

CONSTRUCTION OF KNOWLEDGE ABOUT TEACHING PRACTICE AND
EDUCATING STUDENTS FROM DIVERSE CULTURES IN
AN ONLINE INDUCTION PROGRAM

by

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ABSTRACT

Beginning teachers in both urban areas and geographically isolated rural areas often do not have access to a mentor teacher of the same content area or grade level in their school or district. This project is a study of learning in the online e-Mentoring for Student Success (eMSS) program, which provides induction for science and mathematics teachers in Montana and California. The study centered on a particular segment of eMSS called the Diversity Module.

Two examinations were conducted: 1) Analysis of discourse by all participants in the Diversity Module, and 2) case study of five beginning teachers with diverse student populations. Analysis of learning by cases was conducted by examining discourse in the Diversity Module, private online discussions with their assigned mentors during a two-year period, and pre and post Diversity Module interviews and interviews of their mentors. Three frameworks were developed to aid understanding of findings: 1) discourse analysis, 2) competencies of multicultural teachers, and, 3) competencies of pedagogical and pedagogical content knowledge.

Cases developed their knowledge of teaching along a continuum of needs over two years of participation in the eMSS program. Initial needs expressed by mentees were in areas such as classroom management and general methods of instruction. Cases increased their knowledge in virtually all aspects of pedagogical knowledge, changing their expressed needs to pedagogical content knowledge concerns such as adapting and differentiating instruction for particular content and individual students, and building their repertoire of instructional representations.

Through online discussion, teachers developed or advanced awareness of student culture and learning characteristics, and adapted their practice to foster a climate of student respect. Findings provided little evidence of adapting instruction for diverse student learning. Teachers who had a strong awareness of their own and their students' cultures advanced their understanding of multicultural teaching competencies further than those who did not.

Interview results indicated that learning sometimes takes place in a non-visible manner. Growth in multicultural teaching knowledge, as well as several aspects of pedagogical and pedagogical content knowledge, was clearly evident for participants who posted few messages, but read and actively reflected on thoughts of others.

CHAPTER 1

INTRODUCTION

Background

It is widely accepted that in the profession of teaching, beginning teachers need support and guidance as they work through the process of becoming an experienced, effective teacher (Luft, Patterson, 2002; Feiman-Nemser, 2001; Darling-Hammond, 1998, Odell, 1986). Ingersoll (2003) reported that 40 to 50% of beginning teachers leave the profession within five years. Induction, including mentoring, has been shown to have a positive effect on retention rates. In a 2002 book, *Mentoring Programs for New Teachers: Models of Induction and Support*, Villani reported on two successful mentoring projects. The University of New Mexico Teacher Induction Program reported more than 85% of mentored teachers were still teaching after five years. The Systemic Teacher Excellence Preparation (STEP) Project in Montana reported 96% of mentored teachers still teaching after three years.

Another benefit of induction is improvement of teaching practice for beginning teachers. According to the U.S. Department of Education (2001), Montana students perform well in science and mathematics learning assessments when scores are reported statewide. Disaggregation of test score data shows students in underserved areas or populations (typically Native American) score well below the state and national average in science and mathematics. Compounding the problem,

teachers in isolated areas may teach courses in which they are not content experts, and many are in their first years of teaching, with less developed pedagogical skills.

Feiman-Nemser (2001), notes that successful teaching practice requires coherent and sustained teacher development from pre-service preparation through the early years of teaching and beyond. Development of teaching practice in beginning teachers requires reflection and construction of knowledge, just like any learning situation. Knowledge of pedagogy, content, and cultural awareness are important aspects of a successful induction program (Darling-Hammond, 1998; Feiman-Nemser, 2001; Luft, Patterson, 2002). Research by Feiman-Nemser (2001, 1998) and Britton, et al., (2003) has shown that well planned induction leads to teacher reflection about practice, and potentially improved teaching and student learning.

Beginning teachers may experience feelings of isolation for a number of reasons. In small, rural districts, they may be the single teacher of their content area. In larger rural or urban districts, isolation may be due to the relationships among teachers, or the fact that many of their peers are also new. For these reasons, many districts do not have a locally available mentor prepared to help develop pedagogical content knowledge or cultural awareness for beginning teachers. Seventy percent of teachers in Montana are in rural, isolated communities (Montana OPI, 2004). However, isolation is not just a rural phenomenon. New teachers experience isolation in rural and urban districts throughout the country.

