficacy and cultural competence is the belief an individual has about herself. Consequently, a definition of belief, types of belief, and how belief is developed were provided. The relationship that belief has with self-efficacy and cultural competence were developed, while providing critical background information for both. Essential to self-efficacy is its theoretical background, nature, and source. With regards to cultural competence, it becomes important to describe a continuum of cultural competence and to provide a framework that can be used when determining the extent of and creating the program for professional development.

Professional development is the means for disseminating the knowledge and skills for culturally responsive teaching and cultural competence. A discussion of pedagogy and andragogy is central to professional development because learning maturity requires different approaches and strategies. Planning and program development is complete when program administrators determine how to implement best practices of professional development to match the professional development model chosen by the teachers and administrators. The literature review for this research study provides necessary knowledge regarding principal components in answering the identified research questions.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This quantitative research study described the degree of culturally relevant teaching self-efficacy and level of cultural competence of upper elementary STEM educators within the KKP complex area, which has a prevalent concentration of Native Hawaiian students. It specifically described the degree of self-efficacy and level of competence of educators afforded MSP knowledge and experience and those educators who were not afforded MSP knowledge and experience. This chapter articulates how the research questions drive the design and outcome of the study, how the research design suggests the process of the study, and how the research method prescribes the individual procedures employed in the study.

3.2 Research Design

This research study was guided by the following research questions:

RQ1 - What is the degree of culturally responsive teaching self-efficacy of the STEM educator MSP participants?

RQ2 – What differences in the degree of culturally responsive teaching practices are identifiable between MSP participants and non-MSP participants?

RQ3 – To what extent do the STEM educator MSP participants exhibit cultural competence?

RQ4 – What differences are identifiable in the cultural competence exhibited by MSP participants and non-MSP participants?

In order to determine culturally responsive self-efficacy and cultural competence, the researcher utilized two instruments that capture information specifically aimed at teacher self-efficacy of culturally responsive teaching and at teacher cultural competence. This descriptive study generated primary data that describes the degree of culturally responsive teaching self-efficacy of STEM educator MSP participants and STEM educator non-MSP participants. Additionally, it also produced primary data that illustrates the level of cultural competence of STEM educator

MSP participants and STEM educator non-MSP participants. These data were collected using an electronic survey administered via the Internet using Qualtrics for Virginia Tech. The questions and prompts employed in the electronic survey are detailed later in the Instruments section.

This unfunded and unsponsored study employed a quasi-experimental design consisting of a control group dependent posttest design to collect and analyze data holistically and categorically to identify areas of higher and lower degrees of culturally responsive teaching, as well as higher and lower levels of cultural competence, using mean scores. It also utilized a non-parametric test, Mann Whitney *U* test (discussed in greater detail below) to identify areas of commonalities and disparities among major thematic classifications, also holistically and categorically.

Table 1 *Alignment of research questions, sources of data, and methods of analysis*

| Research Question | Source of Data | Method of Analysis |
|--------------------------|-----------------------|----------------------------|
| RQ1 | CRTSE | Mean scores |
| RQ2 | CRTSE | Mann Whitney <i>U</i> test |
| RQ3 | CCSAQ | Mean scores |
| RQ4 | CCSAQ | Mann Whitney <i>U</i> test |

MSP began in the fall of 2011 and continued its training through the 2014-15 school year. Consequently, the researcher collected and analyzed data from a completed training program, which prevented a random sampling of study participants and the administration of a pretest to adjust for possible initial group differences (Creswell, 2014).

3.3 Research Method

Institutional Review Board

An application was submitted to and approved by the Virginia Polytechnic Institute and State University’s Institutional Review Board (IRB). See Appendix A. As part of the application, the researcher submitted and received approval of a Teacher Consent Form (Appendix B) and two different Recruitment announcements (Appendices C and D). Different

recruitment announcements were created for the STEM teachers that have been afforded MSP knowledge and experiences and those that have not.

After receiving IRB approval, the research submitted an application for research with the HIDOE. As part of the application, the researcher submitted and received approval of the same Teacher Consent Form and the Targeted Schools Form. The application for research requested permission to contact teachers using the HIDOE system email and to receive the names of teachers teaching grades three through six at PAH. The research application was approved. See Appendix G.

Participants

The participants of this research study fell into two categories: the treatment group, STEM educators that have been afforded MSP knowledge and experiences (MSP), and the untreated control group, STEM teachers that have not been afforded MSP knowledge and experiences (Non-MSP).

MSP. At MSP's conception, PAI and KKP were already collaborating on different strategies of increasing student achievement of Native Hawaiian students within the complex area. HIDOE, in the 2011-2012 school year, served 182,705 students. Of these students, 19,334 students are classified as Special Education, 18,099 are English Language Learners, and 94,855 students are economically disadvantaged. Additionally, 50,548 of the students the HIDOE educates are Native Hawaiian or part-Native Hawaiian (see Table 2). These statewide statistics demonstrate the dire need for culturally responsive and culturally competent teachers in the HIDOE elementary and secondary schools.

Table 2 *Student Demographics - State*

| Demographics | Count | Percentage |
|----------------------------|--------------|-------------------|
| Special Education | 19,334 | 10.58% |
| English Language Learners | 18,099 | 9.91% |
| Economically Disadvantaged | 94,855 | 51.92% |
| Native Hawaiian | 50,548 | 27.67% |

The KKP Complex Area, as one of two Zones of School Innovation (ZSI), has demographic percentages that equal or exceed the state percentages, as seen in Table 3. ZSI were created as part of HIDOE’s application for *Race To The Top*.

Table 3 *Student Demographics – KKP Complex Area*

| Demographics | Count | Percentage |
|----------------------------|--------------|-------------------|
| Special Education | 893 | 13.32% |
| English Language Learners | 650 | 9.70% |
| Economically Disadvantaged | 5,047 | 75.29% |
| Native Hawaiian | 3,073 | 45.85% |

These zones “support regions with many of the state’s lowest performing schools. Schools in these zones benefit from greater flexibility and from state investments in curriculum, professional development, technology, teacher recruitment, and wraparound services such as medical care and nutrition education” (U.S. Department of Education, 2015). As the demographics indicate, this Complex Area supports an elevated number of culturally diverse students who would greatly benefit from teachers with higher self-efficacy of culturally responsive teaching and a higher degree of cultural competence.

Consequently, the KKP Complex Area Supervisor, in collaboration with KEO principal agreed to pilot MSP at KEO. The program anticipated a three-year pilot during which time one cohort would enter the program during each year, with the expectation that by the third year all teachers teaching grades three through six at KEO will received some amount of training in MSP.

The first cohort was named *Lehua* because this first group of teachers would be the trailblazers and creating the journey for their colleagues to follow - the *lā’au lehua*, *lehua* tree, is

one of the first plants to return after a lava flow and is a sturdy and hardy tree - included 11 teachers with various years of experience, from new, first year teachers through teachers who had been teaching 15 or more years. These 11 teachers came from grades three, four, and six.

The second cohort was named *Kupukupu* because they would grow from the *'ike*, knowledge, gained by MSP trainers and *Lehua* teachers – the *lā'au kupukupu*, the *kupukupu* fern (narrow sword fern or fishbone fern) is another plant that first begins to grow after a lava flow and it translates as to sprout or to grow – includes 12 teachers encompassing the remaining upper elementary teachers at KEO. These final 12 teachers could actually be divided into two separate cohorts because six of the teachers started in the second program year and the remaining six started in the year three. However, due to human and facility resources, the decision was made to combine the two groups and differentiate instruction as required.

Administrative leaders of PAI and KEO made a conscious choice to train only upper elementary teachers because the lower elementary teachers were already participating in a different professional development program.

Non-MSP. The KKP complex area houses a total of six elementary schools including KEO. They are, Pāhoā Elementary (PAH), Kea'au Elementary (KEO), Mountain View Elementary (MOU), Pahala Elementary (PAL), and Na'alehu Elementary (NAL). The upper elementary teachers from PAH were identified to participate because they teach within the KKP complex area and teach the same grade levels as the MSP group.

Due to the non-random sampling of the MSP group and the Non-MSP group, the research study found it necessary and important to control group characteristic differences to approximate “unbiased estimates of the effects of interest” (Stuart & Rubin, 2008, p. 155), and therefore, employed matching methods to support the elimination of those control units that were most

irrelevant (p. 156). The matching method occurred in two stages. First, the MSP and the Non-MSP groups were chosen prior to accessing and/or reviewing outcome data; and second, the outcome analysis estimated the treatment effects using the matched sample. This analysis was completed by examining urbanicity and demographic statistic using the School Status and Improvement Reports (see Appendix A) to adjust for differences and increase the efficiency of estimates (p. 168). Matching methods were chosen because it does not use the outcome values in the design of the study, and therefore “precludes the selection of a particular design to yield a desired result” (p. 157).

Recruitment. In late November of 2015, identified participants were invited to participate via electronic mailings of the respective Teacher Recruitment Announcements (Appendices C and D). The recruitment letter invited participants to a face-to-face meeting at a local hall to learn more about the research study, ask questions, and voice concerns. It also indicated that teachers willing to participate but unable to attend the face-to-face meeting should email the researcher to indicate their decision to participate and indicate their level of participation (i.e., MSP or Non-MSP). The letter clearly expressed the importance of sending their reply email from the email address they desired to use as their contact information for the extent of the study. Included in the letter was an explanation of survey access, which discussed how the survey could be accessed through the email invitation, could be completed during multiple sittings (meaning that participants could save their responses and continue at a later date) as long as it was finished by the deadline, and could be accessed and completed using any mobile device (e.g., phone or tablet).

At the face-to-face meeting, as participants arrived, they were asked to sign in with their desired email address indicating their level of participation (i.e., MSP or Non-MSP) and to sign a

Teacher Consent Form. The researcher provided participants with a brief description and intent of the study. See Appendix E. At that point, they were encouraged to ask questions and/or voice their concerns. Following the question and answer period, the researcher showed a video to demonstrate how to access the survey, how to respond to survey questions, how to save responses and return to the survey at another time, and how to finish and submit the survey. At the conclusion of the video, there was another opportunity for questions and answers. The meeting concluded with participants having the opportunity to complete the survey that evening using computers provided by the researcher or using their own mobile devices.

Selected participants unable to attend the face-to-face meeting were sent an email that provided them access to the survey tutorial video, and they were encouraged to watch the video if they had never completed an online survey or to refer to the video if they experienced any problems and/or issues while completing the survey. This email also provided them with access to the survey.

Survey logistics and format. Participants were given access to the survey for two weeks from 10 December through 24 December 2015. At the end of the first week and again with three days remaining, reminder emails that included the survey link were sent out to all of the participants. At the end of the two weeks, all responses were recorded. Incomplete survey responses were discarded and the remaining survey data were analyzed as described below.

Two surveys were created, one for the MSP and the second for the Non-MSP. Two separate surveys were created solely for the ability to distinguish between the two group responses. Therefore, all of the prompts, statements, and questions used in the survey, as well as the formatting of the survey were identical.

To enable electronic distribution and data collection, the surveys were transmitted using Virginia Tech's Qualtrics Research Suite (See Appendix F for the complete survey). The first 41 questions of the survey were the culturally responsive teaching self-efficacy appraisal inventory. Since these prompts allowed participants to identify any number between zero and 100, the 41 prompts were created using a slider response that allowed participants to move a slider to their desired efficacy rating between zero and 100. While the prompts were copied and pasted verbatim, the formatting of the questions differed from the original inventory because participants manipulated a slider to indicate their rating instead of writing a single number. However, while the format differed, the final response outcomes matched.

The next 56 items utilized a four-choice Likert scale, with the exception of one question that asked participants to write an open-ended response. The Likert scale questions varied between individual questions with four-choices and a matrix format with multiple questions and four-choices in table form for a total of 105 questions. When answering these questions, participants were only given the opportunity to select one choice as an answer. Questions were copied and pasted verbatim and question formatting was copied exactly as the original paper survey.

The final 13 questions varied in their formatting, where some were selected response and some required a written open ended answer. All questions were copied and pasted verbatim and question formatting was copied exactly as the original paper survey.

Instruments

This study employed the use of three instruments: The Culturally Responsive Teaching Self-Efficacy Appraisal Inventory (CRTSE), the Cultural Competence Self-Assessment

Questionnaire (CCSAQ), and the Cultural Competence Self-Assessment Scale Demographic Information (CCSASDI).

CRTSE. The CRTSE was developed by Siwatu (2007) as part of his research into pre-service teachers' culturally responsive teaching self-efficacy and outcome expectancy beliefs. This researcher received permission from Siwatu to use the instrument for this research study (See Appendix A). Siwatu (2007) developed the CRTSE guided by the theoretical and empirical research on self-efficacy and outcome expectancy beliefs and the culturally responsive teaching competencies (p. 1086). Teachers self-identify their ability to perform “specific teaching practices and tasks that are associated with teachers who have adopted a culturally responsive pedagogy. The scale consists of 41 Likert-type items in which participants are asked to rate how confident they are in their ability to engage in specific culturally responsive teaching practices...by indicating a degree of confidence ranging from 0 (no confidence at all) to 100 (completely confident)” (Siwatu, 2007, p. 1091).

A principal component factor analysis was also completed on the CRTSE. While a varimax rotation of the 41 items “yielded seven factors with eigenvalues greater than one...a scree test suggested that two or three factors could be extracted” (Siwatu, 2007, p. 1092). Since a multiple-factor solution was not interpretable, a one-factor solution, accounting for 44 percent of the total explained variance, was used. Additionally, the internal reliability of the CRTSE was 0.96, as measured by Cronbach's alpha.

By summing participant responses for all 41 items and dividing by the number of items, the researcher generated a CRTSE strength index. Higher indices demonstrated teachers with more confidence in their ability, while lower indices indicated teachers will less confidence in

their culturally responsive teaching ability. The teachers' CRTSE strength index directly relates to the desired outcome of research question RQ1 and RQ2.

The CRTSE was selected for use in this research study because the study involved understanding the confidence of enacting culturally responsive teaching practices by the participants and not teacher dispositions related to motivation for implementing and/or value of understanding culturally responsive teaching practices. Culturally responsive teaching practices have been identified as important to teacher and student success in the complex area where study participants currently work.

The CRTSE has been used in previous studies involving pre-service and in-service teachers. These studies occurred in universities located in the Midwest and Southwest, and in a Midwestern school district. The studies involving pre-service teachers sought to determine relationships between coursework/programs and culturally responsive teaching self-efficacy. The intent of the study involving in-service teachers was to determine if there was a relationship between pedagogical beliefs, instructional practices, and student outcomes. This current research study seeks to involve in-service teachers with varied years of service to determine if there are progression differences between a professional development program and culturally responsive teaching self-efficacy.

CCSAQ. Mason (1995) developed the CCSAQ for the Portland Research and Training Center based on the Child and Adolescent Service System Program Cultural Competence Model of Cross, Bazron, Dennis, and Isaacs (1989). The CCSAQ has been applied to a variety of human service disciplines, including education (p. 4), and "the goal of the instrument is to evaluate the degree to which respondents were exhibiting [culturally competent] appropriate behaviors" (p. 7). This measure can be utilized in multiple ways to improve "service delivery to

culturally diverse populations” and identify “cross-cultural strengths” (p. 4). The CCSAQ comes in two versions, and this research study utilized the direct service provider version, since teachers are a direct service provider. It provides a general score based on six subscales: “knowledge of community [questions 1-15], personal involvement [16-24], resources and linkages [25-37], staffing [38-49], organizational policies and procedures [50-52], and reaching out to communities [53-56]. When analyzed and ranked, the subscales provide information to an organization for establishing training and/or policy and procedural priorities. When examined individually, a “subscale can suggest behaviors congruent with the cultural competence model or assess the degree to which specific behaviors routinely occur” (p. 6).

The internal reliability of the CCSAQ was 0.80 or higher for all subscales, except the personal involvement subscale, which was 0.60. Mason (1995) conducted “extensive reviews and consulted with acknowledged experts to define subscales, identify item content, and refine item wording” (p. 7) when verifying content validity.

Descriptive statistics, primarily computation of item averages and subscale means, are used when scoring the CCSAQ. These statistics can be used to rank individual items and subscales to determine areas of higher and lower levels of cultural competence. Additionally, comparisons between items and subscales can be computed using tests of significance in order to identify correlations between responses.

The CCSAQ has been used in previous studies in the education and healthcare industries. These studies occurred in California, Georgia, Maryland, Massachusetts, Michigan, Ohio, Pennsylvania, and other Northeastern states. The studies involving the education industry sought to determine relationships between coursework/programs and cultural competence. The studies involving the healthcare industry determined if there was a relationship between service

provider-client interaction and cultural competence. This current research study takes place in the education industry and seeks to determine if there are progression differences between a professional development program and cultural competence.

CCSASDI. The purpose of the CCSASDI was to collect demographic and educational information pertaining to the participants. Included in the questionnaire are items eliciting information concerning their gender, racial background, age, marital status, highest level of education completed, professional affiliation, position and experience within the school, the number of professional development trainings and workshops related to cultural competence attended, knowledge of cultural diversity serviced, experiences related to foreign travel, and languages spoken. Demographic and education information was collected for identification of possible limiting and influencing factors and for use in focusing on specific factors in future research studies.

3.4 Data Collection Procedures

Data from the CRTSE, the CCSAQ, and the CCSASDI were collected using an electronic survey administered via the Internet. Using Virginia Tech Qualtrics and the CRTSE, CCSAQ, and CCSASDI, all questions and prompts were input with strict adherence to the original question and prompt format and wording (See Appendix F). MSP and Non-MSP participant emails were input into the Virginia Tech Qualtrics Mailer, and it was used to distribute the survey beginning on 10 December 2015. Both groups received the survey link at the same time and were provided with the same opportunity to complete the survey. The survey link remained active for two weeks ending on 24 December 2015.

The electronic survey was designed to allow participants to complete parts of the survey, save it, and continue at a later time and/or date. Participants were allowed to move back and

forth within all parts of the survey. Survey results were collected by and stored with Virginia Tech Qualtrics. Incomplete surveys, i.e., surveys where questions were left unanswered, at the conclusion of the survey period were discarded from the research data.

Researcher Role

The researcher was previously a member of the MSP training group, having worked for PAI for three years. Her time was spent on two fronts. First, she worked collaboratively with the MSP team to develop the curriculum, instruction, and assessment for the program. Second, she worked as part of the MSP training team, as both a presenter of the professional development content and a teacher coach. In her capacity as a presenter, she collaborated with the training team to develop the content of each training workshop, organized the logistics related to scheduling and hosting each training workshop, and facilitated and presented workshop content. As a teacher coach, the researcher worked with four specific teachers, two fourth grade teachers and two sixth grade teachers, supporting their development of unit curriculum through evaluative feedback of written and delivered curriculum. This support included multiple individual meetings to collaborate on curricular ideas and content, multiple observations of curricular implementation, and multiple written evaluations of the curriculum and instruction.

As one of the developers of the content and context of MSP, the researcher has direct knowledge and understanding of the complete program, as well as strong, continuing relationships with the other members of the MSP team. This comprehensive understanding provides her with robust understanding of the program's learning objectives and outcomes. It additionally provides her with unfettered access to the knowledge, skills, and experiences of the MSP team and their work with the MSP participants. These relationships, while providing the

researcher with valuable information, are accounted for by ensuring that the findings and data included for this research study encompasses actual participant data.

As one member of the MSP training team, the researcher formed strong relationships with the *Lehua*, or first, cohort. She makes a concerted effort to disengage herself from direct interaction with the participants to allow them to provide the feedback and data that they want to share as part of this research study. These efforts include physically removing herself from the face-to-face survey time and the use of an unbiased, non-MSP related presenter for the face-to-face meeting.

3.5 Data Analysis

Descriptive Analysis

Individual teachers' CRTSE. Culturally responsive teaching self-efficacy for specific items for individual teachers were self-determined by their individual scores. An individual's strength index for culturally responsive teaching was determined by individual tabulated means. This index represented culturally responsive teaching self-efficacy. The higher the index, the higher the culturally responsive teaching self-efficacy. Higher scores indicated "more [confidence] in ability" to practice culturally responsive teaching than those with lower scores indicating they "were less confident in their abilities" (Siwatu, 2007, p. 1091).

Standard deviation (σ) is the square root of variance (σ^2), and variance was calculated by first subtracting the mean from each data point and squaring the result, then calculating the mean of the squared differences. Standard deviation described the spread of scores within a data set, where a low standard deviation indicates that the data is close to the measure of central tendency, in this case the mean (McMillan, 2012).

Group CRTSE. Item specific scores were used to calculate group means to demonstrate differences between groups. Group means were calculated for specific items and total scores. Standard deviation was also calculated for each group mean to determine the spread of each data set.

Individual teacher's CCSAQ. Cultural competence for specific items for individual teachers were self-determined by their individual scores. To determine a teacher's level of cultural competence for subscales, the mean and standard deviation were calculated using the responses from those particular questions. An individual's total score for cultural competence was determined by calculating the mean and standard deviation using scores from all CCSAQ questions. A higher score indicated higher confidence in her level of cultural competence. Standard deviation was used to determine the spread of the scores from the mean.