In the last decade, distance education has increased in use and complexity (Garrison, Anderson & Archer, 2000; Kanuka and Anderson, 1998; Tu and Corry,

2003), yet knowledge of how this mode of instruction should best be used for purposes such as supporting beginning teachers in isolated areas, is not clearly understood (Garrison, Anderson & Archer, 2001). Distance education provides a convenient method for learning by allowing participants to engage in peer and instructor interaction at a chosen place and time. The enhanced ability in asynchronous online environments to reflect and frame thoughts before sharing them with fellow learners provides avenues for critical thinking not available in face-to-face instruction (Garrison, Anderson & Archer, 2001, 2000; Gunawardena, Lowe & Anderson, 1997; Henri, 1992).

Distance education technology provides a viable solution to the problem of mentoring for beginning teachers in isolated areas. In addition to the convenience of communicating with a mentor teacher at times that fit the teachers' schedules, mentoring by distance can provide timely interaction with an experienced teacher trained in the same content area. In isolated settings, the busy beginning teacher may not have anyone willing to help in his/her subject area in the school or district, he/she may welcome the convenience and value of mentoring via distance technology. If the beginning teacher can be matched with someone in the same discipline, this allows mentoring relating to how to teach specific content in that discipline, moving beyond the survival or general pedagogy focus of many mentoring programs.

Research findings on student achievement comparing cultural, ethnic and socio-economic factors show that achievement gaps may be narrowing between some groups (North Central Regional Educational Laboratory, 2004) and widening between

others (Brickhouse, Lowery, & Shultz, 2000; Jencks & Phillips, 1998). Despite these modest improvements, gaps in achievement exist among various categories of students, particularly in mathematics and science (Banks, 2004; Oakes, Joseph & Muir, 2004). A consensus exists (Brickhouse, Lowery & Shultz, 2000; Oakes, Joseph & Muir, 2004; Wills, Lintz & Mehan, 2004) that informed, multicultural education practice by teachers is necessary to assure all students learn to their greatest potential.

Teachers' awareness of their own cultures, and those of their students is a precondition for education equity (Black & William, 1998; Brickhouse, Lowery, & Shultz, 2000; Koba, 1996; Malloy & Jones, 1998; Solana-Flores & Nelson-Barber, 2000). Facilitating awareness in teachers and providing appropriate instructional resources may provide benefits to learning by students of various backgrounds (Rothstein, 2004).

We can begin to understand the needs of beginning teachers through the scenario of a real teacher in Montana (name is changed):

Bob is a 23-year-old first year teacher. His first job is as the only science teacher of 7-12 science courses in a rural environment in a K – 12 school with less than 100 students. He teaches five different science classes every day ranging from life science to chemistry and physics. Bob's school is near a reservation, whose Native American students are from a culture very different from the one in which Bob was raised.

Bob is overwhelmed. He has several teachers in the building to talk to, although they are polarized into two groups. One group of teachers has ties to the

community and has been teaching in the school for a number of years. The other group of teachers does not have local ties and are either new, or in their second or third year of teaching. Neither group helps Bob much. The older teachers don't talk to him, believing he will only last one year, and the new teachers can't help him in content or teaching science content. The nearest science colleague teaches 30 miles away. Bob needs mentoring in teaching methodology as well as science content and pedagogical content. He does not understand the culture of his Native American students.

To help Bob improve his practice and become a successful, experienced teacher of science, an induction program combining quality content based curriculum and support from an experienced mentor in a distance mode of delivery is needed. The electronic Mentoring for Student Success (eMSS) mentoring program is a pilot program funded by the National Science Foundation designed to provide content specific, distance based induction for teachers of underserved populations in Montana and California, later scaling up to serve additional teachers in other states. For the purpose of this study, the focus will be on isolated teachers of underserved populations, primarily in Montana.

The eMSS program is led by the National Science Teachers Association, combining the mentoring knowledge of the New Teacher Center at the University of California at Santa Cruz with the distance education and distance mentoring knowledge of the Science Math Resource Center at Montana State University. It

involves mathematics and science teachers in Montana and science teachers only in California.

A unique feature of the eMSS induction program is distance-based delivery. While many states are adopting or mandating induction programs, as with any aspect of education, one size does not fit all. Because of the problems presented by the rural and isolated nature of many Montana teachers, distance delivery may be the only way mentoring can take place for a large number of beginning teachers in Montana and other states with geographic isolation and low population densities.