Group CCSAQ. Item specific scores were used to calculate group means to demonstrate differences between groups. Group means were calculated for specific items, cultural competence subscales, and total scores. Standard deviation was also calculated for each group mean to determine the spread of each data set.

Independent Test

To identify differences between two independent groups, an independent test was conducted. The sampling procedures of this research study prohibited the samples ability to meet three of the assumptions of an independent *t*-test, namely that of normal distribution, homogeneity of variances, and responses are not ordinal. Therefore, a Mann-Whitney *U* test was conducted to test for differences. The Mann-Whitney was chosen because the data meets the four assumptions that the dependent variable is measured at the ordinal or continuous level, the independent variable had two independent groups, each observation is independent of all other

observations, and the distribution will have either the same or different shape (Laerd Statistics, n.d.).

The Mann-Whitney used score ranks to evaluate the distribution of scores to determine if those scores have the same or different shape. The Mann-Whitney determined whether there were differences in distributions between the independent variables with different shapes or similarities in means between the independent variables with the same shape. These differences or similarities were calculated by ranking mean scores by size with the smaller scores receiving the smallest ranks. The null hypothesis (the mean scores for the CRTSE/CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) indicated that the distributions of the independent variables are equal, while the alternative hypothesis indicated that distributions are not equal.

The Mann-Whitney was calculated by carrying out the following procedure:

1. Arrange all observations in order of magnitude.
2. Under each observation, write down X or Y (or some other relevant symbol) to indicate which sample they are from.
3. Under each x write down the number of y s which are to the left of it (i.e., smaller than it); this indicates $x_i > y_j$. Under each y , write down the number of x s which are to the left of it (i.e., smaller than it); this indicates $y_j > x_i$.
4. Add up the total number of times $x_i > y_j$ - denote by U_x . Add up the total number of times $y_j > x_i$ - denote by U_y . Check that $U_x + U_y = n_x n_y$.
5. Calculate $U = \min(U_x, U_y)$.
6. Use statistical tables for the Mann-Whitney U test to find the probability of observing a value of U or lower. If the test is one-sided, this is your p -value; if the test is a two-sided test, double this probability to obtain the p -value.

NOTE: If the number of observations is such that $n_x n_y$ is large enough (>20), a normal

approximation can be used with $\mu_U = \frac{n_x n_y}{2}$, $\sigma_U = \sqrt{\frac{n_x n_y (N + 1)}{12}}$, where $N = n_x + n_y$

(Shier, 2004).

3.6 Summary

This research study utilized descriptive statistics and Mann-Whitney U scores to identify the degree of culturally responsive teaching self-efficacy and the level of cultural competence of teachers who were afforded the knowledge and skills of MSP and those who were not. The participants were identified because they were participants in MSP or because they taught grades three through six at PAH, a school with matched urbanicity with KEO. Due to the data being unable to meet the assumption of a normal distribution, homogeneous variance, and non-ordinal measures, differences were calculated using the Mann-Whitney U test. Descriptive statistics were calculated using mean scores and standard deviation.

CHAPTER 4: FINDINGS

4.1 Introduction

This chapter presents the analysis of the data collected from a composite electronic survey administered via the Internet and prepared for this study. The survey consisted of three sections. The first section, the CRTSE appraisal inventory, consisted of 41 Likert-type items in which participants were asked to rate their confidence in engaging in culturally responsive teaching practices. The second section, the CCSAQ, comprised of 56 four-choice Likert scale items (for a total of 105 questions) in which participants were asked to assess their knowledge of six subscales (knowledge of community, personal involvement, resources and linkages, staffing, organizational policies and procedures, and reaching out to communities. The final section, the CCSADI, contained 13 demographic and educational information items pertaining to the participants. The major findings reported in this chapter are the results of a holistic and categorical data analysis performed to answer this study's four research questions:

RQ1 - What is the degree of culturally responsive teaching self-efficacy of the STEM educator MSP participants?

RQ2 – What differences in the degree of culturally responsive teaching practices are identifiable between MSP participants and non-MSP participants?

RQ3 – To what extent do the STEM educator MSP participants exhibit cultural competence?

RQ4 – What differences are identifiable in the cultural competence exhibited by MSP participants and non-MSP participants?

The data analysis begins with the demographic data of each of the 43 participants. It is followed by the holistic and categorical data of each survey. The CRTSE data is presented first, followed by the CCSAQ data. In each of these respective sections, the data for the STEM Educator MSP participants is shared first, and the STEM Educator non-MSP participant data follows.

The final data presented will be the holistic and categorical data presentation is the comparative data. In this section, the data analysis of the Mann Whitney *U* test is documented with a comparative analysis between the STEM Educator MSP Participants and the STEM Educator non-MSP Participants. There is a holistic comparative analysis of the CRTSE and the CCSAQ, as well as a categorical comparative analysis of the CCSAQ subscales.

4.2 Purpose of the Study

The purpose of this study was to determine the preparedness of teachers in an existing professional development program aimed at training culturally responsive and competent teachers to transition from the learner to the teacher. It focused on the degree of self-efficacy these teachers currently possess related to culturally responsive teaching and the level of the same teachers have regarding cultural competence. A higher degree of culturally responsive teaching self-efficacy and a higher level of cultural competence are two necessary attributes for professional development and teacher learning facilitators with the objective of teaching teachers about culture-based education (Cross et al, 1989; Sareen et al, 2005). Additionally, this study had the potential to inform MSP trainers and PAI with necessary data to inform future curricular and workshop development. This study examined the supporting role of the MSP teacher development knowledge and experiences in the promotion of teacher culturally responsive teaching practices and cultural competence.

4.3 Participants of the Study

This research study focused on the culturally responsive teaching self-efficacy and cultural competence of upper elementary (grades three through six) STEM educators. These educators teach within the State of Hawai‘i’s Ka‘u-Kea‘au-Pāhoa (KKP) complex area, which has a prevalent concentration of Native Hawaiian students. The demographic data is presented

holistically and categorically, beginning with the MSP participants, followed by the non-MSP participants. This study collected demographic data using the CCSASDI.

There were 43 participants in this research study, three males and 40 females (see Table 4).

Table 4 *Participants - Gender*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| Male | 2 | 1 | 3 |
| Female | 21 | 19 | 40 |
| Total | 23 | 20 | 43 |

The races of these participants delineated as 10 Native Hawaiian/Part Native Hawaiian, 15 Asian/Pacific Islander, three Hispanic or Latin American, and 15 Caucasians (see Table 5). The participants' ethnicities (by group) were somewhat reflective of their respective school's student ethnicities, as indicated in Figures 7 and 8.

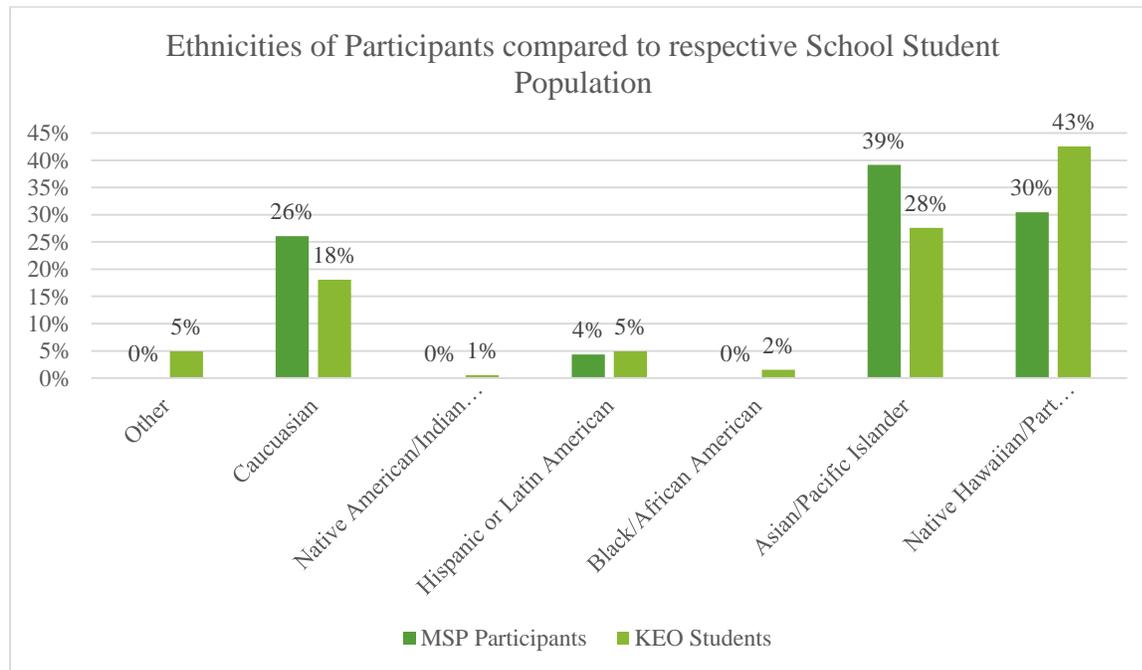


Figure 7 Ethnicities of MSP participants compared to their student population

The three largest ethnicities represented by both the MSP participants and the KEO student population were Native Hawaiian/Part Native Hawaiian (7 and 165), Asian/Pacific Islander (9

and 107), and Caucasian (6 and 70). While these same ethnicities were also highest for the non-MSP participants and the PAH student population, the most represented ethnicity for the non-MSP participants is Caucasian (9 and 115). Based on the demographics instrument, participants also appropriately ranked the highest ethnicities (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, and Caucasian) served by both schools, the ethnicities they were the most knowledgeable of (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, and Caucasian), and the ethnicities they socialize the most with (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, and Caucasian).

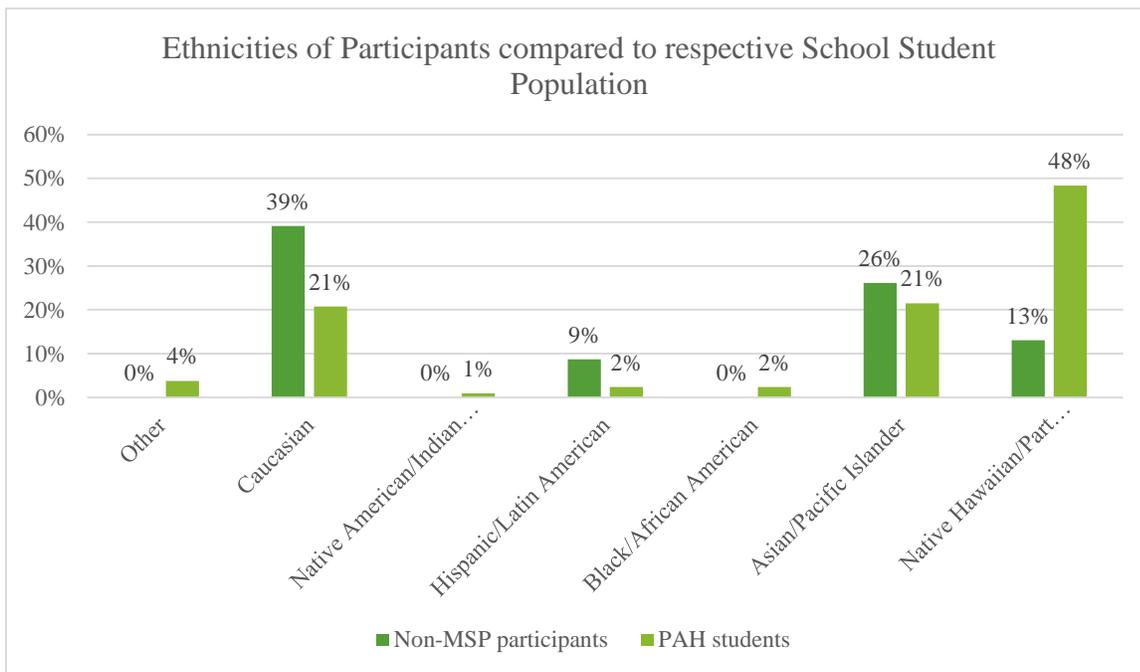


Figure 8 Ethnicities of non-MSP participants compared to their student population

Table 5 *Participants - Race*

| | MSP | Non-MSP | Total |
|--------------------------------------|-----|---------|-------|
| Native Hawaiian/Part Native Hawaiian | 7 | 3 | 10 |
| Asian/Pacific Islander | 9 | 6 | 15 |
| Black/African American | 0 | 0 | 0 |
| Hispanic or Latin American | 1 | 2 | 3 |
| Native American/Indian American | 0 | 0 | 0 |
| Caucasian | 6 | 9 | 15 |
| Other | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

There were six participants within the 23-27 age range, seven within the 28-32 age range, 10 within the 33-37 age range, 12 within the 38-42 age range, four within the 43-47 age range, two within the 53-57 age range, and two within the 58-62 age range (see Table 6). The majority of the participants (90.7 percent) were below the age of 50. Twenty-two (out of 43) of the participants were between the ages of 32 and 42 (51.2 percent), with 30.2 percent younger than 32 and 18.6 percent older than 42. Thirteen of the participants (56.5 percent) within this age range were from the MSP participants.

Table 6 *Participants - Age*

| | MSP | Non-MSP | Total |
|-------|-----|---------|-------|
| 18-22 | 0 | 0 | 0 |
| 23-27 | 3 | 3 | 6 |
| 28-32 | 4 | 3 | 7 |
| 33-37 | 6 | 4 | 10 |
| 38-42 | 7 | 5 | 12 |
| 43-47 | 2 | 2 | 4 |
| 48-52 | 0 | 0 | 0 |
| 53-57 | 1 | 1 | 2 |
| 58-62 | 0 | 2 | 2 |
| 62+ | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

All participants were licensed teachers, and there were 13 participants licensed and teaching between 0-4 years, 17 between 5-9 years, eight between 10-14 years, one between 15-19 years, one between 20-24 years, two between 25-29 years, and one between 30-34 years (see Table 7). With regards to years of teaching experience, the preponderance (88.4 percent) had less than 15 years of classroom experience.

Table 7 *Participants – Years licensed and teaching*

| | MSP | Non-MSP | Total |
|-------|-----|---------|-------|
| 0-4 | 7 | 6 | 13 |
| 5-9 | 11 | 6 | 17 |
| 10-14 | 3 | 5 | 8 |
| 15-19 | 0 | 1 | 1 |
| 20-24 | 1 | 0 | 1 |
| 25-29 | 0 | 2 | 2 |
| 30-34 | 1 | 0 | 1 |
| 35-39 | 0 | 0 | 0 |
| 40-44 | 0 | 0 | 0 |
| 45+ | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Regarding the number of years teaching at the current school, 28 teachers indicated teaching there between 0-4 years, nine between 5-9 years, two between 10-14 years, three between 20-24 years, and one between 30-34 years (see Table 8).

Table 8 *Participants – Years at current school*

| | MSP | Non-MSP | Total |
|-------|-----|---------|-------|
| 0-4 | 14 | 14 | 28 |
| 5-9 | 7 | 2 | 9 |
| 10-14 | 1 | 1 | 2 |
| 15-19 | 0 | 0 | 0 |
| 20-24 | 1 | 2 | 3 |
| 25-29 | 0 | 0 | 0 |
| 30-34 | 0 | 1 | 1 |
| 35-39 | 0 | 0 | 0 |
| 40-44 | 0 | 0 | 0 |
| 45+ | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Participants were asked to rank in order from most to least were the ethnicities (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, Black/African American, Hispanic or Latin American, Native American/Indian American, or Caucasian) they serve most. Native Hawaiian/Part Native Hawaiian students were ranked first by 26 participants, second by 13, fourth by two participants, and fifth by two participants (see Table 9).

Table 9 *Rank of students most served – Native Hawaiian/Part Native Hawaiian*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 14 | 12 | 26 |
| Second | 7 | 6 | 13 |
| Third | 0 | 0 | 0 |
| Fourth | 1 | 1 | 2 |
| Fifth | 1 | 1 | 2 |
| Sixth | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Asian/Pacific Islander students were ranked first by 14 participants, second by 27 participants, and third by two participants (see Table 10).

Table 10 *Rank of students most served – Asian/Pacific Islander*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 8 | 6 | 14 |
| Second | 15 | 12 | 27 |
| Third | 0 | 2 | 2 |
| Fourth | 0 | 0 | 0 |
| Fifth | 0 | 0 | 0 |
| Sixth | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Black/African American students were ranked third by one participant, fourth by 20 participants, fifth by 14 participants, and sixth by eight participants (see Table 11).

Table 11 *Rank of students most served – Black/African American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 0 | 0 |
| Third | 0 | 1 | 1 |
| Fourth | 11 | 9 | 20 |
| Fifth | 7 | 7 | 14 |
| Sixth | 5 | 3 | 8 |
| Total | 23 | 20 | 43 |

Hispanic or Latin American students were ranked second by one participant, third by eight participants, fourth by 11 participants, fifth by 16 participants, and sixth by seven participants (see Table 12).

Table 12 *Rank of students most served – Hispanic or Latin American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 1 | 1 |
| Third | 4 | 4 | 8 |
| Fourth | 3 | 8 | 11 |
| Fifth | 12 | 4 | 16 |
| Sixth | 4 | 3 | 7 |
| Total | 23 | 20 | 43 |

Native American/Indian American students were ranked third by three participants, fourth by three participants, fifth by nine participants, and sixth by 28 participants (see Table 13).

Table 13 *Rank of students most served – Native American/Indian American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 0 | 0 |
| Third | 1 | 2 | 3 |
| Fourth | 2 | 1 | 3 |
| Fifth | 3 | 6 | 9 |
| Sixth | 17 | 11 | 28 |
| Total | 23 | 20 | 43 |

Caucasian students were ranked first by four participants, second by six participants, third by 21 participants, fourth by four participants, fifth by two participants, and sixth by six participants (see Table 14).

Table 14 *Rank of students most served – Caucasian*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 1 | 3 | 4 |
| Second | 2 | 4 | 6 |
| Third | 12 | 9 | 21 |
| Fourth | 3 | 1 | 4 |
| Fifth | 1 | 1 | 2 |
| Sixth | 4 | 2 | 6 |
| Total | 23 | 20 | 43 |

Participants were also asked to rank in order from most to least were the ethnicities (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, Black/African American, Hispanic or Latin American, Native American/Indian American, or Caucasian) for which they are most knowledgeable. Native Hawaiian/Part Native Hawaiian students were ranked first by 17

participants, second by 15, third by five participants, fourth by two participants, fifth by three participants, and sixth by one participant (see Table 15).

Table 15 *Rank of students of which most knowledgeable – Native Hawaiian/Part Native Hawaiian*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 11 | 6 | 17 |
| Second | 9 | 6 | 15 |
| Third | 3 | 2 | 5 |
| Fourth | 0 | 2 | 2 |
| Fifth | 0 | 3 | 3 |
| Sixth | 0 | 1 | 1 |
| Total | 23 | 20 | 43 |

Asian/Pacific Islander students were ranked first by 13 participants, second by 16 participants, third by eight participants, fourth by one participant, fifth by two participants, and sixth by three participants (see Table 16).

Table 16 *Rank of students of which most knowledgeable – Asian/Pacific Islander*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 6 | 7 | 13 |
| Second | 10 | 6 | 16 |
| Third | 4 | 4 | 8 |
| Fourth | 1 | 0 | 1 |
| Fifth | 0 | 2 | 2 |
| Sixth | 2 | 1 | 3 |
| Total | 23 | 20 | 43 |

Black/African American students were ranked third by seven participants, fourth by 22 participants, fifth by six participants, and sixth by eight participants (see Table 17).

Table 17 *Rank of students of which most knowledgeable – Black/African American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 0 | 0 |
| Third | 4 | 3 | 7 |
| Fourth | 13 | 9 | 22 |
| Fifth | 4 | 2 | 6 |
| Sixth | 2 | 6 | 8 |
| Total | 23 | 20 | 43 |

Hispanic or Latin American students were ranked second by two participants, third by nine participants, fourth by 11 participants, fifth by 13 participants, and sixth by eight participants (see Table 18).

Table 18 Rank of students of which most knowledgeable – Hispanic or Latin American

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 2 | 2 |
| Third | 5 | 4 | 9 |
| Fourth | 8 | 3 | 11 |
| Fifth | 4 | 9 | 13 |
| Sixth | 6 | 2 | 8 |
| Total | 23 | 20 | 43 |

Native American/Indian American students were ranked second by three participants, third by one participant, fourth by five participants, fifth by 15 participants, and sixth by 19 participants (see Table 19).

Table 19 Rank of students of which most knowledgeable – Native American/Indian American

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 2 | 1 | 3 |
| Third | 1 | 0 | 1 |
| Fourth | 1 | 4 | 5 |
| Fifth | 11 | 4 | 15 |
| Sixth | 8 | 11 | 19 |
| Total | 23 | 20 | 43 |

Caucasian students were ranked first by 11 participants, second by six participants, third by 15 participants, fourth by three participants, fifth by three participants, and sixth by five participants (see Table 20).

Table 20 Rank of students of which most knowledgeable – Caucasian

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 5 | 6 | 11 |
| Second | 2 | 4 | 6 |
| Third | 7 | 8 | 15 |
| Fourth | 1 | 2 | 3 |
| Fifth | 3 | 0 | 3 |
| Sixth | 5 | 0 | 5 |
| Total | 23 | 20 | 43 |

The last ranking participants were asked to rank in order from most to least were the ethnicities (Native Hawaiian/Part Native Hawaiian, Asian/Pacific Islander, Black/African American, Hispanic or Latin American, Native American/Indian American, or Caucasian) with whom they have the most social contact. Native Hawaiian/Part Native Hawaiian students were ranked first by 17 participants, second by 10, third by 14 participants, and fourth by two participants (see Table 21).

Table 21 Rank of students with most social contact – Native Hawaiian/Part Native Hawaiian

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 9 | 8 | 17 |
| Second | 8 | 2 | 10 |
| Third | 6 | 8 | 14 |
| Fourth | 0 | 2 | 2 |
| Fifth | 0 | 0 | 0 |
| Sixth | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Asian/Pacific Islander students were ranked first by 19 participants, second by 16 participants, third by six participants, and fourth by two participants (see Table 22).

Table 22 Rank of students with most social contact – Asian/Pacific Islander

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 10 | 9 | 19 |
| Second | 9 | 7 | 16 |
| Third | 3 | 3 | 6 |
| Fourth | 1 | 1 | 2 |
| Fifth | 0 | 0 | 0 |
| Sixth | 0 | 0 | 0 |
| Total | 23 | 20 | 43 |

Black/African American students were ranked third by four participants, fourth by 25 participants, fifth by 11 participants, and sixth by three participants (see Table 23).

Table 23 *Rank of students with most social contact – Black/African American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 0 | 0 |
| Third | 0 | 4 | 4 |
| Fourth | 18 | 7 | 25 |
| Fifth | 3 | 8 | 11 |
| Sixth | 2 | 1 | 3 |
| Total | 23 | 20 | 43 |

Hispanic or Latin American students were ranked second by one participant, third by five participants, fourth by 11 participants, fifth by 19 participants, and sixth by seven participants (see Table 24).

Table 24 *Rank of students with most social contact – Hispanic or Latin American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 1 | 1 |
| Third | 4 | 1 | 5 |
| Fourth | 4 | 7 | 11 |
| Fifth | 12 | 7 | 19 |
| Sixth | 3 | 4 | 7 |
| Total | 23 | 20 | 43 |

Native American/Indian American students were ranked fourth by two participants, fifth by eight participants, and sixth by 33 participants (see Table 25).

Table 25 *Rank of students with most social contact – Native American/Indian American*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 0 | 0 | 0 |
| Second | 0 | 0 | 0 |
| Third | 0 | 0 | 0 |
| Fourth | 1 | 1 | 2 |
| Fifth | 4 | 4 | 8 |
| Sixth | 18 | 15 | 33 |
| Total | 23 | 20 | 43 |

Caucasian students were ranked first by five participants, second by 17 participants, third by 14 participants, fourth by two participants, fifth by four participants, and sixth by one participants (see Table 26).

Table 26 *Rank of students with most social contact – Caucasian*

| | MSP | Non-MSP | Total |
|--------|-----|---------|-------|
| First | 3 | 2 | 5 |
| Second | 7 | 10 | 17 |
| Third | 9 | 5 | 14 |
| Fourth | 0 | 2 | 2 |
| Fifth | 3 | 1 | 4 |
| Sixth | 1 | 0 | 1 |
| Total | 23 | 20 | 43 |

The final demographic data collected, displayed in Table 27, asked participants to identify the number of cultural awareness/competence workshops or conferences attended since 2000.

Table 27 *Number of cultural awareness/competence workshops or conferences attended*

| | MSP | Non-MSP | Total |
|-------|-----|---------|-------|
| None | 1 | 7 | 8 |
| 1-3 | 7 | 6 | 13 |
| 4-6 | 0 | 6 | 6 |
| 7-9 | 0 | 1 | 1 |
| 10+ | 15 | 0 | 15 |
| Total | 23 | 20 | 43 |

4.4 Instrumentation

CRTSE

Total Scores. Participant total scores were calculated by summing their responses to each of the 41 items. Table 28 provides the range of total scores, mean scores, and standard deviations by participant group.

Table 28 *CRTSE total mean scores and standard deviation for participants, by group.*

| | Range | M | SD |
|---------|-----------|--------|--------|
| MSP | 2167-3915 | 3331.0 | 465.97 |
| Non-MSP | 1780-3825 | 2855.5 | 615.18 |

The CRTSE was used to answer research question one, RQ1 What is the degree of culturally responsive teaching self-efficacy of the STEM educator MSP participants? Educators of a predominantly Native Hawaiian population and who participated in MSP training experiences had a mean score for culturally relevant teaching practices of 3331.0, which is 81.2 percent of the total possible score (4100). Their range of scores was 2167 (52.9 percent) through 3915 (95.5 percent). The CRTSE inventory does not provide a proficiency indicator that allows researchers using the inventory to identify a specific total score as higher or lower CRTSE. Consequently, a percent of the total was calculated to determine higher or lower proficiency similar to traditional K-12 grading practices. The analysis suggested that the MSP training knowledge and experiences support educator culturally responsive teaching practices. Educators of a predominantly Native Hawaiian population that participate in culturally responsive teaching professional development opportunities had higher culturally responsive teaching self-efficacy than those educators who did not – in this particular study, it was an increase of 16.7 percent.

The range of mean total scores for the non-MSP participants were 1780 (43.4 percent) through 3825 (93.3 percent), which indicates that there were participants, who were not afforded MSP knowledge and experience, who self-reported a higher degree of culturally responsive teaching self-efficacy. There were seven (out of 20) non-MSP participants who self-reported a self-efficacy of 75 percent or higher. This data demonstrates that some (35 percent) educators who teach predominantly Native Hawaiian students possess the knowledge and experiences of culturally responsive teaching practices without participating in MSP.

Item Specific Scores. Item specific mean scores were calculated to identify the knowledge and skills teachers had higher self-efficacies. Table 29 presents the mean scores and standard deviations for each CRTSE item by participant group. Each CRTSE item was analyzed

because the CRTSE was considered a one-factor solution. For the STEM Educator MSP Participants, teachers' self-efficacy was highest for the ability to develop a personal relationship with students ($M = 94.4$, $SD = 5.05$) and the ability to help students feel like important members of the classroom ($M = 92.5$, $SD = 10.77$), and lowest for the ability to greet English Language Learners with a phrase in their Native language ($M = 63.7$, $SD = 30.91$) and ability to praise English Language Learners for their accomplishments using a phrase in their Native language ($M = 64.1$, $SD = 28.61$). For the STEM Educator non-MSP Participants, teachers' self-efficacy was highest for the ability to help students feel like important members of the classroom ($M = 87.2$, $SD = 17.56$) and ability to develop a personal relationship with students ($M = 86.6$, $SD = 12.99$), and lowest for the ability to praise English Language Learners for their accomplishments using a phrase in their Native language ($M = 42.9$, $SD = 32.15$) and ability to use a learning preference inventory to gather data about how my students like to learn ($M = 46.4$, $SD = 31.43$).

Table 29 CRTSE item specific mean scores and standard deviation for participants, by group.

| Q# | CRTSE Items | MSP | | Non MSP | |
|----|--|----------|-----------|----------|-----------|
| | | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| 1 | Adapt instruction to meet the needs of my students | 81.3 | 11.87 | 70.4 | 19.68 |
| 2 | Obtain information about my students' academic strengths | 82.0 | 13.10 | 78.9 | 16.72 |
| 3 | Determine whether my students like to work alone or in a group | 85.2 | 21.24 | 79.1 | 18.88 |
| 4 | Determine whether my students feel comfortable competing with other students | 83.3 | 16.62 | 75.5 | 19.14 |
| 5 | Identify ways that the school culture (e.g., values, norms, and practices) is different from my students' home culture | 82.7 | 15.54 | 67.0 | 20.00 |
| 6 | Implement strategies to minimize the effects of the mismatch between my students' home culture and school culture | 73.1 | 18.31 | 61.1 | 23.70 |
| 7 | Assess student learning using various types of assessments | 80.7 | 15.22 | 74.5 | 16.92 |

| | | | | | |
|----|--|------|-------|------|-------|
| 8 | Obtain information about my students' home life | 78.3 | 17.63 | 64.2 | 23.09 |
| 9 | Build a sense of trust in my students | 92.4 | 7.93 | 82.4 | 14.27 |
| 10 | Establish positive home-school relations | 87.3 | 9.33 | 80.5 | 17.96 |
| 11 | Use a variety of teaching methods | 87.0 | 10.72 | 77.1 | 16.01 |
| 12 | Develop a community of learners when my class consists of students from diverse backgrounds | 83.3 | 14.08 | 74.9 | 18.32 |
| 13 | Use my students' cultural background to help make learning meaningful | 87.9 | 13.82 | 79.8 | 15.21 |
| 14 | Use my students' prior knowledge to help them make sense of new information | 87.1 | 10.58 | 78.3 | 12.99 |
| 15 | Identify ways how students communicate at home may differ from the school norms | 82.7 | 10.58 | 66.1 | 18.69 |
| 16 | Obtain information about my students' cultural background | 85.0 | 12.65 | 72.0 | 20.21 |
| 17 | Teach students about their cultures' contributions to science | 73.3 | 22.0 | 63.3 | 24.09 |
| 18 | Greet English Language Learners with a phrase in their native language | 63.7 | 30.91 | 49.6 | 31.95 |
| 19 | Design a classroom environment using displays that reflects a variety of cultures | 75.7 | 19.66 | 61.4 | 33.20 |
| 20 | Develop a personal relationship with my students | 94.4 | 5.05 | 86.6 | 12.99 |
| 21 | Obtain information about my students' academic weaknesses | 84.6 | 13.26 | 82.0 | 12.07 |
| 22 | Praise English Language Learners for their accomplishments using a phrase in their native language | 64.1 | 28.61 | 42.9 | 32.15 |
| 23 | Identify ways that standardized tests may be biased towards linguistically diverse students | 71.2 | 22.36 | 55.2 | 34.03 |
| 24 | Communicate with parents regarding their child's educational progress | 85.9 | 12.44 | 81.9 | 15.80 |

| | | | | | |
|----|--|-------|-------|------|-------|
| 25 | Structure parent-teacher conferences so that the meeting is not intimidating for parents | 82.3 | 16.58 | 75.9 | 23.65 |
| 26 | Help students to develop positive relationships with their classmates | 86.96 | 8.51 | 77.2 | 22.85 |
| 27 | Revise instructional material to include a better representation of cultural groups | 76.1 | 23.37 | 67.5 | 27.69 |
| 28 | Critically examine the curriculum to determine whether it reinforces negative cultural stereotypes | 78.8 | 21.46 | 60.4 | 30.18 |
| 29 | Design a lesson that shows how other cultural groups have made use of mathematics | 74.9 | 22.92 | 52.3 | 27.78 |
| 30 | Model classroom tasks to enhance English Language Learners' understanding | 79.3 | 21.31 | 61.7 | 29.50 |
| 31 | Communicate with the parents of English Language Learners regarding their child's achievement | 70.1 | 26.09 | 59.5 | 29.84 |
| 32 | Help students feel like important members of the classroom | 92.5 | 10.77 | 87.2 | 17.56 |
| 33 | Identify ways that standardized tests may be biased towards culturally diverse students | 72.5 | 22.10 | 52.8 | 33.83 |
| 34 | Use a learning preference inventory to gather data about how my students like to learn | 72.7 | 29.21 | 46.4 | 31.43 |
| 35 | Use examples that are familiar to students from diverse backgrounds | 80.3 | 19.52 | 60.6 | 30.34 |
| 36 | Explain new concepts using examples that are taken from my students' everyday lives | 85.8 | 11.55 | 77.2 | 21.51 |
| 37 | Obtain information regarding my students' academic interests | 85.9 | 13.35 | 75.8 | 18.35 |
| 38 | Use the interests of my students to make learning meaningful to them | 88.6 | 12.02 | 78.7 | 20.58 |
| 39 | Implement cooperative learning activities for those students who like to work in groups | 84.2 | 16.28 | 81.7 | 12.64 |

| | | | | | |
|----|--|------|-------|------|-------|
| 40 | Design instruction that matches my students' developmental needs | 85.7 | 15.62 | 75.6 | 19.90 |
| 41 | Teach students about their cultures' contributions to society | 81.8 | 17.71 | 66.7 | 26.63 |

There were identifiable differences between the item mean scores for all 41 CRTSE inventory items (refer to Table 34). The MSP participants, who teach predominantly Native Hawaiian students, had a higher mean score for all 41 CRTSE inventory items than the non-MSP participants, who teach predominantly Native Hawaiian students, which further corroborates the hypothesis that the MSP training knowledge and experiences support teacher culturally responsive teaching practices.

The STEM educator non-MSP participants scored below 80 percent for 34 of the 41 (82.9 percent) CRTSE inventory items as compared to 14 out of 41 (34.1 percent) for the STEM educator MSP participants. The STEM educator non-MSP participants “require a more thorough knowledge of the specific cultures of different ethnic groups, how they affect learning behaviors, and how classroom interactions and instruction can be changed to embrace these differences” (Gay, 2002, p. 114).

CCSAQ

Total Scores. Participant total scores were calculated by summing their responses to each of the 105 questions. Table 30 provides the total mean scores and standard deviations by participant group. Participant total scores ranged from 1 to 4. Higher scores indicate a greater level of cultural competence.

Table 30 *CCSAQ total mean scores and standard deviation for participants, by group.*

| | <i>M</i> | <i>SD</i> |
|---------|----------|-----------|
| MSP | 2.36 | 0.38 |
| Non-MSP | 2.06 | 0.16 |

Research question three (RQ3: To what extent do the STEM educator MSP participant exhibit cultural competence?) was answered using the data collected and analyzed from the CCSAQ. The mean cultural competence score of the STEM educator MSP participants who predominantly taught Native Hawaiian students was 2.36. Scoring for the CCSAQ was on a scale of one to four, and Mason (1995) developed the CCSAQ based on the work of Cross et al (1989). Therefore, the mean score could be reconciled using their cultural competence continuum (see Figure 2). This continuum identifies six levels of cultural competence:

0. Culturally destructive: the purposeful destruction of culture,
1. Cultural incapacity: the lack of capacity to support minority groups,
2. Cultural blindness: all minority groups served with equal effectiveness,
3. Cultural pre-competence: recognition of weaknesses in serving minorities and attempting to improve,
4. Cultural competence: acceptance and respect for cultural differences, and
5. Cultural proficiency: holds culture in high esteem.

With a mean score of 2.36, the MSP participants would be between cultural blindness and cultural pre-competence, indicating that they are currently serving all minority groups equally, but are working at identifying the weaknesses of equitable teaching in order to improve.

Item Specific Scores. Item specific mean scores were calculated to identify the knowledge and skills teachers had higher cultural competence. Table 31 presents the mean scores and standard deviations for each CCSAQ item scores. These items are separated into their subscale categories. For the STEM educator MSP participants, teachers' cultural competence was highest for interacting with people of color within service area ($M = 3.7, SD = 0.56$) and for feeling safe within communities of color ($M = 3.5, SD = 0.59$), and lowest for knowledge of formal policy regarding soliciting input from ethnicities with respect to physical plant location and interior design ($M = 1.6, SD = 0.89$) and attending inter-agency coordination (IAC) meetings that impact service delivery in communities of color ($M = 1.7, SD = 0.88$). For STEM educator

non-MSP participants, teachers' cultural competence was highest for feeling safe within communities of color ($M = 3.8, SD = 0.44$) and interacting with people of color within your service area ($M = 3.6, SD = 0.60$), and lowest for attending inter-agency coordination meetings that impact service delivery in communities of color ($M = 1.2, SD = 0.37$) and knowledge of formal policy regarding the school taking referrals from non-traditional sources ($M = 1.2, SD = 0.70$).

Table 31 *CCSAQ item specific means scores and standard deviation for participants, by group.*

| Q# | CCSAQ Items | MSP | | Non-MSP | |
|--------------------------|---|----------|-----------|----------|-----------|
| | | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Knowledge of Communities | | | | | |
| 1 | How well are you able to describe the communities of color in your service area? | 3.0 | 0.77 | 2.9 | 0.59 |
| 2 | How well are you able to describe within-group differences? | 2.8 | 0.60 | 2.6 | 0.69 |
| 3 | How well are you able to describe the strengths of the ethnicities in your service area? | 2.9 | 0.42 | 2.5 | 0.61 |
| 4 | How well are you able to describe the social problems of the ethnicities in your service area? | 2.7 | 0.54 | 2.6 | 0.68 |
| 5a | To what extent do you know the unemployment rates within communities of color in your service area? | 2.3 | 0.76 | 2.1 | 0.79 |
| 5b | To what extent do you know the geographic locations within communities of color in your service area? | 2.7 | 0.82 | 2.4 | 0.88 |
| 5c | To what extent do you know the income differentials within communities of color in your service area? | 2.3 | 0.71 | 2.4 | 0.67 |
| 5d | To what extent do you know the educational attainment within communities of color in your service area? | 2.4 | 0.66 | 2.3 | 0.72 |
| 5e | To what extent do you know the birth/death rates within communities of color in your service area? | 1.8 | 0.60 | 1.8 | 0.79 |
| 5f | To what extent do you know the crime rates within communities of color in your service area? | 2.1 | 0.69 | 2.1 | 0.83 |
| 5g | To what extent do you know the homicide rates within communities of color in your service area? | 2.0 | 0.64 | 1.8 | 0.72 |
| 6a | To what extent to you know the social historians of color in your service area? | 1.9 | 0.73 | 1.9 | 0.64 |
| 6b | To what extent to you know the informal supports and natural helpers of color in your service area? | 2.2 | 0.72 | 2.0 | 0.73 |
| 6c | To what extent to you know the formal social service agencies of color in your service area? | 2.4 | 0.73 | 2.0 | 0.69 |

| | | | | | |
|----------------------|---|-----|------|-----|------|
| 6d | To what extent to you know the formal leaders of color in your service area? | 2.3 | 0.76 | 2.2 | 0.67 |
| 6e | To what extent to you know the informal leaders of color in your service area? | 2.3 | 0.75 | 2.1 | 0.67 |
| 6f | To what extent to you know the business people of color in your service area? | 2.4 | 0.66 | 2.3 | 0.66 |
| 6g | To what extent to you know the advocates of color in your service area? | 2.2 | 0.80 | 2.1 | 0.69 |
| 6h | To what extent to you know the clergy or spiritualists of color in your service area? | 2.2 | 0.72 | 2.2 | 0.88 |
| 7 | Do you know the prevailing beliefs, customs, norms and values of the ethnicities in your service area? | 2.3 | 0.78 | 2.6 | 0.68 |
| 8 | Do you know the social service needs within ethnicities that go unaddressed by the formal social service system? | 2.3 | 0.88 | 1.9 | 0.72 |
| 9 | Do you know of social service problems that can be addressed by natural networks of support within the ethnicities? | 2.1 | 0.69 | 1.9 | 0.64 |
| 10 | Do you know any conflicts between or within ethnicities in your service area? | 2.4 | 0.78 | 2.1 | 0.60 |
| 11 | Do you know the social protocol within communities of color? | 2.3 | 0.81 | 2.2 | 0.75 |
| 12 | Do you know how the causes of mental health/illness are viewed by the ethnicities in your area? | 2.1 | 0.79 | 1.7 | 0.66 |
| 13 | Do you understand the conceptual distinction between the terms “immigrant” and “refugee”? | 3.0 | 0.77 | 3.2 | 0.59 |
| 14 | Do you know what languages are used by the communities of color in your area? | 2.7 | 0.64 | 2.7 | 0.66 |
| 15 | Are you able to describe the common needs of people <i>of all colors</i> in your community? | 2.6 | 0.72 | 2.4 | 0.68 |
| Personal Involvement | | | | | |
| 16 | Do you attend cultural or racial group holidays or functions within communities of color? | 2.6 | 0.90 | 2.5 | 0.83 |
| 17 | Do you interact with people of color within your service area? | 3.7 | 0.56 | 3.6 | 0.60 |
| 18 | Do you attend school-based meetings that impact people of color in your service area? | 3. | 0.56 | 2.6 | 1.05 |
| 19 | Do you attend community forums or neighborhood meetings within communities of color? | 2.6 | 1.12 | 2.2 | 1.09 |
| 20 | Do you patronize businesses owned by people of color in your service area? | 2.1 | 1.10 | 2.7 | 1.30 |
| 21 | Do you pursue recreational or leisure activities within communities of color? | 3.3 | 1.06 | 3.0 | 0.97 |
| 22 | Do you feel safe within communities of color? | 3.5 | 0.59 | 3.8 | 0.44 |