This study examined a professional development intervention (hereafter called the Diversity Module) designed to improve teaching practice of teachers whose students are from a culture different from their own, as a component of the eMSS induction program. California Latino/a students in participating school districts make up 20 to 73% of the student population, with up to 56% of all students qualifying for free and reduced lunch district wide. Less than half of these students test at the proficient level in 11th grade science. In Montana, 75 to 80 percent of students statewide test at the proficient level in 11th grade science. Students in rural schools located near or on Native American reservations typically score 20 to 45 percentile points below state averages. Increased awareness and skills in teachers may improve learning by minority students and decrease this achievement gap.

The Diversity Module, detailed in Chapter Three, was designed to affect change in teaching practice for teachers of diverse students in three ways. It was designed to increase teachers' awareness of his/her own culture and ethnicity; help

teachers understand the background and experiences that shape their students; and help teachers develop culturally relevant curriculum and skills to maximize learning by all students. This module differs from pre-service multicultural education courses because learning was based on the teacher's own classroom and specific students. In this professional development module, beginning teachers also had a mentor teacher to reflect and share ideas with.

Induction has been examined extensively in the research literature, although little research on content-specific induction exists (Luft & Patterson, 2002). Similarly, distance education has been studied extensively, although with little emphasis on learner outcomes (Berge & Mrozowski, 1999). In recent years, electronic mentoring has received some study, the most comprehensive by Single & Muller (2001) on MentorNet, a successful program for mentoring female engineering students. The present study is unique in that it combined the elements of distance education with a content-based induction program. To provide further knowledge on important teaching practice issues, an examination of student diversity needs is also included.

Statement of Problem

In a study of induction programs, Luft & Cox (2001) found that only 20% of beginning mathematics and science teachers in southwestern states had access to an induction program. Furthermore, none of these programs addressed the unique requirements of teaching math and science. In addition to a lack of induction

opportunities, there is a lack of research that specifically addresses induction for science and mathematics teachers (Luft, Roehrig & Patterson, 2002).

According to a 2003 Northwest Regional Labs study, nearly 80% of Montana schools are rural, many of these with only one teacher in secondary content areas (NWREL, 2003). For a new teacher, this is an added burden to the already daunting experience of being a first year teacher. An experienced teacher mentor, with knowledge of content teaching skills may be more than 50 miles away. Even teachers in large schools may experience isolation. Without an available mentor, a beginning teacher may not have the experiences to learn from, and may find it more difficult to improve his/her practice through reflection on practice. A lack of mentoring to help beginning teachers improve classroom practice, compounded by high attrition rates may cause students in rural, isolated schools to have teachers with less experience than non-rural peers. This achievement gap among teachers may be narrowed through quality distance delivered mentoring.

An achievement gap exists among students from different cultural groups in Montana. Examination of the 2003 (most recent available) Montana Iowa Test of Basic Skills results (Montana Office of Public Instruction, 2004) illustrates a test score gap between Native American and White students in science and mathematics. Percentile score comparisons are shown in Table 1.

Table 1 Montana Student Results (Percentile) on 2003 Iowa Test of Basic Skills

Grade Level		Science	Mathematics
Grade 8	White	67	63
	Native American	43	36
Grade 11	White	73	65
	Native American	46	40

Studies of classroom learning by Native American students provide evidence that teacher's awareness of culture and the skills to accommodate culture in the classroom are significant factors in successful learning by individual students (Agbo, 2001; Holm & Holm, 1995; Klug, 2003; Pewewardy, 2002). An intervention to increase awareness and provide resources for beginning teachers to narrow this achievement gap is a component of this study.

To summarize the problem, students of diverse backgrounds do not demonstrate the same levels of achievement as their non-minority peers. Teachers in isolated or urban settings may not have the resources available to develop culturally relevant curriculum and pedagogy. Well planned and executed teacher induction has been shown to positively affect practice in beginning teachers, and the handful of studies that have looked at the achievement of students whose teachers are in such programs show promising results. Induction specially designed for beginning teachers of diverse learners in Montana and California may help to narrow achievement gaps. It should be noted that this study includes in-depth examination of dialogue of beginning and mentor teachers during a two-year period, comparing the classroom

practices they describe with recommendations from multicultural education research.

However, the study does not include classroom observations.

Research Questions

The overarching purpose of this study was to examine the effectiveness of structured online delivery of mentoring during the induction years. This overarching concern can be answered through the following research questions:

1. Are beginning teachers who participate in a distance mentoring program increasing understanding of their students' culture and subsequently adjusting their classroom practice?
2. How does teachers' increased understanding of their students' culture relate to their thinking about classroom practice?

One can argue that the purpose of the eMSS program or any distance-based induction program is to foster online learning communities. These online learning communities, through reflective discourse, can foster knowledge construction among members of the community. Studies on learning communities by Fahy (2003), Hara, Bonk & Angeli (2000), and Lavooy & Newlin (2003) have provided evidence that collaborative reflection in online learning does not happen spontaneously.

The effectiveness of knowledge construction about teacher practice is dependent on the appropriateness of facilitated discourse produced within the program. Therefore, to answer the preceding research questions, one must examine

teacher thinking about practice. The following focus questions guide this examination:

A. What are they learning?

1. What is the content of learning about teaching diverse students and how does it compare to practices for the new teachers' teaching diverse science and mathematics students recommended in the research and practitioner literature?
2. What is the content of mentee and mentor learning and how is it influenced by the formal module curriculum and facilitated discussion?

B. How are they learning it?

1. In what ways do beginning teachers learn about teaching diverse students through interactions with a mentor teacher in a primarily online environment?
2. In what ways do beginning teachers and their mentors learn about teaching diverse students through participation in a facilitated online professional development module?

C. How does new knowledge relate to classroom practice?

1. How do beginning teachers and their mentors monitor the impact of classroom practices they implement to support the learning of their diverse students? What are their measures of success?
2. What is the evidence that the beginning and mentor teachers' develop new understanding about their classroom practice as a result of paired interactions and module discussions about diverse student learning?
3. What is the evidence that beginning teachers and their mentor teachers' classroom practice changes as a result of their paired interactions and module discussions about diverse student learning?

The design of this study is qualitative, using analysis of discourse and case studies to document the phenomenon of online induction for supporting teachers of diverse students. The research questions were designed to inform understanding of the salient structures, processes and beliefs involved in learning by teachers in this

study. Two examinations were conducted for this study. The examination of all discourse in the Diversity Module was accomplished to understand the learning of all participants in this curriculum-based module. The case study examined the learning of five teachers selected from participants in the eMSS induction program. Selection criteria centered on the teacher's student population. I selected the case study participants for this research using the following criteria:

- Montana secondary science or mathematics teacher in first three years of content teaching
- Participating beginning teacher in eMSS program
- Teach on or near a Native American reservation or in a school where student population is culturally different from that of the teacher

(Culturally different student population is defined as exceeding at least one of the following State population averages:

11.2% Native American

15% Non-White

35% low SES (free and reduced lunch)

- Participate in online discourse
- Willing to participate in interviews for study

Fifteen percent of public school students state-wide in Montana are reported as non White (just over 11 percent of students in Montana are Native American). A classroom with greater than 15% minority students can be considered greater than the state average (Montana OPI, 2004). Socio-economic status can be measured by the percentage of students on free or reduced lunch. The state average is 35%, thus a student population greater than 35% free and reduced lunch can be considered to have

a greater percentage of low SES students than the state average. An additional criterion is that participants must have been sufficiently active online to provide informative discourse for analysis.

Two data collection procedures were employed in this study; compilation of discourse and interview. Discourse was collected from several sources. The entire Diversity Module discourse was collected. Case study participants' discourse was collected from the Diversity Module as well as their mentor-mentee paired dialogue (Pair Place). For those case study participants involved in eMSS for two years, Pair Place dialogue was collected for both years.

In any study, choices about data collection must be made. Classroom observations were considered for this study, but the choice was made to not include them. This study focused on gleaning information from two full years worth of online dialogue, with information enhanced by two interviews with each participant and one interview with each participants' mentor.

Each participating teacher was interviewed either in person or by telephone two times, before and after the Diversity Module was conducted. In addition, mentors of case study participants were interviewed after the final case interviews. Analysis of discourse provided information on online learning by participants. Interviews provided a depth of understanding of learning and classroom application.

Knowledge construction by participants was analyzed for understanding of culturally relevant education and application of this understanding. Irvine (2003) contends that a key variable affecting the school achievement of culturally diverse

students is the teacher, who must be sensitive to the needs interests and abilities of his/her students. Blair (1999), Gay (2003), Irvine (2003), and Neuwirth (2003) found that professional development that caused teachers to reflect on their own culture, as well as that of their students, yields successful classroom learning by diverse students. An in depth analysis of discourse and interview responses was conducted for evidence of reflective learning about teachers' own as well as their students' culture.

Definition of Key Terms

Cognitive Presence. Garrison, Anderson, Archer (2001) describe cognitive presence as the extent to which the participants in a community of inquiry are able to construct meaning through sustained communication.