| | | | | | |
|------------------------|---|-----|------|-----|------|
| 23 | Do you attend interagency coordination (IAC) meetings that impact service delivery in communities of color? | 1.7 | 0.88 | 1.2 | 0.37 |
| 24 | Do you attend community-or culturally-based advocacy group meetings within communities of color? | 1.8 | 0.90 | 1.6 | 0.89 |
| Resources and Linkages | | | | | |
| 25a | Does your agency work collaboratively with programs that provide employment training? | 2.3 | 1.06 | 2.0 | 1.10 |
| 25b | Does your agency work collaboratively with programs that provide educational opportunity? | 2.7 | 1.05 | 2.3 | 1.02 |
| 25c | Does your agency work collaboratively with programs that provide housing? | 1.7 | 0.83 | 1.6 | 0.76 |
| 25d | Does your agency work collaboratively with programs that provide alcohol/substance abuse treatment? | 1.7 | 0.83 | 1.5 | 0.76 |
| 25e | Does your agency work collaboratively with programs that provide maternal/child health services? | 2.2 | 1.03 | 1.7 | 0.81 |
| 25f | Does your agency work collaboratively with programs that provide public health services? | 2.3 | 0.86 | 1.7 | 0.88 |
| 25g | Does your agency work collaboratively with programs that provide juvenile justice services? | 2.0 | 0.82 | 1.4 | 0.50 |
| 25h | Does your agency work collaboratively with programs that provide recreation services? | 2.5 | 0.91 | 1.8 | 0.79 |
| 25i | Does your agency work collaboratively with programs that provide child welfare services? | 2.5 | 0.99 | 1.7 | 0.93 |
| 25j | Does your agency work collaboratively with programs that provide youth development services? | 2.7 | 0.93 | 1.9 | 0.97 |
| 26 | Does your agency have linkages with institutions of higher education (e.g., colleges, universities, or professional schools) that could provide you with accurate information concerning communities of color? | 2.1 | 0.81 | 2.2 | 0.81 |
| 27 | Does your agency have linkages with civil rights, human rights, or human relation groups that provide accurate information concerning populations of color? | 1.9 | 0.92 | 1.8 | 0.72 |
| 28 | Does your agency have linkages with the U. S. Department of the Census, local planners, chambers of commerce, or philanthropic groups who can provide you with accurate information regarding populations of color? | 1.9 | 0.76 | 1.7 | 0.67 |
| 29 | Does your agency publish or assist in the publication of information focusing on populations of color? | 1.8 | 0.83 | 1.4 | 0.49 |
| 30 | Has your agency conducted or participated in a needs assessment utilizing providers in communities of color as respondents? | 1.8 | 0.95 | 1.5 | 0.69 |

| | | | | | |
|----------|---|-----|------|-----|------|
| 31 | Has your agency conducted or participated in a needs assessment utilizing people of color as respondents? | 2.1 | 1.12 | 1.8 | 0.83 |
| 32 | Does your agency have linkages with advocates for communities of color who can give you reliable information regarding community opinions about diverse and important issues? | 2.1 | 0.87 | 1.6 | 0.68 |
| 33 | Does your agency conduct an open house or similar event to which you invite providers, consumers, and others concerned with service delivery to communities of color? | 2.2 | 1.11 | 2.0 | 0.92 |
| 34 | Does staff utilize cultural consultants who can help them work more effectively within a cultural context? | 2.6 | 1.12 | 2.2 | 1.04 |
| 35 | Does your agency utilize interpreters to work with non-English speaking persons? | 2.7 | 1.15 | 2.0 | 1.08 |
| 36 | Does your agency subscribe to publications (local or national) in order to stay abreast of the latest information about populations of color? | 1.8 | 0.78 | 1.5 | 0.61 |
| 37 | Does your agency compile books or culturally-related written materials regarding people of color? | 2.8 | 0.89 | 2.2 | 0.95 |
| Staffing | | | | | |
| 38 | Are there people of color on the staff of your agency? | 3.4 | 0.79 | 3.3 | 0.97 |
| 39a | Are there people of color represented in administrative positions? | 2.4 | 1.16 | 2.8 | 1.01 |
| 39b | Are there people of color represented in direct service positions? | 3.0 | 0.93 | 2.8 | 0.97 |
| 39c | Are there people of color represented in administrative support positions? | 2.7 | 1.10 | 2.6 | 1.05 |
| 39d | Are there people of color represented in operational support positions? | 3.0 | 0.98 | 2.7 | 1.08 |
| 39e | Are there people of color represented in board positions? | 2.4 | 1.12 | 2.6 | 0.99 |
| 39f | Are there people of color represented in agency consultants? | 2.5 | 0.99 | 2.1 | 1.02 |
| 39g | Are there people of color represented in case consultants? | 2.5 | 0.99 | 2.1 | 1.05 |
| 39h | Are there people of color represented in (sub)contractors? | 2.7 | 0.93 | 2.2 | 1.01 |
| 40a | Does your agency hire natural helpers or other non-credentialed people of color as para-professionals? | 3.3 | 0.92 | 2.4 | 1.10 |
| 40b | Does your agency hire practicum students or interns of color? | 3.0 | 1.02 | 2.4 | 1.14 |
| 40c | Does your agency hire out-station staff in communities of color? | 2.6 | 1.12 | 1.9 | 1.14 |
| 40d | Does our agency hire bilingual staff? | 3.0 | 0.85 | 2.6 | 1.15 |
| 41 | Does your agency prepare new staff to work with people of color? | 2.3 | 0.76 | 1.7 | 0.66 |

| | | | | | |
|--|---|------|------|-----|------|
| 42 | Does your agency provide training that help staff work with people of color? | 2.3 | 0.81 | 1.7 | 0.75 |
| 43 | Does your agency emphasize active recruitment of people of color for staff positions? | 2.4 | 1.20 | 2.0 | 1.00 |
| 44 | How well has your agency been able to retain people of color on the staff? | 3.0 | 0.77 | 2.7 | 0.98 |
| 45 | Does your agency staff routinely discuss barriers to working across cultures? | 2.3 | 0.82 | 2.0 | 0.97 |
| 46 | Does your agency staff routinely discuss their feelings about/of working with consumers/co-workers of color? | 1.8 | 0.85 | 1.4 | 0.60 |
| 47 | Does agency staff routinely share practice-based “success stories” involving people of color? | 2.3 | 0.96 | 1.9 | 0.99 |
| 48 | Does your agency direct students of color towards careers in human service or related occupations? | 2.5 | 0.95 | 1.9 | 0.97 |
| 49 | Does your agency convene or reward activities that promote learning new languages relevant to the communities of color that the agency serves? | 2.0 | 0.95 | 1.9 | 0.93 |
| Organizational Policies and Procedures | | | | | |
| 50a | As a matter of formal policy, does your agency use culture-specific assessment instruments for diagnosis? | 2.2 | 1.28 | 1.6 | 1.23 |
| 50b | As a matter of formal policy, does your agency use culture-specific treatment approaches? | 2.0 | 1.20 | 1.5 | 1.10 |
| 50c | As a matter of formal policy, does your agency envision community empowerment as a treatment goal? | 1.96 | 1.14 | 1.4 | 0.99 |
| 50d | As a matter of formal policy, does your agency review case practice on a regular basis to determine relevancy to clients of color? | 1.7 | 1.07 | 1.3 | 0.92 |
| 50e | As a matter of formal policy, does your agency provide or facilitate childcare? | 2.0 | 1.35 | 1.8 | 1.33 |
| 50f | As a matter of formal policy, does your agency provide or facilitate transportation (e. g., bus tickets, ride-sharing)? | 2.1 | 1.24 | 1.8 | 1.32 |
| 50g | As a matter of formal policy, does your agency allow access after regular business hours (e. g., through message-beeper, agreements with crisis-providers, etc.)? | 1.8 | 1.15 | 1.6 | 1.23 |
| 50h | As a matter of formal policy, does your agency consider <i>culture</i> in service plans? | 2.1 | 1.04 | 1.7 | 1.26 |
| 50i | As a matter of formal policy, does your agency conduct outreach to community-based organizations, social service agencies, natural helpers, or extended families? | 2.0 | 0.88 | 1.6 | 1.05 |
| 50j | As a matter of formal policy, does your agency take referrals from non-traditional sources? | 2.0 | 1.19 | 1.2 | 0.70 |

| | | | | | |
|-----------------------------|---|-----|------|-----|------|
| 50k | As a matter of formal policy, does your agency translate agency materials into languages that reflect the linguistic diversity in your service area? | 2.3 | 1.22 | 1.5 | 1.00 |
| 50m | As a matter of formal policy, does your agency solicit input from ethnicities with respect to physical plant location and interior design? | 1.6 | 0.89 | 1.4 | 0.93 |
| 50n | As a matter of formal policy, does your agency advocate for a better quality of life for persons of color in addition to providing services? | 1.7 | 0.97 | 1.6 | 1.14 |
| 51 | In general, how well are policies communicated to agency staff? | 2.5 | 0.95 | 2.6 | 0.60 |
| 52 | Is information on the ethnicity or culture of clients specifically recorded in your organization management information system? | 2.2 | 0.95 | 2.0 | 0.73 |
| Reaching Out to Communities | | | | | |
| 53 | How well do you assure that the communities of color are aware of your program and the services and resources you offer? | 2.2 | 0.90 | 2.1 | 0.85 |
| 54a | Does your agency reach out to churches and other places of worship, clergy persons, ministerial alliances, or indigenous religious leaders in communities of color? | 1.9 | 1.01 | 2.0 | 1.12 |
| 54b | Does your agency reach out to medicine people, health clinics, doctors, dentists, chiropractors, naturopaths, herbalists, or midwives that provide services in or to members of communities of color? | 2.2 | 1.09 | 1.6 | 0.76 |
| 54c | Does your agency reach out to publishers, broadcast, or other media sources within communities of color? | 2.1 | 0.92 | 1.7 | 0.66 |
| 54d | Does your agency reach out to formal entities that provide services? | 2.4 | 0.94 | 1.6 | 0.68 |
| 54e | Does your agency reach out to cultural, racial, or tribal organizations where people of color are likely to voice complaints or issues? | 2.1 | 0.85 | 1.7 | 0.75 |
| 54f | Does your agency reach out to business alliances or organizations in communities of color? | 2.4 | 1.12 | 2.0 | 0.79 |
| 55 | Are people of color depicted on agency brochures or other media? | 3.1 | 1.06 | 3.6 | 0.60 |
| 56 | Does your agency participate in cultural, political, religious, or other events or festivals sponsored by communities of color? | 2.8 | 0.95 | 2.9 | 0.81 |

Both participant groups revealed highest mean scores for interacting with people of color within the service area and for feeling safe within communities of color. Both of these questionnaire items are from the Personal Involvement subscale. Elevated personal involvement

supports the continued development of cultural knowledge and cultural sensitivity (Cross et al, 1989). Additionally, both participant groups exhibited a lower mean score for attending inter-agency coordination meetings that impact service delivery in communities of color, also a Personal Involvement subscale questionnaire item. Although the second lowest indicated mean score questionnaire item is different, both are from the Organizational Policies and Procedures subscale. Policies and procedures outlining organizational beliefs and values provide a necessary foundation for the development and maintenance of cultural competence (Cross et al, 1989), hinting at the importance of participants familiarizing themselves with HIDEOE policies and procedures regarding cultural competence.

Subscale specific scores. Subscale specific mean scores were also calculated and ranked to identify the subscale that teachers had higher cultural competence. Table 32 provides mean scores and standard deviations for CCSAQ subscale scores. For STEM educator MSP participants, teachers’ cultural competence was highest for the personal involvement subscale ($M = 2.7, SD = 0.61$) and lowest for the organizational policies and procedures subscale ($M = 2.0, SD = 0.71$). For STEM educator non-MSP participants, teachers’ cultural competence was highest for the personal involvement subscale ($M = 2.6, SD = 0.53$) and lowest for the organizational policies and procedures subscale ($M = 1.6, SD = 0.43$).

Table 32 *CCSAQ subscale specific mean scores and standard deviation for participants, by group.*

| CCSAQ Subscale | MSP | | Non-MSP | |
|--|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Knowledge of community | 2.4 | 0.42 | 2.2 | 0.42 |
| Personal involvement | 2.7 | 0.61 | 2.6 | 0.53 |
| Resources and linkages | 2.2 | 0.54 | 1.8 | 0.45 |
| Staffing | 2.6 | 0.64 | 2.2 | 0.54 |
| Organizational policies and procedures | 2.0 | 0.71 | 1.6 | 0.43 |
| Reaching out to communities | 2.4 | 0.63 | 2.1 | 0.43 |

The CCSAQ provided six subscales that were also used to identify any similarities and/or differences identifiable in the cultural competence exhibited between MSP participants and non-MSP participants. Analysis of the subscale mean scores showed both groups have a higher level of cultural competence in Personal Involvement and a lower level cultural competence in Organizational Policies and Procedures. Upon further review of the data, the mean scores of both participant groups showed the same ranking of the subscales.

1. Personal involvement,
2. Staffing,
3. Knowledge of community.
4. Reaching out to communities,
5. Resources and linkages, and
6. Organizational policies and procedures.

The STEM educator MSP participants, of pre-dominantly Native Hawaiian students, had a higher level of cultural competence for all six subscales, validating the hypothesis that the MSP training knowledge and experiences support educator cultural competence of Native Hawaiians. Educators that participate in cultural competence professional development opportunities had higher cultural competence in knowledge of communities, personal involvement, resources and linkages, staffing, organizational policies and procedures, and reaching out to communities than those educators who did not participate in cultural competence professional development opportunities.

4.5 Mann-Whitney *U* Test

This study utilized a non-parametric Mann-Whitney *U* Test because it met the four required assumptions, as follows:

1. The dependent variables, culturally relevant teaching self-efficacy and cultural competence, are measured ordinally and continuously, respectively;
2. The independent variable consists of two categorical, independent groups, the STEM Educator MSP participants, and the STEM Educator non-MSP participants;
3. The observations of and within each group are independent; and

4. The two variables are not normally distributed due to the small sample sizes of each group.

The null hypothesis and alternative hypothesis for both tests are as follows:

H_0 : the mean scores for the CRTSE/CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal, and

H_a : the mean scores for the CRTSE/CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are not equal.

Each test utilized were two-tailed with a 0.05 significance level.

CRTSE

Total score. The data provided from the Mann-Whitney U test answered research question two (RQ2: What differences in the degree of culturally responsive teaching practices are identifiable between MSP participants and non-MSP participants?). Since one sample group had greater than 20 participants ($n_1 = 23$), the value of U approaches a normal distribution, therefore the null hypothesis can be tested using a z -test (for a two-tailed test, using a critical z -test statistic table value of 1.96). The test statistic for the Mann-Whitney U test was compared to the designated critical table value based on the sample size of each group's participant sample. The critical alpha value was set at 0.05 for this investigation. The p -value for the test (0.012) was determined to be smaller than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the culturally responsive teaching self-efficacy in STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants (see Table 33).

Table 33 *CRTSE total score Mann-Whitney U test statistics*

| | N | Mean Rank | Rank Sum | U | z | p |
|-----------------------|-----|-----------|----------|-----|-------|-------|
| STEM Educator MSP | 23 | 26.5 | 603 | 127 | -2.51 | 0.012 |
| STEM Educator non-MSP | 20 | 16.9 | 337 | 333 | 2.51 | 0.012 |

CRTSE item scores. Item specific scores were calculated using the Mann-Whitney U test. Each CRTSE item was analyzed because the CRTSE was considered a one-factor solution (Siwatu, 2007). The Mann-Whitney U test statistic for cultural responsive teaching self-efficacy in adapting instruction to meet the needs of students for the STEM Educator MSP participants ($\mu_1 = 81.3$, $U_1 = 158.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 70.4$, $U_2 = 301.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.082) was determined to be greater than 0.05, therefore the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in adapting instruction to meet the needs of students in the STEM Educator MSP and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in obtaining information about students' academic strengths for the STEM Educator MSP participants ($\mu_1 = 82.0$, $U_1 = 212.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 78.9$, $U_2 = 248.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.661) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in obtaining information about students' academic strengths in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in determining whether students like to work alone or in a group for the STEM Educator MSP participants ($\mu_1 = 85.1$, $U_1 = 173.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 =$

79.1, $U_2 = 287.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.165) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in determining whether students like to work alone or in a group in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in determining whether students feel comfortable competing with other students for the STEM Educator MSP participants ($\mu_1 = 83.3$, $U_1 = 165.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 75.5$, $U_2 = 295.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.114) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in determining whether my students feel comfortable competing with other students in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in identifying ways that the school culture (e.g., values norms, and practices) is different from students' home culture for the STEM Educator MSP participants ($\mu_1 = 82.7$, $U_1 = 121.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 67.0$, $U_2 = 338.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.008) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive

teaching self-efficacy in identifying ways that the school culture (e.g., values norms, and practices) is different from students' home culture in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in implementing strategies to minimize the effects of the mismatch between students' home culture and the school culture for the STEM Educator MSP participants ($\mu_1 = 73.1$, $U_1 = 153.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 61.1$, $U_2 = 306.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.063) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in implementing strategies to minimize the effects of the mismatch between students' home culture and the school culture in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in assessing student learning using various types of assessments for the STEM Educator MSP participants ($\mu_1 = 80.7$, $U_1 = 169.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 74.5$, $U_2 = 290.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.141) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in assessing student learning using various types of assessments in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in obtaining information about students' home life for the STEM Educator MSP participants ($\mu_1 = 78.3$, $U_1 = 141.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 64.2$, $U_2 = 319.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.030) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in obtaining information about students' home life in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in building a sense of trust in students for the STEM Educator MSP participants ($\mu_1 = 92.4$, $U_1 = 136.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 82.4$, $U_2 = 323.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.023) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in building a sense of trust in students in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in establishing positive home-school relations for the STEM Educator MSP participants ($\mu_1 = 87.3$, $U_1 = 182.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 80.5$, $U_2 = 277.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.248) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator

MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in establishing positive home-school relations in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using a variety of teaching methods for the STEM Educator MSP participants ($\mu_1 = 87.0$, $U_1 = 139.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 77.1$, $U_2 = 321.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.027) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in using a variety of teaching methods in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in developing a community of learners when the class consists of students from diverse backgrounds for the STEM Educator MSP participants ($\mu_1 = 83.3$, $U_1 = 167.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 74.9$, $U_2 = 292.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.128) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in developing a community of learners when the class consists of students from diverse backgrounds in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using my students' cultural background to help make learning meaningful for the STEM Educator MSP participants ($\mu_1 = 87.9$, $U_1 = 150.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 79.8$, $U_2 = 309.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.053) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating that the cultural responsive teaching self-efficacy in using my students' cultural background to help make learning meaningful in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using students' prior knowledge to help them make sense of new information for the STEM Educator MSP participants ($\mu_1 = 87.1$, $U_1 = 132.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 78.3$, $U_2 = 328.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.017) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in using students' prior knowledge to help them make sense of new information in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in identifying ways how students communicate at home may differ from the school norms and for the STEM Educator MSP participants ($\mu_1 = 82.7$, $U_1 = 126326.0$, $n_1 = 23$) and the STEM

Educator non-MSP participants ($\mu_2 = 66.1$, $U_2 = 96288.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.002) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in identifying ways how students communicate at home may differ from the school norms in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in obtaining information about students' cultural background for the STEM Educator MSP participants ($\mu_1 = 85.0$, $U_1 = 138.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 72.0$, $U_2 = 322.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.025) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in obtaining information about students' cultural background in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in teaching students about their cultures' contributions to science for the STEM Educator MSP participants ($\mu_1 = 73.3$, $U_1 = 172.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 63.3$, $U_2 = 287.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.162) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in teaching

students about their cultures' contributions to science in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic table value for the cultural responsive teaching self-efficacy in greeting English Language Learners with a phrase in their native language for the STEM Educator MSP participants ($\mu_1 = 63.7$, $U_1 = 178.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 49.6$, $U_2 = 281.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.210) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in greeting English Language Learners with a phrase in their native language in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in designing a classroom environment using displays that reflects a variety of cultures for the STEM Educator MSP participants ($\mu_1 = 75.7$, $U_1 = 192.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 61.4$, $U_2 = 268.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.355) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in designing a classroom environment using displays that reflects a variety of cultures in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in developing a personal relationship with students for the STEM Educator MSP participants ($\mu_1 = 94.4$, $U_1 = 158.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 86.6$, $U_2 = 302.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.080) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in developing a personal relationship with students in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in obtaining information about students' academic weaknesses for the STEM Educator MSP participants ($\mu_1 = 84.6$, $U_1 = 196.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 82.0$, $U_2 = 263.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.415) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in obtaining information about students' academic weaknesses in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in praising English Language Learners for their accomplishments using a phrase in their native language for the STEM Educator MSP participants ($\mu_1 = 64.1$, $U_1 = 146.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 42.9$, $U_2 = 314.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.041) was determined to be less than 0.05, therefore, the null

hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in praising English Language Learners for their accomplishments using a phrase in their native language in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in identifying ways that standardized tests may be biased towards linguistically diverse students for the STEM Educator MSP participants ($\mu_1 = 71.2$, $U_1 = 165.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 55.2$, $U_2 = 293.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.122) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating cultural responsive teaching self-efficacy in identifying ways that standardized tests may be biased towards linguistically diverse students in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in communicating with parents regarding their child's educational progress for the STEM Educator MSP participants ($\mu_1 = 85.9$, $U_1 = 204.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 81.9$, $U_2 = 256.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.527) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in

communicating with parents regarding their child's educational progress in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in structuring parent-teacher conferences so that the meeting is not intimidating for parents for the STEM Educator MSP participants ($\mu_1 = 82.3$, $U_1 = 197.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 75.9$, $U_2 = 262.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.429) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in structuring parent-teacher conferences so that the meeting is not intimidating for parents in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in helping students to develop positive relationships with their classmates for the STEM Educator MSP participants ($\mu_1 = 87.0$, $U_1 = 201.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 77.2$, $U_2 = 259.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.480) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in helping students to develop positive relationships with their classmates in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in revising instructional material to include a better representation of cultural groups for the STEM