Computer Mediated Communication. Communication for learning purposes between two or more individuals using integrated synchronous or asynchronous web-based computer hardware and software.

Content. A concept to be known and learned. One can define science in this context as the study of the phenomena and material of the universe and the laws, theories and methods of understanding these phenomena and materials. Mathematics content includes understanding the skills and concepts for operations, problem solving and reasoning in number and spatial based systems.

Content Knowledge. For this study, content knowledge is the understanding of science and/or mathematics acquired by study of that content.

Critical Thinking. The acquisition of deep and meaningful understanding through content-specific critical inquiry by the individual learner.

Culturally Responsive Teaching. Pewewardy (1994) provides a clear definition of culturally responsive teaching in regard to Native American students. His definition is applicable for all diverse students: Culturally responsive teaching provides the best possible education for children that preserves their own cultural heritage and prepares them for meaningful relationships with other people, and for living productive lives in the present society without sacrificing their own cultural perspective.

Dialogue. Discussion between two or more persons. One can consider dialogue to be limited to thoughts shared between two people or limited to a specific context.

Discourse. Lupton (1992) describes discourse as a group of ideas or patterned way of thinking which can be identified in textual and verbal communications. In this study discourse is the related ideas and patterns collected in the record of messages in on online communication. Discourse is an inclusive term and can include several dialogues.

Distance Education. Instruction or learning in which the instructor and students do not occupy the same space at the same time. Computer Mediated Communication is often used as a means for distance instruction.

Diversity in Education. While diversity can simply mean different, for the purpose of this study, diversity is used when describing student-teacher relationships. Diverse students are those from a cultural, ethnic or socio-economic group different than that of the majority group.

e-Mentoring. Single & Muller (2001) provide a comprehensive definition of e-mentoring: A relationship between a more experienced individual (mentor) and a less skilled or experienced individual (mentee), primarily using CMC, that is intended to develop and improve the skills, knowledge, confidence and cultural understanding of the mentee to help him/her succeed, while also assisting in the development of the mentor.

Facilitation. Making the process of learning easier through application of methods and skills by a more experienced individual.

Facilitator. A person with a greater conceptual understanding or knowledge that applies his/her knowledge of learning to aide in the construction of knowledge by less experienced learners.

Induction. Borrowing from Sharon Feiman-Nemser's view, induction is both a phase in a teachers' career and a process. As a phase, it is the period during which a teacher develops from preservice preparation through professional practice. As a process, induction involves socializing beginning teachers into teaching practice as well as supporting teachers and helping them build their knowledge about teaching through professional development.

Knowledge Construction. To understand some new piece of information by relating it to an existing mental schema, integrating it with existing knowledge; a type of learning.

Learning. The acquisition of new information through a process and/or experience that results in a relatively permanent change in behavior or understanding.

Mentoring. Single & Muller's (2001) definition of e-mentoring can be applied to mentoring in general as well: A relationship between a more experienced individual (mentor) and a less skilled or experienced individual (mentee), that is intended to develop and improve the skills, knowledge, confidence and cultural understanding of the mentee to help him/her succeed, while also assisting in the development of the mentor.

Online Learning (e-Learning). Online learning comes in many forms, including purely web-based, synchronous (participants online interacting at the same time), asynchronous (participants online at different times), Cd-Rom and Video based, or any combination of these. For the purpose of this study, online learning is considered web-based, primarily using an asynchronous format, with occasional synchronous chat.

Pedagogical Content Knowledge. Pedagogical Content Knowledge combines the knowledge of pedagogy with knowledge of the content being taught. Borrowing from INTASC and NBPTS standards, three aspects of pedagogical content knowledge can be described.

- Teachers understand the central concepts, tools of inquiry, and structures of the discipline they teach.
- Teachers understand how knowledge in their subject is created, organized and linked to other disciplines.
- Teachers can create learning experiences using multiple paths to content knowledge for their students and make the subject matter meaningful.

Pedagogical Knowledge. Pedagogical Knowledge is more than simply understanding teaching. Shulman (1987) describes teaching as the exchange of ideas, in which the teacher takes in an idea, comprehends it, and shapes the idea until it can be grasped by students. To help readers understand this complex system, Shulman describes six aspects of pedagogical knowledge, which are described in Table 11 (Chapter 4).

Practice (Teacher). The process of teaching. Combining the skills, abilities and multiple knowledge types of a teacher in providing and facilitating the construction of knowledge by less experienced learners.