Educator MSP participants ($\mu_1 = 76.1$, $U_1 = 182.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 67.5$, $U_2 = 278.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.243) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in revising instructional material to include a better representation of cultural groups in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in critically examining the curriculum to determine whether it reinforces negative cultural stereotypes for the STEM Educator MSP participants ($\mu_1 = 78.8$, $U_1 = 141.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 60.4$, $U_2 = 318.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.031) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in critically examining the curriculum to determine whether it reinforces negative cultural stereotypes in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in designing a lesson that shows how other cultural groups have made use of mathematics for the STEM Educator MSP participants ($\mu_1 = 74.9$, $U_1 = 125.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 52.3$, $U_2 = 335.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.011) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores

for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in designing a lesson that shows how other cultural groups have made use of mathematics in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in modeling classroom tasks to enhance English Language Learners' understanding for the STEM Educator MSP participants ($\mu_1 = 79.3$, $U_1 = 146.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 61.7$, $U_2 = 314.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.041) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in modeling classroom tasks to enhance English Language Learners' understanding in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in communicating with the parents of English Language Learners regarding their child's achievement for the STEM Educator MSP participants ($\mu_1 = 70.1$, $U_1 = 177.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 56.6$, $U_2 = 283.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.197) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in communicating with the parents of English Language

Learners regarding their child's achievement in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in helping students feel like important members of the classroom for the STEM Educator MSP participants ($\mu_1 = 92.5$, $U_1 = 196.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 87.2$, $U_2 = 263.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.415) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in helping students feel like important members of the classroom in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in identifying ways that standardized tests may be biased towards culturally diverse students for the STEM Educator MSP participants ($\mu_1 = 72.5$, $U_1 = 149.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 52.8$, $U_2 = 310.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.049) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in identifying ways that standardized tests may be biased towards culturally diverse students in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using a learning preference inventory to gather data about how students like to learn for the

STEM Educator MSP participants ($\mu_1 = 72.7$, $U_1 = 111.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 44.1$, $U_2 = 349.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.004) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in using a learning preference inventory to gather data about how students like to learn in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using examples that are familiar to students from diverse cultural backgrounds for the STEM Educator MSP participants ($\mu_1 = 80.3$, $U_1 = 141.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 60.6$, $U_2 = 319.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.030) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in using examples that are familiar to students from diverse cultural backgrounds in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in explaining new concepts using examples that are taken from students' everyday lives for the STEM Educator MSP participants ($\mu_1 = 85.8$, $U_1 = 201.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 77.2$, $U_2 = 258.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.488) was determined to be greater than 0.05, therefore, the null hypothesis (the mean

scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in explaining new concepts using examples that are taken from students' everyday lives in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in obtaining information regarding students' academic interests for the STEM Educator MSP participants ($\mu_1 = 85.9$, $U_1 = 152.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 75.8$, $U_2 = 307.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.059) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in obtaining information regarding students' academic interests in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in using the interests of my students to make learning meaningful for them for the STEM Educator MSP participants ($\mu_1 = 88.6$, $U_1 = 162.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 78.7$, $U_2 = 298.0$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.098) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in using the interests of students to make learning meaningful for them in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in implementing cooperative learning activities for those students who like to work in groups for the STEM Educator MSP participants ($\mu_1 = 84.2$, $U_1 = 176.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 81.7$, $U_2 = 283.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.193) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the culturally responsive teaching self-efficacy in implementing cooperative learning activities for those students who like to work in groups in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in designing instruction that matches students' developmental needs for the STEM Educator MSP participants ($\mu_1 = 85.7$, $U_1 = 140.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 75.6$, $U_2 = 319.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.029) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural responsive teaching self-efficacy in designing instruction that matches students' developmental needs in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural responsive teaching self-efficacy in teaching students about their cultures' contributions to society for the STEM Educator MSP participants ($\mu_1 = 81.8$, $U_1 = 157.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 66.7$, $U_2 = 302.5$, $n_2 = 20$) can be found in Table 34. The p -value for the test (0.078) was

determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CRTSE for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural responsive teaching self-efficacy in teaching students about their cultures' contributions to society in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

Table 34 *CRTSE item level Mann-Whitney U tests*

| # | | <i>N</i> | Mean Rank | Rank Sum | <i>U</i> | <i>z</i> | <i>P</i> |
|----|-----------------------|----------|-----------|----------|----------|----------|----------|
| 1 | STEM Educator MSP | 23 | 25.1 | 577.5 | 158.5 | -1.74 | 0.082 |
| | STEM Educator non-MSP | 20 | 18.43 | 368.5 | 301.5 | 1.74 | 0.082 |
| 2 | STEM Educator MSP | 23 | 22.8 | 524.0 | 212.0 | -0.44 | 0.661 |
| | STEM Educator non-MSP | 20 | 21.1 | 422.0 | 248.0 | 0.44 | 0.661 |
| 3 | STEM Educator MSP | 23 | 24.5 | 563.0 | 173.0 | -1.39 | 0.165 |
| | STEM Educator non-MSP | 20 | 19.2 | 383.0 | 287 | 1.39 | 0.165 |
| 4 | STEM Educator MSP | 23 | 24.8 | 571.0 | 165.0 | -1.58 | 0.114 |
| | STEM Educator non-MSP | 20 | 18.8 | 375 | 295.0 | 1.58 | 0.114 |
| 5 | STEM Educator MSP | 23 | 26.7 | 614.5 | 121.5 | -2.64 | 0.008 |
| | STEM Educator non-MSP | 20 | 16.6 | 331.5 | 338.5 | 2.64 | 0.008 |
| 6 | STEM Educator MSP | 23 | 25.3 | 582.5 | 153.5 | -1.86 | 0.063 |
| | STEM Educator non-MSP | 20 | 18.2 | 363.5 | 306.5 | 1.86 | 0.063 |
| 7 | STEM Educator MSP | 23 | 24.6 | 566.5 | 169.5 | -1.47 | 0.141 |
| | STEM Educator non-MSP | 20 | 19.0 | 379.5 | 290.5 | 1.47 | 0.141 |
| 8 | STEM Educator MSP | 23 | 25.9 | 595.0 | 141.0 | -2.17 | 0.030 |
| | STEM Educator non-MSP | 20 | 17.6 | 351.0 | 319 | 2.17 | 0.030 |
| 9 | STEM Educator MSP | 23 | 26.1 | 599.5 | 136.5 | -2.28 | 0.023 |
| | STEM Educator non-MSP | 20 | 17.3 | 346.5 | 323.5 | 2.28 | 0.023 |
| 10 | STEM Educator MSP | 23 | 24.1 | 553.5 | 182.5 | -1.16 | 0.248 |
| | STEM Educator non-MSP | 20 | 19.6 | 392.5 | 277.5 | 1.16 | 0.248 |
| 11 | STEM Educator MSP | 23 | 26.0 | 597.0 | 139.0 | -2.22 | 0.027 |
| | STEM Educator non-MSP | 20 | 17.5 | 349.0 | 321.0 | 2.22 | 0.027 |

| | | | | | | | |
|----|-----------------------|----|------|-------|-------|-------|-------|
| 12 | STEM Educator MSP | 23 | 24.7 | 568.5 | 167.5 | -1.52 | 0.128 |
| | STEM Educator non-MSP | 20 | 18.9 | 377.5 | 292.5 | 1.52 | 0.128 |
| 13 | STEM Educator MSP | 23 | 25.5 | 585.5 | 150.5 | -1.93 | 0.053 |
| | STEM Educator non-MSP | 20 | 18.0 | 360.5 | 309.5 | 1.94 | 0.053 |
| 14 | STEM Educator MSP | 23 | 26.3 | 604.0 | 132.0 | -2.39 | 0.017 |
| | STEM Educator non-MSP | 20 | 17.1 | 642.0 | 328.0 | 2.39 | 0.017 |
| 15 | STEM Educator MSP | 23 | 27.6 | 634.0 | 102.0 | -3.12 | 0.002 |
| | STEM Educator non-MSP | 20 | 15.6 | 312.0 | 358.0 | 3.12 | 0.002 |
| 16 | STEM Educator MSP | 23 | 26.0 | 598.0 | 138.0 | -2.24 | 0.025 |
| | STEM Educator non-MSP | 20 | 17.4 | 348.0 | 322.0 | 2.24 | 0.025 |
| 17 | STEM Educator MSP | 23 | 24.5 | 563.5 | 172.5 | -1.40 | 0.162 |
| | STEM Educator non-MSP | 20 | 19.1 | 382.5 | 287.5 | 1.40 | 0.162 |
| 18 | STEM Educator MSP | 23 | 24.2 | 557.5 | 178.5 | -1.25 | 0.210 |
| | STEM Educator non-MSP | 20 | 19.4 | 388.5 | 281.5 | 1.25 | 0.210 |
| 19 | STEM Educator MSP | 23 | 23.7 | 544.0 | 192.0 | -0.93 | 0.355 |
| | STEM Educator non-MSP | 20 | 20.1 | 402.0 | 268.0 | 0.93 | 0.355 |
| 20 | STEM Educator MSP | 23 | 25.1 | 578.0 | 158.0 | -1.75 | 0.080 |
| | STEM Educator non-MSP | 20 | 18.4 | 368.0 | 302.0 | 1.75 | 0.080 |
| 21 | STEM Educator MSP | 23 | 23.5 | 539.5 | 196.5 | -0.82 | 0.415 |
| | STEM Educator non-MSP | 20 | 20.3 | 406.5 | 263.5 | 0.82 | 0.415 |
| 22 | STEM Educator MSP | 23 | 25.7 | 590.0 | 146.0 | -2.05 | 0.041 |
| | STEM Educator non-MSP | 20 | 17.8 | 356.0 | 314.0 | 2.05 | 0.041 |
| 23 | STEM Educator MSP | 23 | 24.8 | 569.5 | 166.5 | -1.55 | 0.122 |
| | STEM Educator non-MSP | 20 | 18.8 | 376.5 | 293.5 | 1.55 | 0.122 |
| 24 | STEM Educator MSP | 23 | 23.1 | 532.0 | 204.0 | -0.63 | 0.527 |
| | STEM Educator non-MSP | 20 | 20.7 | 414.0 | 256.0 | 0.63 | 0.527 |
| 25 | STEM Educator MSP | 23 | 23.4 | 538.5 | 197.5 | -0.79 | 0.429 |
| | STEM Educator non-MSP | 20 | 20.4 | 407.5 | 262.5 | 0.79 | 0.429 |
| 26 | STEM Educator MSP | 23 | 23.3 | 535.0 | 201.0 | -0.71 | 0.480 |
| | STEM Educator non-MSP | 20 | 20.6 | 411.0 | 259.0 | 0.71 | 0.480 |
| 27 | STEM Educator MSP | 23 | 24.1 | 554.0 | 182.0 | -1.17 | 0.243 |

| | | | | | | | |
|----|-----------------------|----|------|-------|-------|-------|-------|
| | STEM Educator non-MSP | 20 | 19.6 | 392.0 | 278.0 | 1.17 | 0.243 |
| 28 | STEM Educator MSP | 23 | 25.8 | 594.5 | 141.5 | -2.15 | 0.031 |
| | STEM Educator non-MSP | 20 | 17.6 | 351.5 | 318.5 | 2.15 | 0.031 |
| 29 | STEM Educator MSP | 23 | 26.6 | 611.0 | 125.0 | -2.56 | 0.011 |
| | STEM Educator non-MSP | 20 | 16.8 | 335.0 | 335.0 | 2.56 | 0.011 |
| 30 | STEM Educator MSP | 23 | 25.7 | 590.0 | 146.0 | -2.05 | 0.041 |
| | STEM Educator non-MSP | 20 | 17.8 | 356 | 314.0 | 2.05 | 0.041 |
| 31 | STEM Educator MSP | 23 | 24.3 | 559.0 | 177.0 | -1.29 | 0.197 |
| | STEM Educator non-MSP | 20 | 19.4 | 387.0 | 283.0 | 1.29 | 0.197 |
| 32 | STEM Educator MSP | 23 | 23.5 | 539.5 | 196.5 | -0.82 | 0.415 |
| | STEM Educator non-MSP | 20 | 20.3 | 406.5 | 263.5 | 0.82 | 0.415 |
| 33 | STEM Educator MSP | 23 | 25.5 | 586.5 | 149.5 | -1.96 | 0.049 |
| | STEM Educator non-MSP | 20 | 18.0 | 359.5 | 310.5 | 1.96 | 0.049 |
| 34 | STEM Educator MSP | 23 | 27.2 | 625.0 | 111.0 | -2.90 | 0.004 |
| | STEM Educator non-MSP | 20 | 16.1 | 321.0 | 349.0 | 2.90 | 0.004 |
| 35 | STEM Educator MSP | 23 | 25.9 | 595.0 | 141.0 | -2.17 | 0.030 |
| | STEM Educator non-MSP | 20 | 17.6 | 351.0 | 319.0 | 2.17 | 0.030 |
| 36 | STEM Educator MSP | 23 | 23.2 | 534.5 | 201.5 | -0.69 | 0.488 |
| | STEM Educator non-MSP | 20 | 20.6 | 411.5 | 258.5 | 0.69 | 0.488 |
| 37 | STEM Educator MSP | 23 | 25.4 | 582.5 | 152.5 | -1.89 | 0.059 |
| | STEM Educator non-MSP | 20 | 18.1 | 362.5 | 307.5 | 1.89 | 0.059 |
| 38 | STEM Educator MSP | 23 | 25.0 | 574.0 | 162.0 | -1.66 | 0.098 |
| | STEM Educator non-MSP | 20 | 18.6 | 372.0 | 298.0 | 1.66 | 0.098 |
| 39 | STEM Educator MSP | 23 | 24.3 | 559.5 | 176.5 | -1.30 | 0.193 |
| | STEM Educator non-MSP | 20 | 19.3 | 386.5 | 283.5 | 1.30 | 0.193 |
| 40 | STEM Educator MSP | 23 | 25.9 | 595.5 | 140.5 | -2.18 | 0.029 |
| | STEM Educator non-MSP | 20 | 17.5 | 350.5 | 319.5 | 2.18 | 0.029 |
| 41 | STEM Educator MSP | 23 | 25.2 | 578.5 | 157.5 | -1.77 | 0.078 |
| | STEM Educator non-MSP | 20 | 18.4 | 367.5 | 302.5 | 1.77 | 0.078 |

Fifteen items of the CRTSE were significantly different and are shown in Table 35.

Table 35 *CRTSE significantly different inventory items*

| Item No. | Inventory Description | Mean | | Mean Rank | | <i>z</i> | <i>p</i> |
|----------|--|------|------|-----------|------|----------|----------|
| | | MSP | Non | MSP | Non | | |
| 5 | Identify ways that the school culture (e.g., values, norms, and practices) is different from my students' home culture | 82.7 | 67.0 | 26.7 | 16.6 | 2.64 | 0.008 |
| 8 | Obtain information about my students' home life | 78.3 | 64.2 | 25.9 | 17.6 | 2.17 | 0.030 |
| 9 | Build a sense of trust in my students | 92.4 | 82.4 | 26.1 | 17.3 | 2.28 | 0.023 |
| 11 | Use a variety of teaching methods | 87.0 | 77.1 | 26.0 | 17.5 | 2.22 | 0.027 |
| 14 | Use my students' prior knowledge to help them make sense of new information | 87.1 | 78.3 | 26.3 | 17.1 | 2.39 | 0.017 |
| 15 | Identify ways how students communicate at home may differ from the school norms | 82.7 | 66.1 | 27.6 | 15.6 | 3.12 | 0.002 |
| 16 | Obtain information about my students' cultural background | 85.0 | 72.0 | 26.0 | 17.4 | 2.24 | 0.025 |
| 22 | Praise English Language Learners for their accomplishments using a phrase in their native language | 64.1 | 42.9 | 25.6 | 17.8 | 2.05 | 0.041 |
| 28 | Critically examine the curriculum to determine whether it reinforces negative cultural stereotypes | 78.8 | 60.4 | 25.8 | 17.6 | 2.15 | 0.031 |
| 29 | Design a lesson that shows how other cultural groups have made use of mathematics | 74.9 | 52.3 | 26.6 | 16.8 | 2.56 | 0.011 |
| 30 | Model classroom tasks to enhance English Language Learners' understanding | 79.3 | 61.7 | 25.7 | 17.8 | 2.05 | 0.041 |
| 33 | Identify ways that standardized tests may be biased towards culturally diverse students | 72.5 | 52.8 | 25.5 | 18.0 | 1.96 | 0.049 |
| 34 | Use a learning preference inventory to gather data about how my students like to learn | 72.7 | 44.1 | 27.2 | 16.1 | 2.90 | 0.004 |
| 35 | Use examples that are familiar to students from diverse backgrounds | 80.3 | 60.6 | 25.9 | 17.6 | 2.17 | 0.030 |

| | | | | | | | |
|----|--|------|------|------|------|------|-------|
| 40 | Design instruction that matches my students' developmental needs | 85.7 | 75.6 | 25.9 | 17.5 | 2.18 | 0.029 |
|----|--|------|------|------|------|------|-------|

CCSAQ

Total score. Research question four (RQ4: What differences are identifiable in the cultural competence exhibited by MSP participant and non-MSP participants?) was answered using the data from the CCSAQ outcomes. Since one sample group had greater than 20 participants ($n_1 = 23$), the value of U approaches a normal distribution, therefore the null hypothesis can be tested using a z -test (for a two-tailed test, using a critical z -test statistic table value of 1.96). The test statistic for the Mann-Whitney U test was compared to the designated critical table value based on the sample size of each group's participant sample. The critical alpha value was set at 0.05 for this investigation. The p -value for the test (0.010) was determined to be smaller than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural competency self-assessment in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants (see Table 36).

Table 36 *CCSAQ total score Mann-Whitney U test statistics*

| | N | Mean Rank | Rank Sum | U | z | p |
|-----------------------|-----|-----------|----------|-------|-------|-------|
| STEM Educator MSP | 23 | 26.6 | 612.5 | 123.5 | -2.59 | 0.010 |
| STEM Educator non-MSP | 20 | 16.7 | 333.5 | 336.5 | 2.59 | 0.010 |

CCSAQ subscale scores. Comparisons of the CCSAQ subscales were made using a Mann-Whitney U test. The Mann-Whitney U test statistic for the cultural competency self-assessment in knowledge of community for the STEM Educator MSP participants ($\mu_1 = 2.4$, $U_1 = 191.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 2.2$, $U_2 = 269.0$, $n_2 = 20$)

can be found in Table 37. The p -value for the test (0.342) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural competency self-assessment in knowledge of community in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural competency self-assessment in personal involvement for the STEM Educator MSP participants ($\mu_1 = 2.7$, $U_1 = 187.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 2.6$, $U_2 = 273.0$, $n_2 = 20$) can be found in Table 37. The p -value for the test (0.295) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural competency self-assessment in personal involvement in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural competency self-assessment in resources and linkages for the STEM Educator MSP participants ($\mu_1 = 2.2$, $U_1 = 130.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 1.8$, $U_2 = 129.5$, $n_2 = 20$) can be found in Table 37. The p -value for the test (0.015) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural competency self-assessment in resources and linkages in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural competency self-assessment in staffing for the STEM Educator MSP participants ($\mu_1 = 2.6$, $U_1 = 149.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 2.2$, $U_2 = 311.0$, $n_2 = 20$) can be found in Table 37. The p -value for the test (0.049) was determined to be less than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was rejected, indicating the cultural competency self-assessment in staffing in the STEM Educator MSP participants was significantly different than the STEM Educator non-MSP participants.

The Mann-Whitney U test statistic for the cultural competency self-assessment in organizational policies and procedures for the STEM Educator MSP participants ($\mu_1 = 2.0$, $U_1 = 156.5$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 1.6$, $U_2 = 303.5$, $n_2 = 20$) can be found in Table 37. The p -value for the test (0.074) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural competency self-assessment in organizational policies and procedures in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

The Mann-Whitney U test statistic for the cultural competency self-assessment in reaching out to communities for the STEM Educator MSP participants ($\mu_1 = 2.4$, $U_1 = 167.0$, $n_1 = 23$) and the STEM Educator non-MSP participants ($\mu_2 = 2.1$, $U_2 = 293.0$, $n_2 = 20$) can be found in Table 37. The p -value for the test (0.125) was determined to be greater than 0.05, therefore, the null hypothesis (the mean scores for the CCSAQ for the STEM Educator MSP participants and the STEM Educator non-MSP participants are equal) was not rejected, indicating the cultural

competency self-assessment in reaching out to communities in the STEM Educator MSP participants and the STEM Educator non-MSP participants did not differ significantly.

Table 37 *CCSAQ subscale Mann-Whitney U test statistics*

| | <i>N</i> | Mean Rank | Rank Sum | <i>U</i> | <i>z</i> | <i>p</i> |
|---|----------|-----------|----------|----------|----------|----------|
| Knowledge of Community | | | | | | |
| STEM Educator MSP | 23 | 23.7 | 545 | 191.0 | -0.95 | 0.342 |
| STEM Educator non-MSP | 20 | 20.1 | 401 | 269.0 | 0.95 | 0.342 |
| Personal Involvement | | | | | | |
| STEM Educator MSP | 23 | 23.9 | 549 | 187.0 | -1.05 | 0.295 |
| STEM Educator non-MSP | 20 | 19.9 | 397 | 273.0 | 1.05 | 0.295 |
| Resources and Linkages | | | | | | |
| STEM Educator MSP | 23 | 26.3 | 605.5 | 130.5 | -2.42 | 0.015 |
| STEM Educator non-MSP | 20 | 17.0 | 340.5 | 329.5 | 2.42 | 0.015 |
| Staffing | | | | | | |
| STEM Educator MSP | 23 | 25.5 | 587 | 149.0 | -1.97 | 0.049 |
| STEM Educator non-MSP | 20 | 18.0 | 359 | 311.0 | 1.97 | 0.049 |
| Organizational Policies and Procedures | | | | | | |
| STEM Educator MSP | 23 | 25.2 | 579.5 | 156.5 | -1.79 | 0.074 |
| STEM Educator non-MSP | 20 | 18.3 | 366.5 | 303.5 | 1.79 | 0.074 |
| Reaching Out to Communities | | | | | | |
| STEM Educator MSP | 23 | 24.7 | 569 | 167.0 | -1.53 | 0.125 |
| STEM Educator non-MSP | 20 | 18.9 | 377 | 293.0 | 1.53 | 0.125 |

Two of the CCSAQ subscales were significantly different and are shown in Table 38.

Table 38 *CCSAQ significantly different subscales*

| Inventory Description | Mean | | Mean Rank | | <i>z</i> | <i>p</i> |
|------------------------|------|------|-----------|------|----------|----------|
| | MSP | Non | MSP | Non | | |
| Resources and Linkages | 2.18 | 1.76 | 26.3 | 17.0 | 2.42 | 0.015 |
| Staffing | 2.61 | 2.24 | 25.5 | 18.0 | 1.97 | 0.049 |

4.6 Summary

This chapter presented the analysis of the data collected using online versions of the CRTSE, CCSAQ, and the CCSASDI. The data were used to answer the study's research questions. The CRTSE data analysis was used to answer research question one (RQ1: What is

the degree of culturally responsive teaching self-efficacy of the STEM educator MSP participants?) and research question two (RQ2: What differences in the degree of culturally responsive teaching practices are identifiable between MSP participants and non-MSP participants?). The data analysis demonstrated STEM educator MSP participants had a degree of culturally responsive teaching self-efficacy of 3331.0. The data also suggested that the culturally responsive teaching self-efficacy in the STEM educator MSP participants was statistically different than the STEM educator non-MSP participants.

The CCSAQ data analysis was used to answer research question three (RQ3: To what extent do the STEM educator MSP participants exhibit cultural competence?) and research question four (RQ4: What differences are identifiable in the cultural competence exhibited by MSP participants and non-MSP participants?). The data analysis showed STEM educator MSP participants exhibited a cultural competence level of 2.4. The data also suggested that the cultural competency self-assessment in the STEM educator MSP participants was statistically different than the STEM educator non-MSP participants.

Chapter 5 will present the discussion and limitations of the results, implications of the study, and suggestions for further research.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

5.1 Introduction

The purpose of this study is to determine the preparedness of teachers in an existing professional development program aimed at training culturally responsive and competent teachers to transition from the learner to the teacher. It focused on the degree of self-efficacy these teachers currently possess related to culturally responsive teaching and the level of the same teachers have regarding cultural competence. A higher degree of culturally responsive teaching self-efficacy and a higher level of cultural competence are two necessary attributes for professional development and teacher learning facilitators with the objective of teaching teachers about culture-based education (Cross et al, 1989; Sareen et al, 2005). Additionally, this study had the potential to inform MSP trainers and PAI with necessary data to inform future curricular and workshop development. This study examined the supporting role of the MSP teacher development knowledge and experiences in the promotion of teacher culturally responsive teaching practices and cultural competence.

This chapter summarizes and discusses the findings for this research study. The chapter begins with a summary of the study. Following the summary, a discussion of the results and limitations of the results are presented. Implications of the study follows, and the chapter closes with suggestions for further research.

5.2 Summary of the Study

The goal of this study was to determine the degree of participants' culturally responsive teaching practices and level of cultural competence, as well as identify similarities and/or differences between participants' culturally responsive teaching practices and cultural

competence. Upper elementary (grades three through six) STEM educators from KEO and PAH were identified, invited, and chosen to participate in this study.

Participants completed an electronic survey delivered online. There were three parts to the survey. The first part allowed participants to self-report their culturally responsive teaching self-efficacy using the CRTSE. The second part gave participants the opportunity to self-assess their cultural competence via the CCSAQ. Lastly, the CCSASDI was used to collect participants' demographic data.

For each group, the data were analyzed holistically and categorically using mean scores. The data were compared holistically and categorically between groups using a Mann-Whitney *U* test.

5.3 Discussion of Results

Study Participants

The study participants were teachers from two elementary schools within the HIDEO KKP Complex Area, whose ethnic backgrounds reflected the ethnic composition of both schools. Participants indicated they are most knowledgeable about the three largest ethnic groups of both schools; however, despite this ranking, there were some incongruities with regards to the data. Data revealed lower participant self-efficacies for ability to implement strategies to minimize the effects of the mismatch between students' home and school cultures, to teach students about their cultures' contributions to science and math, to greet and praise students in their Native Language, to identify cultural stereotypes within a published curriculum, and to communicate with parents. This data, along with a third-place ranking of the knowledge of communities subscale might prove incongruous. These discrepancies might have arisen from the generalization of ethnicities (Banks J. A., 1992; Banks J. A., 2004; Gay, 2002; Gay, 2010;

Kana'iaupuni & Kawai'ae'a, 2008; Klump & McNeir, 2005). Asian/Pacific Islander captures the identity of a large group of people from many different cultural backgrounds, e.g., Japanese, Filipino, Tongan, Guamanian, Chuukese. Failing to categorize ethnicities by the individual ethnic groups who reside in Hawai'i could have affected the true knowledge and understanding a teacher would have regarding a specific ethnicity. For example, Micronesian students make up 10.8% of the student population (Keonepoko Elementary School, 2014-2015). Micronesians are categorized as Pacific Islanders, however, lacking detailed classification of Pacific Islander from a demographic perspective, it is difficult to ascertain participants' identified culture. Therefore, although not causal, it is possible that the discrepancy between higher mean scores for cultural knowledge items of the CRTSE and lower mean scores for the knowledge of communities subscale of the CCSAQ might be attributable to the lack of a descriptive ethnic demographic question.

Of the 43 participants, 28 indicated that they have been at their respective school (KEO or PAH) between zero to four years. However, only 13 participants indicated they have been licensed and teaching between zero to four years, which implies that the remaining 15 participants have recently transferred into either school. While not correlated, the low number of years at their respective schools might account for their lower levels of cultural competence as it pertains to organizational policies and procedures and resources and linkages. Each school's culture differs, requiring teachers to learn and acclimate to a new school culture each time they move to a different school. Acclimation might entail learning new organizational policies and procedures and determining specific resources and linkages associated with the school compensating for the diverging outcomes.

With 40 participants claiming five or more years as a currently teaching and licensed teacher, it is difficult to place the lower self-efficacy scores for obtaining information about students, for understanding how standardized tests are biased towards the culturally and linguistically diverse, and for not knowing how to use a learning preference inventory within a context. HODOE three-year teacher induction program places new/beginning teachers “in a system of support that includes working with a highly skilled, trained instructional mentor to accelerate teacher effectiveness and student learning” (State of Hawai‘i Department of Education, n.d.). Having supported the development of the induction program, this researcher is aware of specific training modules that specifically address student information and student relationships. Consequently, lower scores for the above mentioned inventory items might possibly be affected by the lack of veteran teachers at the two schools.

Seven (out of 20) non-MSP participants self-reported a degree of culturally responsive teaching self-efficacy of 3075 or higher. This data demonstrates that 35 percent of the non-MSP educators who teach predominantly Native Hawaiian students possess the knowledge and experiences of culturally responsive teaching practices. This fact aligns with the finding that seven of the non-MSP participants indicated attending four or more cultural awareness/competence workshops or conferences. This might suggest that these seven attendees are also the seven participants with a degree of culturally responsive teaching self-efficacy of 3075 or higher.

Culturally Responsive Teaching Self-Efficacy

Although not causal, the analysis concludes that higher degrees of culturally responsive teaching self-efficacy might be attributed to extensive cultural awareness/competence training through additional analysis of the study data. MSP participants, barring one (out of 23), received

some kind of cultural awareness/competence training. Fifteen out of 23 (65.3 percent) of those participants attended 10 or more cultural awareness/competence training, which includes MSP. This might explain, though without verification, how 22 out of 23 (95.7 percent) of the MSP participants had a score of 3075 (75 percent) or higher, as well as how 17 of those 22 (73.9 percent) scored 3690 (90 percent) or higher. It would also validate the suggestion that cultural awareness/competence training, like MSP, supports the promotion of cultural responsive teaching self-efficacy.

The mean scores of the MSP participants possibly support, but not causally, a link between MSP knowledge and experiences and higher mean scores of culturally responsive teaching self-efficacy. Further examination of the data might support how well the MSP participants scored on 65.9 percent (27 out of 41) of the CRTSE items versus the non-MSP participants, 17.1 percent (7 out of 41) of the CRTSE items; supplementing the hypothesis that the MSP training knowledge and experiences support teacher culturally responsive teaching practices.

Both participant groups demonstrated highest mean scores for the ability to develop a personal relationship with students and the ability to help students feel like important members of the classroom, and both of these inventory items proved to differ significantly. Both these culturally relevant practices are important in demonstrating cultural caring and building a learning community (Gay, 2002), suggesting that both participant groups are “teachers in an ethical, emotional, and academic partnership with ethnically diverse students, a partnership that is anchored in respect, honor, integrity, resource sharing, and a deep belief in the possibility of transcendence” (Gay, 2010, p. 52). Additionally, teachers “become attuned to and take others into themselves, show empathy, share power, and nourish their students’ total being” (Gay,

1995). These attributes might support the higher mean scores of participants for their ability to develop a personal relationship with students and the ability to help students feel like important members of the classroom.

Both participant groups revealed a lower mean score that did not differ significantly, for the ability to praise English Language Learners for their accomplishments using a phrase in their Native language, implying that the participants need increased support in “acquiring detailed factual information about the cultural particularities of specific ethnic groups” (Gay, 2002, p. 107). Although a causal relationship cannot be determined, the reason for lower mean scores for the use of Native language within the classroom might be due to the lack of language resources for Native languages other than Native Hawaiian within the two study schools. These resources include opportunities to learn the Native languages of the various cultures of their classrooms and to invite Native speakers to the classroom.

Both participant groups scored below 80 percent for the following items: 6, 8, 17, 18, 19, 22, 23, 27, 28, 29, 30, 31, 33, and 34, and of these items, only six of the inventory items demonstrated statistical difference in means (see Table 35). Scores below 80 percent could indicate specific culturally relevant teaching practices that require additional and/or continued support for educators of predominantly Native Hawaiian students. According to Gay (2002), teachers can increase their degree of culturally responsive teaching practices by “using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively” (p. 106). This could suggest that inventory outcomes for these specific items could be supported through professional development opportunities focused on the diversity of cultural knowledge.

Of the 41 inventory items, only 15 (5, 8, 9, 11, 14, 15, 16, 22, 28, 29, 30, 33, 34, 35, and 40) were found to be statistically significant (see Table 35). With the overall CRTSE mean score for the STEM educator MSP participants being statistically different than the mean score for the STEM educator non-MSP participants, it might suggest that for the above indicated items, the scores for the MSP participants and the non-MSP participants were substantially different, further demonstrating the benefit of culturally competent professional development opportunities for the topic of these specific inventory items. The CCSAQ data illustrated some of the same similarities that will be discussed next.

Cultural Competence Self-Assessment

Similar to the analysis of the culturally responsive teaching self-efficacy data, educators provided with MSP knowledge and experiences resulted in higher cultural competence than educators without MSP opportunities. Although this claim is not causal, the statistically different scores of the MSP participants and the non-MSP participants suggest this conclusion. Of the six subscales, only two subscales (Resources and Linkages and Staffing) were found to be statistically significant. As with the CRTSE, the outcomes of these two subscales are different between the STEM educator MSP participants and the STEM educator non-MSP participants. The MSP knowledge and experiences might prove to be beneficial to teachers with regards to resources and linkages and staffing content.

The subscale score rankings for each group might support the choice of school for the control group as being appropriate for this study. This is significant because the treatment group was not randomly sampled which made it difficult for determining an appropriate control group. It might seem that the employment of matching methods to minimize group characteristic differences was successful.

5.4 Limitations of Results

This research study was dependent on the self-reporting of the study participants. The responses and data collected is limited by the bias of self-reporting. “In general, research participants want to respond in a way that makes them look as good as possible” (Donaldson & Grant-Vallone, 2002, p. 247). This is driven by the need for individuals to act in socially desirable ways.

This research study was limited by the sample size. The MSP participants were pre-selected by KEO administration, which limited the sample size and the randomness of the sample participants. This limitation of the study participants also limited the sample size for the non-MSP participants because it was necessary to control group characteristic differences. These limitations prohibit the generalization of the study’s findings.

All study participants were identified because they were teachers at school’s where Native Hawaiian and Part Native Hawaiian students were dominant. See Figure 7 and Figure 8. Due to this limitation, the findings from this study targets those specific teachers, meaning teachers in schools with an elevated Native Hawaiian student population.

The cultural competency sets discussed as a result of the findings apply specifically to the Native Hawaiian population, understanding that cultures have different values and beliefs that define and frame their specific population (Cross et al, 1989; Gay, 2002; & Kana’iaupuni & Kawaia’e’a, 2008). Thus indicating that different cultures require cultural competency sets different from the cultural competency set for educators of predominantly Native Hawaiian and Part Native Hawaiian students.

The absence of baseline data collected from a pre-assessment and isolation and control of specific variables does not allow the identification of correlations between MSP, culturally relevant teaching practices, and cultural competence.

5.5 Implications of the Study

A reflection on the findings and conclusions drawn from the data analysis provided several implications. There are opportunities available to improve the degree of culturally responsive teaching self-efficacy and the level of cultural competence for educators of predominantly Native Hawaiian students. The findings indicated that focused and purposeful training opportunities can support educator culturally responsive teaching practices and cultural competence. These professional development opportunities should focus on the development of culturally responsive teaching practices, cultural identity, cultural sensitivity, and cultural knowledge as it relates to Native Hawaiian culture (Sareen, Visencio, Russ, & Halfon, 2005) to gain a better understanding of the differing cultures of the student population and the pedagogical strategies that support culturally responsive teaching practices.

Similar to teachers developing and delivering instruction based on students' prior knowledge, HIDOE needs to also justify professional development opportunities based on the knowledge, skills, and experiences teachers possess. The use of the CRTSE inventory and the CCSA questionnaire prior to planning for professional development would provide HIDOE officials with a clear professional development focus. The HIDOE Office of Hawaiian Education (OHE), currently directed by state policy, requires the development of cultural competencies that "strengthen a sense of belonging, responsibility, excellence, aloha, total-well-being, and Hawai'i" (Lupenui, et al., 2015). A clear understanding of the existing knowledge,

attitudes, and beliefs of educators would allow for directed planning and delivery of professional development opportunities around these specific competencies.

The results of the study examined the supporting role of the MSP training knowledge and experiences had in educator culturally responsive teaching practices and cultural competence. The curriculum development support, the instructional modeling, the small group instructional practice sessions, the in-class observations, the one-on-one evaluations and reflections, and the continued mentoring and coaching reinforce culturally responsive teaching practices could continue to foster culturally responsive teaching. The workshop experiences, the community excursions, and the immersion in a variety of cultural practices are knowledge features that can continue to cultivate cultural competence.

MSP implemented a variety of teacher learning models and best practices of andragogy. Continued implementation of these models and practices will offer necessary supports to the continued development of culturally relevant teaching practices and cultural competence in STEM educators of a predominantly Native Hawaiian student population.

MSP training included only in-service educators and the non-MSP participants were also in-service educators. The findings from this study provide information that can be applied to the development of courses that provide pre-service teachers with the knowledge, attitudes, and beliefs of working in a predominantly Native Hawaiian classroom. It identifies the culturally responsive teaching practices that pre-service teachers must understand and be able to apply. It also recognizes the elements of cultural competence that improves service delivery for Native Hawaiian students. This information can shape the framework and provide direction for developing a class that seeks to provide students the cultural competence and culturally responsive teaching practices.

Over the past four years, there have been a succession of systemic changes to curriculum, assessment, and teacher evaluation. With each change, the State of Hawai‘i Board of Education (HIBOE) were provided with opportunities for improvement through thoughtful and careful planning necessary to make educationally sound decisions (Banks J. A., 2013). The HIBOE believes that school reform through these three channels will achieve improved and increased student learning (State of Hawai‘i Department of Education), however, these “reform efforts often end up punishing schools, teachers, districts, and ultimately students who have not measured up to norms of success” (Nieto & Bode, 2013, p. 313) without realizing that these types of reform do not account for our country’s appalling history of educational inequality, especially for students who belong to groups whom schools are not currently structured.

Multicultural education supports student equity in learning and achievement (Banks J. A., 2013; Banks J. A., 2004; Banks J. A., 1992; Demmert & Towner, 2003; Díaz, 1992; Gay, 2010). Culturally responsive teaching practices and cultural competence are two aspects of multicultural education that can have a “major influence on how and to what extent students learn” (Nieto & Bode, 2013, p. 314) from a micro-level, which includes “the cultures, languages, and experiences of students and their families” (p. 315). The findings from this study has the potential to provide schools and school systems with baseline data and information regarding the existing knowledge, skills, and experiences of teachers with regards to cultural competence and culturally responsive teaching practices. This baseline data can lead to effective and efficient allocation of professional development resources as it pertains to supporting higher teacher cultural competence and culturally responsive teaching self-efficacy. The persistent and consistent advocacy at the micro-level will ultimately support the work at the macro-level, including the “historical, economic, sociopolitical, and moral components of racial stratification” (p. 315).

Higher levels of cultural competence and higher degrees of culturally responsive teaching self-efficacy could potentially extend to advanced professional development in integrative STEM (science, technology, engineering, and math) education. The combination of integrative STEM education pedagogy and culturally relevant teaching practices has the prospective of providing students with robust learning opportunities that connect rigorous content through a cultural context. For example, fifth graders would learn marine biology, test water quality, design methods for propagation, and learn fractions through the context of native and invasive *limu* (algae). However, moving to this level of curricular, instructional, and assessment development requires a proficient level of cultural competence, higher degrees of culturally relevant teaching practices, and training around the best practices of integrative STEM education (Sanders M. E., 2012). All of this would be purposefully and intentionally done in order to produce globally responsible citizens through the implementation a rigorous curriculum placed within a relevant context that relates to students' prior knowledge and experiences.

5.6 Suggestions for Further Research

Suggestions for future research include further factor analysis for the CRTSE inventory. The identification of subscales might allow for a more purposeful and meaningful discussion of an educator's culturally responsive teaching practices. There is existing and current research on culturally responsive teaching practices that can be used to help mold the factor analysis. For example, Gay (2002) provides five components of culturally responsive teaching practices, developing a cultural diversity base, designing culturally relevant curricula, demonstrating cultural caring and building a learning community, cross-cultural communications, and cultural congruity in classroom instruction. The use of existing components, categories, or subscales and

determining how the CRTSE inventory relates to them would allow for a more robust discussion of results.

Standardized tests use cut scores, “select points on the score scale of a test to determine “whether a particular test score is sufficient for some purpose” (Zieky & Perie, p. 2). The use of a proficiency indicator, such as a cut score, would provide purposeful and meaningful motives behind each score of the CRTSE inventory. Further research surrounding the creation of a proficiency indicator would allow future researchers to clearly indicate whether a group of participants or individual participants have a higher degree of culturally responsive teaching self-efficacy. Additionally, since the CCSAQ was developed based on the research and monograph of Cross et al, further research that makes clear connections between the CCSAQ and the cultural competency continuum could help to clearly identify a group or individual’s level of cultural competence.

Both the CRTSE and the CCSAQ can be used to collect baseline data to support the work of the HODOE OHE. The baseline data, pre-assessing HODOE educators, will provide valuable data when planning for the training of HĀ competencies and satisfies the second (“each educator involved in professional learning comes to an experience ready to learn” (p. 42)) and third (“disparate experience levels and use of practice among educators, professional learning can foster collaborative inquiry and learning that enhances individual and collective performance” (p. 42)) NSDC prerequisite for effective professional development.