Social Knowledge Construction. Learning in which interaction with a collaborative peer or group helps the learner construct new knowledge based on existing schema.

Significance of Study

An achievement gap in science and mathematics clearly exists among groups of students from diverse cultures. Examination of an intervention to assist teachers in awareness of cultural differences and resources to better teach all students will inform research on achievement gaps in education. Improvements in learning by culturally diverse students are attributed to professional development for culturally relevant curriculum and pedagogy (Agbo, 2001; Lomawaima, 2004, 1995) and understanding of learning characteristics (Blair, 1999; Deyhle & Swisher, 1997; Pewewardy, 2002). There is little research that examines teacher professional development programs for the needs of diverse learners (Britton, Raizen, Kaser & Porter, 2000). There is no readily available evidence to support improvement of culturally relevant teaching through professional development delivered online.

The purpose of this study is to advance the understanding of distance, content-based induction and mentoring for beginning teachers of diverse students. The induction program investigated is designed to increase knowledge and enhance practice in pedagogical and pedagogical content areas, especially for teachers (rural or urban), who are isolated in the sense that they do not have ready access to an experienced colleague in the same field. For the purpose of this study, an isolated teacher is one who is the only teacher of their subject in their school, or one that may have difficulty connecting with a content-knowledgeable colleague in the same subject areas in the same building. Since isolated teachers may not have access to a mentor knowledgeable in the same discipline, distance methods may be the best, or

only, option for induction. Research on online learning is also informed by this study, as the induction program examined is offered through distance delivery.

Reflective communication has been shown to have a positive effect on the growth of teacher practice (Raizen, Huntley & Britton, 2003, Stansbury & Zimmerman, 2000). A key aspect of the induction program studied is to foster reflective, social discourse online. Evidence of this communication is maintained in the electronic record, and all messages posted online in the eMSS program are archived. Through examination of the electronic discourse record, this study examined significant factors that impact the level of critical thought and reflection during knowledge construction in an online induction program.

This study provided information on induction and mentoring for teachers of diverse students. Evidence from this study provides new knowledge on professional development for multicultural education in isolated teaching environments. Finally, this study informs understanding of the social construction of knowledge in online learning.

Who Will Benefit From This Study

Knowledge gained from this study informs professional developers, online instructors, researchers and those striving to improve multicultural education. Professional developers will be informed through this study by learning about a relatively new model of professional development: providing facilitated learning in an online induction program. Facilitation includes not only fostering of dialogue, but the

use of formal curriculum for professional development activities. Induction programs based on a specific curriculum have been studied, but there is little research on curriculum-based induction using online learning. Mentoring online has been studied, but programs examined are primarily based on a “buddy” system of mentoring for protégé support (Bierema & Merriam, 2002; Single & Muller, 2001). Growth in professionalism by beginning teachers as a function of mentoring, with or without a formal curriculum is also not well studied.

This study contributes to understanding of the effect of distance learning on teacher learning through analysis of how teachers construct knowledge about many important teaching competencies within a distance learning community. Insight into the development of knowledge construction will assist instructors and facilitators in fostering learning in such communities. Although online learning communities have been previously studied (Garrison, Anderson & Archer, 2001; Ludwig-Hardman, 2003), the construction of knowledge of classroom teaching in an online professional development experience is not clearly understood.

Our understanding of beginning teacher’s growth in knowledge about teaching diverse learners is informed by this study, particularly by examining mentees’ construction of knowledge through reflective discourse with knowledgeable mentors and peers as well as collaborative development of curriculum adapted for a specific culture.

Multicultural education is increasingly important to education due to the accountability requirements of the No Child Left Behind (NCLB) act (Northwest

Regional Educational Laboratories, 2003; Oakes, Joseph & Muir, 2003). This study informs those educators who desire to improve multicultural education with or without resource limitations. Examination of discourse and interviews leads to an increase in understanding of construction of knowledge of teaching practice for cultural and ethnic diversity among teachers of students from underachieving populations.

A set of standards (Table 10) for multicultural teaching was developed for this study to compare the learning of participants to graduated levels of competence for teaching diverse students. These competencies will inform professional developers of programs to help teachers develop skills and strategies for teaching diverse students. At the very least, these competencies will contribute to discussions of what a multicultural teacher should know and be able to do.

Use of distance delivery for teacher professional development and coursework is growing. Mentoring for beginning teachers is one such application. In some isolated and rural areas, distance delivery may be the best, if not the only, method to provide quality mentoring for classroom teachers. A number of online professional development and graduate programs originally designed for rural teachers find urban teachers joining in large numbers. Increasing understanding of what makes a distance mentoring program work can inform online practice in several ways. For example, the design and facilitation strategies used in other online programs for teachers may be improved. Practical knowledge of online induction may benefit administrators struggling with helping beginning teachers in isolated settings.

The value of the process of induction is well founded in research (Britton, et al., 2003; Feiman-Nemser, Schwill, Carver, & Yusko, 1999). A need for induction in science content has been well established by Luft and associates (2002, 2003). The need for culturally relevant education is established in the NCLB act and by research (Darling-Hammond, 1995; Gay, 2003; Irvine, 2003). Because of teacher isolation (rural or urban), face to face induction for beginning science and mathematics teachers may not be available. This lack of mentoring support may extend to culturally relevant teaching practice as well. The need for distance based induction and professional development is real. Findings from this study of valuable aspects of distance induction in science and mathematics can inform and improve the practice of teaching, ultimately improving education for students in rural and urban areas.

Potential Limitations

Population and Sample.

Based on the experience of the first year of the eMSS mentoring program, one can expect in excess of 10,000 individual messages to be posted during this academic year. One researcher and the time needed to study online dialogue will limit this study to a sample of messages, potentially limiting the understanding provided by all available discourse.

Online discourse

Much can be learned from online discourse as shown by a number of studies (Gunawardena, Lowe & Anderson, 1997; Henri, 1992; Jarvela & Hakkinen, 2002; Kanuka & Anderson, 1998) Discourse analysis has specific limitations, however. Interpersonal communication can be enhanced, clarified or exaggerated through visually expressed actions and motions. This extension of communication is not available through discourse analysis. Underlying meanings to personal communication may not be readily observable in written discourse analysis.

CHAPTER 2

REVIEW OF LITERATURE

The first section of the following literature review examines induction without specific regard to computer mediated communication. The second section will examine significant research on distance education. The third section will examine current research on education for diverse learners, with emphasis on Native American students. Finally, a fourth section illustrates how review of literature from these three aspects of education research can inform the development of the induction module as an intervention in this study.

Induction

Organizing a literature review on induction is made difficult by the differences in induction programs and the way researchers view and describe induction. Induction programs are rarely the same, making comparison and identification of salient characteristics difficult. The word induction has different meanings in different studies. Studies in this review range from examining the mentoring of one teacher by one other (Feiman-Nemser, 2001), to complex studies of international induction models (Britton, et al., 2003).

Induction programs range from formal or informal mentoring of one teacher by another; structured induction; including an “induction curriculum” with mentoring as a component (the present study); to professional development for new and

experienced teachers without mentoring. Review of research shows many different combinations of these models.

To organize the present review of this complicated body of research, two sections are presented in this study:

- The first section, *Describing Induction*, examines what induction is, including benefits of induction, and ways to measure those benefits.
- The second section, *Review of Significant Research*, examines characteristics from research that inform knowledge of induction, with curriculum serving as an anchor for these characteristics.

Describing Induction

Induction can be as simple as the meeting the day before school begins in which the new teacher is introduced to staff and shown where the copier is, or as complex as a continuing series of workshops and courses designed to help the beginning teacher grow into professionalism (see Measuring change in teacher practice: standards, later in this section for examination of teacher professionalism). Mentoring for teachers (a component of the eMSS induction program) generally involves a person with teaching experience sharing his/her knowledge and experiences with a less experienced protégé. Mentoring can vary from emotional support to structured assistance in helping a beginning teacher improve instruction in a particular subject area.

Feiman-Nemser, Carver, et al. (1999), describes induction as both a process of professional development activities and a phase in the teaching career. Induction can be designed to affect a number of different needs of the beginning teacher. Two such

needs are teacher retention and improving teacher practice. In the following paragraphs, I will describe the benefits of induction in stemming teacher attrition and affecting changes in classroom practice as well as describing standards and methods one can use to examine changes in teacher practice.

Benefit of Induction: Stemming Attrition

Induction has been cited as a method to stem the attrition rate of beginning teachers. Attrition is not seen as a problem in all countries of the world – teachers leaving the profession in Switzerland are seen as enriching society rather than damaging education (Raizen, Huntley & Britton, 2003) – in the US, replacing teachers is considered a problem, especially in urban schools (Feiman-Nemser, Carver, et al., 1999). Replacing teachers causes more work for administrators, reduces instructional continuity in classrooms, and costs districts more money than professional development for continuing teachers (Strong & St. John, 2001).