The CRTSE gauges the degree of culturally responsive self-efficacy of educators. This information can be used to identify the extent to which these culturally responsive teaching practices are actually being implemented in the classroom setting with culturally diverse learners to determine if learning leads to application. Consequently, further research documenting

implementation and application of learned culturally responsive teaching practices would provide insights the relationships between learning and implementation.

5.7 Conclusions

The culturally responsive teaching self-efficacy mean score for the Moenahā School Program participants was 3331.0, as compared to the 2855.5 mean score for the non-Moenahā School Program participants. The difference between these scores were found to be significantly different. Professional development opportunities that facilitate teacher growth culturally relevant teaching practices might be critical to the success of teachers teaching an elevated number of Native Hawaiian students. These students greatly benefit from culturally relevant teaching (Gay, 2010; Kana‘iaupuni & Kawai‘ae‘a, 2008; Kana‘iaupuni & Ledward, 2013; Kawai‘ae‘a, 2011) because culturally relevant curricula creates relationships with students. It creates connections between the content by placing the learning within a relevant context.

There were identifiable significant differences between the MSP participants and the non-MSP participants for 15 of the 41 CRTSE inventory items (see Table 35). These items could be further categorized as teachers’ cultural congruity in classroom instruction (items 11, 30, 35, and 40), cultural knowledge base (items 5, 22, 33, and 34), cultural care and building community (items 8, 9, and 16), culturally relevant curricula (items 14, 28, and 29), and cross-cultural communication (item 15).

MSP participants indicated a greater number of inventory items for cultural congruity in classroom instruction and cultural knowledge base. From an instructional perspective, MSP teachers were better able to implement a variety of teaching methods, to model tasks during and throughout instruction, to employ familiar contexts in examples, and to match appropriate developmental levels when instructing. The MSP participants were better able to identify

cultural differences between the school and home, to use Native languages, to recognize how standardized tests are biased, and to implement a learning preference inventory. They also create “classroom climates that are conducive to learning for ethnically diverse students” (Gay, 2002, p. 52) when they make time to obtain student information and build trusting relationship and design culturally relevant curricula when they incorporate prior knowledge in their planning, identify negative cultural stereotypes in published curricula, and demonstrate the use of mathematics by diverse cultural groups. Finally, the MSP participants take the time to understand the differences in communication at school and at home.

The cultural competence mean score for the MSP participants was 2.36 and was significantly different from the non-MSP participants means score of 2.06. Culture “plays a critical role in learning and ... cultural competence increases teaching effectiveness, which can help to close the achievement gap” (Pace, 2011, p. 5), and teachers with higher levels of cultural competence and higher degrees of culturally responsive teaching self-efficacy might play an integral role in helping to close the achievement gap faced by Native Hawaiian students.

There were identifiable significant differences in the Resources and Linkages and Staffing subscales. MSP participants are knowledgeable of the interactions between the school and the community and how their school and complex area supports the inclusion and promotion of the different ethnic groups. This data also indicates a lower priority for these two subscales when planning for future professional developments for the MSP participants.

Cultural competence is “a process encompassing understanding and accepting oneself, one another, and all of society: locally and globally” (Bowles, 2011) and is gained through the development of one’s cultural identity, cultural sensitivity, and cultural knowledge. MSP was one professional development program that facilitated teachers’ development of cultural

competence. Becoming a culturally competent teacher who implements and applies culturally relevant teaching practices helps to understand the heart of every child in the classroom.

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APPENDICES

A: IRB Approval Letter



Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website <http://www.irb.vt.edu>

MEMORANDUM

DATE: November 12, 2015
TO: Jeremy V Ernst, Toni Marie Mapuana Kauai
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires July 29, 2020)
PROTOCOL TITLE: Developing Cultural Competence and Culturally Responsive Teaching with the Moenahā School Program
IRB NUMBER: 15-073

Effective November 11, 2015, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Exempt, under 45 CFR 46.110 category(ies) 2,4
Protocol Approval Date: June 16, 2015
Protocol Expiration Date: N/A
Continuing Review Due Date*: N/A

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

| Date* | OSP Number | Sponsor | Grant Comparison Conducted? |
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* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

B: Teacher Consent Form

Title of Study

Developing Cultural Competence and Promoting Culturally Responsive Teaching in STEM Educators of Native Hawaiian Students

Investigator

Toni Marie Kauai (tokauai@vt.edu)

What are some general things you should know about research studies?

You are being asked to take part in a research project. Your participation in this project is voluntary. You have the right to be a part of this study, to choose not to participate, or to stop participating at any time without penalty. The purpose of research projects are to gain a better understanding of a certain topic or issue. In this consent form, you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the investigator for clarification or more information. If at any time you have question about your participation, do not hesitate in contacting the investigator named above.

What is the purpose of this research?

The Moenahā School Program is a professional development program aimed at increasing cultural competence, a necessary component of culturally responsive teaching. The purpose of this research study is to determine if there is a correlation between the Moenahā School professional development program and the degree of teacher culturally responsive teaching self-efficacy and the level of teacher cultural competence.

What are the benefits and risks in participating in this research?

Research participants will have the opportunity to reflect on and self-assess his/her culturally responsive teaching practices and cultural competence. The research findings will allow participating schools to develop cultural competence professional development that is relevant to its faculty and staff, respect group differences, and acknowledge the existing levels of competence of its current personnel. The Hawaii Department of Education will be able to identify training needs with respect to improving curriculum, instruction, and assessment for its culturally diverse population, especially the Native Hawaiian population, identify the existing cultural competence strength of its personnel, and identify key training topics. There are no known risks to participating in this study.

What will happen if you take part in this project?

Teachers participating in this study will be asked to complete a three-part survey.

Confidentiality

The information in the three-part survey will be kept confidential to the full extent allowed by law. Data will be stored securely and measures will be taken to protect the security of data. No reference will be made in oral or written reports which could link you to the project. You will

NOT be asked to for your name on the survey, so that no one can match your identity to the answers that you provide.

What if you have questions about this study?

If you have any questions at any time about the study or the procedures, you may contact the researcher, Toni Marie Kauai at tokaui@vt.edu or (808) 557-5998.

Rights as a Research Participant

Should you have any questions and/or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the VT IRB Chair, Dr. David M. Moore at moored@vt.edu or (540) 231-4991.

Consent to Participate

I have read and understand the above information. I agree to participate in the three-part survey with the understanding that I may choose not to participate in the research study or stop participating at any time without penalty. Consent to participate is implied with submission of this survey.

C: Recruitment Announcement for MSP Participants

Aloha mai kākou!

Because you are a participant in the Moenahā School Program, you are invited to participate in a study examining the development of teacher cultural competence and culturally responsive teaching self-efficacy. In order to participate in this study, you will be asked to complete a three part survey in which you provide different types of rating on your development of cultural competence and your self-efficacy of culturally responsive teaching. The survey is administered electronically via the Internet. It should take no more than 45 minutes to complete the survey. The survey allows you to save, exit, and continue multiple times within the two week survey open period. Your access to the survey will be via a self-identified email address and can only be accessed via this email address that you share with the researcher. The survey also has mobile capability allowing for the use of tablets and cell phone, which might require you to share an email that you can access using either or both of these types of equipment, as well as your desktop or laptop computer.

Informational Meeting

You are invited to an informational meeting to be held at the University of Hawai‘i Hilo in UCB 101 on Thursday 10 December 2015. This meeting will begin at 5:00 p.m. The informational meeting will take no more than 45 minutes and will include an explanation of the research study, training on how to access, use, and complete the survey, signing of the consent to participate form, and a question and answer period. During this meeting, you will also be provided an opportunity for you to begin and/or complete the survey using your personal devices or a device provided by the researcher.

If you are unable to attend this informational meeting, but would still like to participate in the research study. Please send an email, from the email that you would like to access the survey, to the researcher at tokaui@vt.edu. Please type “RESEARCH STUDY PARTICIPANT” in the subject line. At that point, I will email you instructions on completing and returning the consent form, an instructional video of how to access, use, and complete the electronic survey, and logistic information regarding the survey period.

Risks and Benefits

Research participants will have the opportunity to reflect on and self-assess his/her culturally responsive teaching practices and cultural competence. The research findings will allow participating schools to develop cultural competence professional development that is relevant to its faculty and staff, respect group differences, and acknowledge the existing levels of competence of its current personnel. The Hawaii Department of Education will be able to identify training needs with respect to improving curriculum, instruction, and assessment for its culturally diverse population, especially the Native Hawaiian population, identify the existing cultural competence strength of its personnel, and identify key training topics. There are no known risks to participating in this study. The survey is completely anonymous. You will not be compensated for your participation in the study.

Anonymity and Confidentiality

The survey does not ask you to provide any personally identifying information so it is anonymous. Individual responses to the survey will be available only to the principal investigator. It is possible that the Institutional Review Board (IRB) at Virginia Tech will view this study's data for auditing purposes. The IRB is responsible for overseeing the protection of human subjects who are involved in research.

Questions

If you have any questions about the study, please contact Mrs. Toni Marie Kaui at tokaui@vt.edu.

Mahalo nui loa for your support in helping us to maintain the high caliber professional development we strive to offer each and every one of you! We thank you in advance for your participation!

Mālama pono!

Me ka ha'aha'a,

Toni Marie Kaui

D: Recruitment Announcement for Non-MSP Participants

Aloha mai kākou!

Because you are a teacher at an elementary school in the KKP complex and teach grade 3, 4, 5, or 6, you are invited to participate in a study examining the development of teacher cultural competence and culturally responsive teaching self-efficacy. In order to participate in this study, you will be asked to complete a three part survey in which you provide different types of rating on your development of cultural competence and your self-efficacy of culturally responsive teaching. The survey is administered electronically via the Internet. It should take no more than 45 minutes to complete the survey. The survey allows you to save, exit, and continue multiple times within the two week survey open period. Your access to the survey will be via a self-identified email address and can only be accessed via this email address that you share with the researcher. The survey also has mobile capability allowing for the use of tablets and cell phone, which might require you to share an email that you can access using either or both of these types of equipment, as well as your desktop or laptop computer.

Informational Meeting

You are invited to an informational meeting to be held at the University of Hawai‘i Hilo in UCB 101 on Thursday 10 December 2015. This meeting will begin at 5:00 p.m. The informational meeting will take no more than 45 minutes and will include an explanation of the research study, training on how to access, use, and complete the survey, signing of the consent to participate form, and a question and answer period. During this meeting, you will also be provided an opportunity for you to begin and/or complete the survey using your personal devices or a device provided by the researcher.

If you are unable to attend this informational meeting, but would still like to participate in the research study. Please send an email, from the email that you would like to access the survey, to the researcher at tokaui@vt.edu. Please type “RESEARCH STUDY PARTICIPANT” in the subject line. At that point, I will email you instructions on completing and returning the consent form, an instructional video of how to access, use, and complete the electronic survey, and logistic information regarding the survey period.

Risks and Benefits

Research participants will have the opportunity to reflect on and self-assess his/her culturally responsive teaching practices and cultural competence. The research findings will allow participating schools to develop cultural competence professional development that is relevant to its faculty and staff, respect group differences, and acknowledge the existing levels of competence of its current personnel. The Hawaii Department of Education will be able to identify training needs with respect to improving curriculum, instruction, and assessment for its culturally diverse population, especially the Native Hawaiian population, identify the existing cultural competence strength of its personnel, and identify key training topics. There are no known risks to participating in this study. The survey is completely anonymous. Your administrators and/or colleagues will not know if you choose to participate or not. Participation in this study will have no impact on your future employment. You will not be compensated for your participation in the study.

Anonymity and Confidentiality

The survey does not ask you to provide any personally identifying information so it is anonymous. Individual responses to the survey will be available only to the principal investigator. It is possible that the Institutional Review Board (IRB) at Virginia Tech will view this study's data for auditing purposes. The IRB is responsible for overseeing the protection of human subjects who are involved in research.

Questions

If you have any questions about the study, please contact Mrs. Toni Marie Kaui at tokau@vt.edu.

Mahalo nui loa for your support in helping us to maintain the high caliber professional development we strive to offer each and every one of you! We thank you in advance for your participation!

Mālama pono!

Me ka ha'aha'a,

Toni Marie Kaui

E: Script for Informational Meeting

Informational Meeting

1. Welcome to potential participants.
 - 1.1. “Aloha mai kākou! Welcome and thank you for your willingness to participate in this research study.”
 - 1.2. Email sign-up sheet.
 - 1.2.1. “Please provide your preferred email address you would like to use for this research study. When deciding what email address to use, please keep in mind that in order to use the mobile features of the electronic survey, you will need to have access to your preferred email address via your tablet and/or smart phone. For some, this may eliminate the use of your work email address. Please indicate your preferred email address under the appropriate column. If you were a Moenahā participant, you will write your email address in the appropriate column, the left column. If you were not a Moenahā participant, you will write your email address in the right column.”
2. Purpose of research study.
 - 2.1. “As your invitational email indicated, the purpose of this research study is to determine if there is a correlation between the Moenahā School professional development program and the degree of teacher culturally responsive teaching self-efficacy and the level of teacher cultural competence.”
3. Requirements of your participation.
 - 3.1. “Participation in this research study only requires the completion of an electronic survey.”

4. Risk and Benefits.

4.1. “Research participants will have the opportunity to reflect on and self-assess his/her culturally responsive teaching practices and cultural competence. The research findings will allow participating schools to develop cultural competence professional development that is relevant to its faculty and staff, respect group differences, and acknowledge the existing levels of competence of its current personnel. The Hawaii Department of Education will be able to identify training needs with respect to improving curriculum, instruction, and assessment for its culturally diverse population, especially the Native Hawaiian population, identify the existing cultural competence strength of its personnel, and identify key training topics. There are no known risks to participating in this study. The survey is completely anonymous. You will not be compensated for your participation in the study.”

5. Anonymity and Confidentiality.

5.1. “The survey does not ask you to provide any personally identifying information so it is anonymous. Individual responses to the survey will be available only to the principal investigator. It is possible that the Institutional Review Board (IRB) at Virginia Tech will view this study’s data for auditing purposes. The IRB is responsible for overseeing the protection of human subjects who are involved in research.

6. Consent Form.

6.1. “When you arrived, you were provided with a copy of the consent form for your review and records. Your completion of the electronic survey implies your consent to participate in the research study. Please take as much time as you need to review the consent form.”

7. Questions.

7.1. “Are there any questions regarding what I have already discussed, the electronic survey, and/or the research study, itself?”

8. Instructional Video.

8.1. “If there are no further questions, let us watch an Instructional Video about accessing and completing the survey. During the video, I will prepare and send your electronic survey access email.”

9. Conclusion.

9.1. “You have been provided access to the electronic survey. At this time, you can stay to complete the survey here using these computers, or you may leave to complete the survey at a later time. The survey will only be open for two weeks from today. You will no longer have access to the survey as of midnight on Thursday 24 December 2015. You will receive two reminder emails with one week remaining and with three days remaining. If, at any time during this survey period, you have any questions, concerns, and/or technical difficulties, please contact me, Toni Marie Kaui, via email at tokaui@vt.edu or phone at (808) 557-5998.”

10. Thank you.

10.1. “Thank you for your participation and support.”

F: Survey Instrument

Appraisal Inventory

Q1.1. Rate how confident you are in your ability to successfully accomplish each of the tasks listed below. Each task is related to teaching. Please rate your degree of confidence using the sliding scale from 0 (no confidence at all) to 100 (completely confident). Remember that you may use any number between 0 and 100.

Q1.2. I am able to:

| | No Confidence At All | | | | Moderately Confident | | | | Completely Confident | | | |
|--|-------------------------|----|----|----|-------------------------|----|----|----|-------------------------|----|-----|--|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| 1. adapt instruction to meet the needs of my students. | | | | | | | | | | | | |
| 2. obtain information about my students' academic strengths. | | | | | | | | | | | | |
| 3. determine whether my students like to work alone or in a group. | | | | | | | | | | | | |

| | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|
| <p>4. determine whether my students feel comfortable competing with other students.</p> | | | | | | | | | | |
| <p>5. identify ways that the school culture (e.g., values, norms, and practices) is different from my students' home culture.</p> | | | | | | | | | | |
| <p>6. implement strategies to minimize the effects of the mismatch between my students' home culture and the school culture.</p> | | | | | | | | | | |
| <p>7. assess student learning using various types of assessments.</p> | | | | | | | | | | |
| <p>8. obtain information about my students' home life.</p> | | | | | | | | | | |
| <p>9. build a sense of trust in my students.</p> | | | | | | | | | | |
| <p>10. establish</p> | | | | | | | | | | |

| | | | | | | | | |
|--|--|--|--|--|--|--|--|--|
| positive home-school relations. | | | | | | | | |
| 11. use a variety of teaching methods. | | | | | | | | |
| 12. develop a community of learners when my class consists of students from diverse backgrounds. | | | | | | | | |
| 13. use my students' cultural background to help make learning meaningful. | | | | | | | | |
| 14. use my students' prior knowledge to help them make sense of new information. | | | | | | | | |
| 15. identify ways how students communicate at home may differ from the school norms. | | | | | | | | |
| 16. obtain information about my students' cultural background. | | | | | | | | |

| | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
| 17. teach students about their cultures' contributions to science. | | | | | | | | | |
| 18. greet English Language Learners with a phrase in their native language. | | | | | | | | | |
| 19. design a classroom environment using displays that reflects a variety of cultures. | | | | | | | | | |
| 20. develop a personal relationship with my students. | | | | | | | | | |
| 21. obtain information about my students' academic weaknesses. | | | | | | | | | |
| 22. praise English Language Learners for their accomplishments using a phrase in their native language. | | | | | | | | | |
| 23. identify ways that standardized tests may be | | | | | | | | | |

| | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| biased towards linguistically diverse students. | | | | | | | | |
| 24. communicate with parents regarding their child's educational progress. | | | | | | | | |
| 25. structure parent-teacher conferences so that the meeting is not intimidating for parents. | | | | | | | | |
| 26. help students to develop positive relationships with their classmates. | | | | | | | | |
| 27. revise instructional material to include a better representation of cultural groups. | | | | | | | | |
| 28. critically examine the curriculum to determine whether it reinforces negative cultural stereotypes. | | | | | | | | |
| 29. design a lesson that shows how other cultural | | | | | | | | |

| | | | | | | | | |
|--|--|--|--|--|--|--|--|--|
| groups have made use of mathematics. | | | | | | | | |
| 30. model classroom tasks to enhance English Language Learner's understanding. | | | | | | | | |
| 31. communicate with the parents of English Language Learners regarding their child's achievement. | | | | | | | | |
| 32. help students feel like important members of the classroom. | | | | | | | | |
| 33. identify ways that standardized tests may be biased towards culturally diverse students. | | | | | | | | |
| 34. use a learning preference inventory to gather data about how my students like to learn. | | | | | | | | |
| 35. use examples that are familiar to students from | | | | | | | | |

| | | | | | | | | |
|--|--|--|--|--|--|--|--|--|
| diverse cultural backgrounds. | | | | | | | | |
| 36. explain new concepts using examples that are taken from my students' everyday lives. | | | | | | | | |
| 37. obtain information regarding my students' academic interests. | | | | | | | | |
| 38. use the interests of my students to make learning meaningful for them. | | | | | | | | |
| 39. implement cooperative learning activities for those students who like to work in groups. | | | | | | | | |
| 40. design instruction that matches my students' developmental needs. | | | | | | | | |
| 41. teach students about their cultures' contributions to society. | | | | | | | | |



Knowledge of Communities

Q2.1. Please indicate the response that most accurately reflects your perceptions. If you have trouble understanding a question, answer to the best of your ability. Inapplicable questions will be statistically eliminated from the analysis. Please keep in mind that there is no way to perform poorly.

Q2.2. How well are you able to describe the communities of color in your service area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.3. Please list the cultural group(s) of color who reside in your complex area and how much of the overall population this represents. In the box below, please use the following format:

Cultural group, percent of population in complex area, percent of population in state.

Q2.4. How well are you able to describe within-group differences?

- Not at all
- Barely

- Fairly well
- Very well

Q2.5. How well are you able to describe the strengths of the groups of color in your service area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.6. How well are you able to describe the social problems of the groups of color in your service area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.7. To what extent do you know the following demographics within communities of color in your complex area?

| | Not at all | Barely | Fairly well | Very well |
|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Unemployment rates | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Geographic locations | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Income differentials | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Educational attainment | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Birth/death rates | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Crime rates | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Homicide rates |

Q2.8. To what extent do you know the following types of people of color in your service area?

| | Not at all | Barely | Fairly well | Very well |
|---------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Social historians | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Informal supports and natural helpers | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Formal social service agencies | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Formal leaders | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Informal leaders | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Business people | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Advocates | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Clergy or spiritualists | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q2.9. Do you know the prevailing beliefs, customs, norms and values of the groups of color in your service area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.10. Do you know the social service needs within groups of color that go unaddressed by the formal social service system?

- Not at all
- Barely
- Fairly well
- Very well

Q2.11. Do you know of social service problems that can be addressed by natural networks of support within the groups of color?

- Not at all
- Barely
- Fairly well
- Very well

Q2.12. Do you know of any conflicts between or within groups of color in your complex area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.13. Do you know the social protocol within communities of color?

- Not at all
- Barely
- Fairly well
- Very well

Q2.14. Do you know how the causes of mental health/illness are viewed by the groups of color in your area?

- Not at all
-

Barely

- Fairly well
- Very well

Q2.15. Do you understand the conceptual distinction between the terms "immigrant" and "refugee?"

- Not at all
- Barely
- Fairly well
- Very well

Q2.16. Do you know what languages are used by the communities of color in your area?

- Not at all
- Barely
- Fairly well
- Very well

Q2.17. Are you able to describe the common needs of people of *all colors* in your community?

- Not at all
- Barely
- Fairly well
- Very well

Personal Involvement

Q3.1. Do you attend cultural or racial group holidays or functions within communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Q3.2. Do you interact with people of color within your service area?

- Not at all
- Seldom
- Sometimes
- Often

Q3.3. Do you attend school-based meetings that impact people of color in your service area?

- Not at all
- Seldom
- Sometimes
- Often

Q3.4. Do you attend community forums or neighborhood meetings within communities of color?

- Not at all
- Seldom
-

Sometimes

- Often

Q3.5. Do you patronize businesses owned by people of color in your complex area?

- Not at all
- Seldom
- Sometimes
- Often

Q3.6. Do you pursue recreational or leisure activities within communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Q3.7. Do you feel safe within communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Q3.8. Do you attend inter-agency coordination (IAC) meetings that impact service delivery in communities of color?

-

- Not at all
- Seldom
- Sometimes
- Often

Q3.9. Do you attend community- or culturally-based advocacy group meetings within communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Resources and Linkages

Q4.1. Does your school work collaboratively with programs that provide...

| | Not at all | Barely | Fairly well | Very well |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| employment training? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| educational opportunity? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| housing? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| alcohol/substance abuse treatment? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| maternal/child health services? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| public health services? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| juvenile justice services? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| recreation services? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| child welfare services? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

youth development
services?



Q4.2. Does your school have linkages with institutions of higher education (e.g., colleges, universities, or professional schools) that could provide you with accurate information concerning communities of color?

- None
- A few
- Some
- Many

Q4.3. Does your school have linkages with civil rights, human rights, or human relations groups that provide accurate information concerning populations of color?

- None
- A few
- Some
- Many

Q4.4. Does your school have linkages with the U.S. Department of Census, local planners, chambers of commerce, or philanthropic groups who can provide you with accurate information regarding populations of color?

- None
- A few
- Some
- Many

Q4.5. Does your school publish or assist in the publication of information focusing on populations of color?

- None
- A few
- Some
- Many

Q4.6. Has your school conducted or participated in a needs assessment utilizing providers in communities of color as respondents?

- Never
- Once or twice
- A few times
- A number of times

Q4.7. Has your school conducted or participated in a needs assessment utilizing people of color as respondents?

- Never
- Once or twice
- A few times
- A number of times

Q4.8. Does your school have linkages with advocates for communities of color who can give you reliable information regarding community opinions about diverse and important issues?

- None
- A few
-

- Some
- Many

Q4.9. Does your school conduct an open house or similar event to which you invite providers, consumers, and others concerned with service delivery to communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Q4.10. Does staff utilize cultural consultants who can help them work more effectively within a cultural context?

- Not at all
- Seldom
- Sometimes
- Often

Q4.11. Does your school utilize interpreters to work with non-English speaking persons?

- Not at all
- Seldom
- Sometimes
- Often

Q4.12. Does your school subscribe to publications (local or national) in order to stay abreast of the latest information about populations of color?

- None
- A few
- Some
- Many

Q4.13. Does your school compile books or culturally-related written materials regarding people of culture?

- None
- A few
- Some
- Many

Staffing

Q5.1. Are there people of color on the staff of your school?

- None
- A few
- Some
- Many

Q5.2. Are there people of color represented in...

| | None | A few | Some | Many |
|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| administrative positions? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| direct service positions? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| administrative support positions? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| operational support positions? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| board positions? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| agency consultants? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| case consultants? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| (sub)contractors? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q5.3. Does your school...

| | Never | Seldom | Sometimes | Regularly |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| hire natural helpers or other non-credentialed people of color as para-professionals? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| hire practicum students or interns of color? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| out-station staff in communities of color? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| hire bilingual staff? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q5.4. Does your school prepare new staff to work with people of color?

- Not at all
- Barely
- Fairly well
- Very well

Q5.5. Does your school provide training that help staff work with people of color?

- Not at all
- Seldom
- Sometimes
- Often

Q5.6. Does your school emphasize active recruitment of people of color for staff positions?

- None
- A little
- Some
- A lot

Q5.7. How well has your school been able to retain people of color on the staff?

- Not at all
- Barely
- Fairly well
- Very well

Q5.8. Does your school staff routinely discuss barriers to working across cultures?

- Not at all
- Seldom
- Sometimes
-

Often

Q5.9. Does school staff routinely discuss their feelings about working with consumers/co-workers of color?

- Not at all
- Seldom
- Sometimes
- Often

Q5.10. Does school staff routinely share practice-based "success stories" involving people of color?

- Not at all
- Seldom
- Sometimes
- Often

Q5.11. Does your school direct students of color towards careers in human service or related occupations?

- Not at all
- Seldom
- Sometimes
- Often

Q5.12. Does your school convene or reward activities that promote learning new languages relevant to the communities of color that the agency serves?

~

- Not at all
- Seldom
- Sometimes
- Often

Organizational Policy and Procedures

Q6.1. As a matter of formal policy, does your school...

| | No policy | Considering policy | Writing formal policy | Policy in place |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| use culture-specific assessment instruments for diagnosis? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| use culture-specific treatment approaches? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| envision community empowerment as a treatment goal? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| review case practice on a regular basis to determine relevancy to clients of color? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| provide or facilitate child care? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| provide or facilitate transportation (e.g., bus tickets, ride-sharing)? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| allow access after regular business hours (e.g., through message-beeper, agreements with crisis-providers, etc.)? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| consider culture in service plans? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

conduct outreach to community-based organizations, social service agencies, natural helpers, or extended families?

take referrals from non-traditional sources?

translate agency materials into languages that reflect the linguistic diversity in your service area?

solicit input from groups of color with respect to physical plant location and interior design?

advocate for a better quality of life for persons of color in addition to providing services?

Q6.2. In general, how well are policies communicated to school staff?

- Not at all
- Barely
- Fairly well
- Very well

Q6.3. Is information on the ethnicity or culture of clients specifically recorded in your organization management information system?

- Not at all
- Minimally

- Pretty well
- Very well

Reaching Out to Communities

Q7.1. How well do you assure that the communities of color are aware of your program and the services and resources you offer?

- Not at all
- Barely
- Fairly well
- Very well

Q7.2. Does your school reach out to...

| | Never | Seldom | Sometimes | Regularly |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| churches and other places of worship, clergy persons, ministerial alliances, or indigenous religious leaders in communities of color? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| medicine people, health clinics, doctors, dentists, chiropractors, naturopath, herbalists or midwives that provide services in or to members of communities of color? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| publishers, broadcast or other media sources within communities of | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

color?

formal entities that
provide services?

cultural, racial, or
tribal organizations
where people of
color are likely to
voice complaints or
issues?

business alliances or
organization in
communities of
color?



Q7.3. Are people of color depicted on school brochures or other media?

- Not at all
- Seldom
- Sometimes
- Often

Q7.4. Does your school participate in cultural, political, religious, or other events or festivals sponsored by communities of color?

- Not at all
- Seldom
- Sometimes
- Often

Demographic Information

Q8.1. Now we would like to ask your questions about yourself. These are for research purposes only and will not be used to identify you.

Q8.2. Sex

- Male
- Female

Q8.3. Race

- Native Hawaiian/Part Native Hawaiian
- Asian/Pacific Islander
- Black/African American
- Hispanic- or Latino-American
- Native American/Indian American
- Caucasian
- Other

Q8.4. Age

- 18-22
- 23-27
- 28-32
- 33-37
- 38-42
- 43-47
- 48-52
- 53-57
- 58-62
- 62+

Q8.5. Are you a licensed teacher?

- Yes
- No

Q8.6. If you are a licensed teacher, how many years have you been licensed?

- 0-4
- 5-9
- 10-14
- 15-19
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45+

Q8.7. How many years have you been teaching?

- 0-4
- 5-9
- 10-14
- 15-19
- 20-24
- 25-29
- 30-34
-

35-39

- 40-44
- 45+

Q8.8. How many years have you been at your current school?

- 0-4
- 5-9
- 10-14
- 15-19
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45+

Q8.9. Rank in order from most to least the groups of color with whom you serve most.

Native Hawaiian/Part Hawaiian

Asian/Pacific Islander

Black/African American

Hispanic- or Latino-American

Native American/Indian American

Caucasian

Q8.10. Rank in order from most to least the groups of color of which you feel most knowledgeable.

Native Hawaiian/Part Hawaiian

Asian/Pacific Islander

Black/African American

Hispanic- or Latino-American

Native American/Indian American

Caucasian

Q8.11. Rank in order from most to least the groups of color with whom you have most social contact.

Native Hawaiian/Part Hawaiian

Asian/Pacific Islander

Black/African American

Hispanic- or Latino-American

Native American/Indian American

Caucasian

Q8.12. List any foreign languages that you currently speak.

Q8.13. How many cultural awareness/competence workshops or conferences have you attended since 2000?

- None
- 1 to 3
- 4 to 6
- 7 to 9
- 10 or more

Survey Powered By **Qualtrics**

G: HIDOE Approval Letter

DAVID Y. IGE
GOVERNOR



KATHLEEN S. WATAYÓSHI
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2380
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

November 25, 2015

Ms. Toni Marie Kauri
P.O. Box 163
Pearl City, HI 96782

Re: Research Application Decision

Dear Ms. Kauri:

I am pleased to approve your Hawaii State Department of Education (HIDOE) research application for the study "Developing Cultural Competence and Promoting Culturally Responsive Teaching in STEM Educators of Native Hawaiian Students" (Application #RES2015009).

This approval will expire May, 31, 2016. If you require additional time to complete your study, you must submit a request for an extension or another application before this approval expires. If you intend to make changes to your project you must submit the change request to the Data Governance and Analysis Branch prior to implementing the change. These changes include but are not limited to (1) any changes that require approval from your Institutional Review Board and (2) any changes that are in conflict with or not included in this approval letter. Significant changes may need to be reviewed by the Research Review Committee at their next scheduled meeting. If changes are approved, a modified approval letter will be issued to the researcher, the targeted schools, and affiliated state/district office staff.

As described in your application, the objective of your study is:

- To determine the extent to which STEM educators of Native Hawaiian student populations are culturally responsive and culturally competent through a comparative assessment of the degrees of culturally responsive teaching self-efficacy reported and the level of cultural competence of STEM educators Moanalua School program participants and non-program participants.

You have indicated that you will be inviting three (3) HIDOE schools to participate in your study:

1. Keaau Elementary
2. Koonopoko Elementary
3. Pahoa Elementary

You must present this letter to the appropriate HIDOE administrator(s) upon invitation to participate in your research.

You have also indicated that you will be inviting the following individuals at these targeted schools to participate in your study:

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

Ms. Toni Marie Kaui
November 25, 2015
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- Teachers

Teachers who participate in your study will be involved in the following activities:

1. Attend an informational meeting regarding the study; 45 minutes long
2. Complete an electronic survey of participant; approximately 45 minutes to complete, conducted outside of work hours.

You will also collect the following data about teachers:

1. HIDOE email addresses for distribution of survey and recruitment materials

As you proceed with your study, please be aware of the following:

- The participation of HIDOE schools, offices, students, and personnel in your study is strictly voluntary.
- All study activities must take place at dates, times, and locations agreed upon by the administrators of the participating HIDOE schools and offices.
- Any compensation provided to HIDOE personnel for participation in your study must be for activities completed outside of instructional and work hours and must be in compliance with the Hawaii State Ethics Code. Any questions about this topic should be referred to the Data Governance and Analysis Branch.
- You are required to conduct your study in accordance with both the conditions of approval described in this letter and the document "Affirmation and Acknowledgement of the Processes, Procedures, and Conditions for Conducting Research in the Hawaii State Department of Education" (the "Affirmation Form for Researchers"). This document is attached to this letter.
- You are responsible for ensuring that all individuals involved in this study – both those affiliated with your organization and those contracted by your organization and affiliated with external entities or vendors – adhere to all of the conditions of my approval, including those detailed in this letter and those stipulated by the Affirmation Form for Researchers.

Should you have any questions about the above, please contact Ke'ala Fukuda, HIDOE Data Governance and Analysis Branch, at DOEResearch@notes.k12.hi.us or (808) 784-6061.

Best wishes for a successful study. We look forward to receiving your findings and recommendations.

Very truly yours,


Kiyomi S. Matayoshi
Superintendent

KSM:bk

Attachment : Affirmation and Acknowledgement of the Procedures and Conditions for Conducting Research
in the Hawaii State Department of Education

c: Data Governance and Analysis Branch

**AFFIRMATION AND ACKNOWLEDGEMENT OF THE PROCEDURES AND CONDITIONS FOR
CONDUCTING RESEARCH IN THE HAWAII STATE DEPARTMENT OF EDUCATION**

Section I: Researcher InformationName: Toni Marie Kauj Title: _____Affiliated organization or institution: Virginia TechEmail address: tkauj@vt.edu Phone number: (800) 557-3334Mailing address: PO Box 163, Pearl City, HI 96782

**Section II: Affirmation of Research Project Value and Quality &
Affirmation of Research Project Representative Responsibilities**

I, the above-named research project representative, have reviewed the Application to Conduct Research in the Hawaii State Department of Education (HIDOE) to which this document is attached ("the Application") and affirm that, to the best of my knowledge, information and belief, the research project proposed in the Application ("the Project"), entitled Developing Cultural Competence and Promoting Culturally Responsive Teaching in STEM Educators of Native Hawaiian Students is educationally worthwhile and of sound technical design.

Furthermore, I affirm that I will:

1. Comply with the established procedures and conditions for conducting research in HIDOE, as described in this document;
2. If applicable, comply with the established procedures for requesting data from HIDOE;
3. Act in accordance with professional ethics and standards of conduct when implementing the Project, including using the data collected during the course of implementing the Project (e.g., completed surveys, interview responses, signed participant consent forms, minor student assent documentation) or made available to me by HIDOE for the Project (e.g., HIDOE data sets) [collectively referred to as "the Data"] exclusively for the purposes described in the Application and in an ethically responsible manner that is consistent with the Forum Code of Data Ethics;¹
4. Ensure that the Project and the handling of the Data are in compliance with all relevant federal and state laws and regulations pertaining to information confidentiality and security and the privacy and use of student and personnel records, such as the Family Educational Rights and Privacy Act (FERPA), the Protection of Pupil Rights Amendment (PPRA), the Individuals with Disabilities Act (IDEA), and the Hawaii Revised Statutes (HRS);
5. Obtain and maintain documentation of written consent from all adult participants (which includes students 18 years and older) and both active assent from participants who are minors (written assent for those ages 12 to 17 years and verbal assent for those 11 years

¹ For information about the Forum Code of Data Ethics, see the National Forum on Education Statistics' Forum *Guide to Data Ethics*, available from the U.S. Department of Education's National Center for Education Statistics (NCES) website at <https://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2010091>.

**AFFIRMATION AND ACKNOWLEDGEMENT OF THE PROCEDURES AND CONDITIONS FOR
CONDUCTING RESEARCH IN THE HAWAII STATE DEPARTMENT OF EDUCATION**

and younger) and written consent from their guardians prior to their participation in the Project;

6. Protect the security of the Data and the confidentiality of the Project's participants by:
 - a. Ensuring that procedures for maintaining the Data are secure enough to prohibit access to anyone other than the Project Staff;
 - b. Preventing the unauthorized release or publication of the Data, particularly those data that are personally identifiable and school-identifiable, by the Project Staff;
 - c. Maintaining the confidentiality of the personally identifiable and school-identifiable at all stages of the Project, including within the final report, and
 - d. Destroying the Data, including any copies, when the final report on the Project is complete
7. Assume responsibility for the protection of the Data and liability for any inappropriate or unlawful release or publication of the Data by the Project Staff;
8. Submit proposed revisions to the Application to DGA for review and approval prior to making changes to the Project's approved scope or design;
9. Submit an application for an extension of the Project to DGA prior to the end of the Project's approval period, should additional time be required to complete the Project;
10. Duly note the general source of information as "Hawaii State Department of Education;"
11. At least two (2) weeks prior to printing, publishing or otherwise publicly releasing the final report on the Project, submit electronic copies of a final draft to:
 - a. The administrators of the participating schools and offices for their review, and
 - b. If the Project involved either participants who are HIDOE students or personnel or the collection and/or receipt of personally identifiable HIDOE student or personnel data, to DGA via email at DGA@notes.k12.hi.us to be screened for the inclusion of personally identifiable HIDOE student and personnel data;
12. Submit an electronic copy of the final report on the Project, including its findings and any related recommendations, to DGA *no later than six (6) months after the end of the Project's approval period*; and
13. Upon request, share electronic copies of the final report on the Project with:
 - a. Participants in the Project,
 - b. The complex area superintendents of the participating schools, and
 - c. The assistant superintendents/directors of the participating HIDOE offices.

Section III: Acknowledgement of Conditions for Conducting Research In HIDOE

In addition, I acknowledge the following:

1. Participation in the Project by HIDOE students and personnel will be strictly voluntary and contingent upon the written approval of the relevant school or office administrator(s) and the written consent of the individual participant(s) (and, in the case of minor participants, their guardians);

**AFFIRMATION AND ACKNOWLEDGEMENT OF THE PROCEDURES AND CONDITIONS FOR
CONDUCTING RESEARCH IN THE HAWAII STATE DEPARTMENT OF EDUCATION**

2. After consenting to participate in the Project, participants (and, in the case of minor participants, their guardians on their behalf) may withdraw from the Project at any time, for any reason;
3. All activities related to the Project must take place at dates, times, and locations agreed upon by the administrators of the participating schools and offices;
4. Any compensation provided to HIDOE personnel for participation in the Project must be for activities completed outside of instructional and work hours;
5. Observation activities must be limited to the stated scope of the Project and observations of HIDOE personnel must not be used for the purpose of personnel performance evaluations;
6. Copies of the Project's data collection instruments (e.g. surveys, interview schedules) must be presented to the administrators of the participating schools and offices for review prior to the implementation of the Project;
7. If the Project will involve participants who are minor students, a copy of the relevant data collection instrument(s) must, upon request, be made available to the students' guardians for review in the office of the participating school prior to the implementation of the Project;
8. Oral instructions must be provided for all participant activities related to the Project that involve minor students;
9. The Application cannot be approved by HIDOE until DGA has received an official approval or response letter for the Project that has been issued by an accredited institutional review board (IRB);
10. Data requests related to the Project will be filed as the time and workload of HIDOE personnel allow;
11. If a FERPA-compliant written agreement pertaining to the Project is executed between myself and a designated HIDOE representative and its contents are in any way in conflict with the contents of this document, the language of the FERPA-compliant written agreement will take precedence.
12. Consideration by HIDOE of any future Applications to Conduct Research in HIDOE that I may submit is contingent upon my submission of a final report on the Project to DGA no later than six (6) months after the end of the Project's approval period;
13. If the Project involves either participants who are HIDOE students or personnel or the collection and/or receipt of personally identifiable HIDOE student or personnel data, it may be subject to a random audit by DGA— either during its implementation or after its completion — to determine whether the Project, the Project Staff, and the handling of the Data are/were in compliance with the processes, procedures and conditions for conducting research in HIDOE described in this document, as well as all relevant federal and state laws and regulations pertaining to information confidentiality and security and the privacy and use of student and personnel records;
14. In the event that any of the processes, procedures, or conditions for conducting research in HIDOE described in this document are violated by any of the Project Staff, I will report the violation(s) and submit a detailed description of the violation(s) — including dates and other relevant details — to DGA in writing within ten (10) days;

**AFFIRMATION AND ACKNOWLEDGEMENT OF THE PROCEDURES AND CONDITIONS FOR
CONDUCTING RESEARCH IN THE HAWAII STATE DEPARTMENT OF EDUCATION**

15. In the event that there is a security breach involving any of the Data that are personally identifiable, I will immediately report the breach to DGA in writing and submit a completed "Information Security Breach — Initial Assessment and Scope" form to DGA (this form will be provided by DGA in the event it is needed).
16. If any FERPA violations occur related to the Project, I, as the responsible party, will be ineligible to receive personally identifiable data from HIDOE for a minimum of five (5) years;
17. Violation of any of the procedures or conditions for conducting research in HIDOE described in this document by any of the Project Staff will result in the immediate revocation of the Project's approval, at which point I will:
 - a. Stop the implementation of the Project,
 - b. Have the Data, including any copies, destroyed by a company with which the Project Staff are not affiliated, and
 - c. Have said company send a letter to DGA verifying the destruction of the Data; and
18. If approval of the Project is revoked by HIDOE, I will be ineligible to submit an Application to Conduct Research in HIDOE or to conduct research in HIDOE as either a principal investigator or a research project team member for 24 months from the date of the revocation of the Project's approval.

Signature: _____



Date: 10 July 2015