Ingersoll (2003) reported that 40 to 50% of U.S. beginning teachers hired leave the profession within five years. Villani (2002), provides evidence of induction stemming attrition in his study on the University of New Mexico Teacher Induction Program, in which 85% of mentored teachers were still teaching after five years. The Santa Cruz New Teacher Project at the Santa Cruz County Office of Education in collaboration with the University of California at Santa Cruz has been conducting a program since 1988 working with over 1500 beginning teachers by the year 2000 (Gless & Moir, 2000). One NTC study reports 88% of inducted teachers still teaching

after seven years, with a total of 94% still serving in education roles (Strong & St. John, 2001).

Benefit of Induction: Improving Teacher Practice

Although retention is important in considering the outcomes of induction, the present study will focus primarily on how teacher practice may be improved by induction. Britton, et al. (2003) found in their study of international induction programs that induction helps beginning teachers learn about teaching, which can yield enhanced instruction that may affect the quality of teaching of “hundreds, even thousands of students” for an individual teacher (p. 5). In an article by Stansbury & Zimmerman (2000), the authors state that the self reflection developed through an induction program, “can lead directly to improved teaching and learning in the beginning teachers’ classroom” (p. 5). Ralph (2002) interviewed mentored beginning teachers about the affect mentoring had on their classroom practice. Eighty-four percent of them reported that they improved their teaching practice, most citing the help received from mentors as the primary reason. In a New Teacher Center report (Gless & Moir, 2000), 95% of principals surveyed (number unknown) credited induction with, “significantly improving beginning teacher performance” (p. 6).

To examine the benefit of induction to teacher practice, Koetsier & Wubbels (1995) compared teaching behavior of beginning teachers who had completed an induction program to those who had not. Their study combined interviews with classroom observations of 24 beginning teachers. Observations verified that teachers completing induction developed professional competencies more quickly than those

without induction experience. During interviews, beginning teachers commended the induction program for supporting their professional growth.

In a case study, Bullough (1987), followed a secondary teacher for the entire first year of her teaching. Bullough's case study included an interview before the beginning of the participating teacher's school year, weekly observations, and interviews on the day of the observation. While Bullough's study only had one subject, he was able to gain a wealth of valuable information about her induction. The new teacher demonstrated that the first year of teaching creates a pattern of behavior and understanding that is played out in subsequent years of practice. In Bullough's words, "habits develop, ideas harden." One can equate this time to Vygotsky's (1978) zone of proximal development, when teachers need the most help to reflect on and develop quality practice.

Through thoughtful interaction with mentor teachers, beginning teachers can learn about teaching by internalizing the experiences of their mentors (Paine, Fang & Wilson, 2003). It should be noted, however, that mentoring may not always foster improved teaching practice in the novice teacher. Feiman-Nemser, Parker & Zeichner (1993) found that mentors may promote their own practices, limiting reform and growth by the novice teacher. In the induction program being examined in the present study, mentors are introduced to and practice language, observation tools and methods to give feedback that promotes new teacher learning and reflective self assessment (Gless & Moir, 2001). Beginning teachers in the eMSS program also learn

about teaching from a larger group of experienced and beginning teachers in addition to their assigned mentor.

A little seen characteristic of induction is worth noting; that of informing pre-service teacher education. According to Feiman-Nemser (2001) successful mentoring for teacher practice must take place while teachers are engaged in practice. This may sound obvious, but Feiman-Nemser's argument is that mentoring for teaching practice cannot take place without experiential knowledge of classroom practice on which to build. Feiman-Nemser contends that a way to improve teaching practice is to match the curriculum of pre-service instruction with that of induction, to create a coherent, well-planned curriculum before and during teaching. Her concern is that university teacher educators are trying to cram too much into courses because they believe it is their last chance to influence teachers. Planning between pre-service instructors and professional developers may produce more coherence between pre-service instruction and professional development training.

Pre-service faculty modified curriculum using knowledge gained from induction programs as described in a study by Varah, Theune & Parker (1986). Modifications were made to help pre-service teachers learn the knowledge and skills that professional developers found lacking during the induction phase of teaching. This modification led to observed improvement in teaching practice by beginning teachers instructed through the coherent program. Knowledge gained from the present study could be used to inform induction programs as well as teacher preparation programs.

Measuring Change in Teacher Practice: Standards

The previous section describes a goal of induction to improve classroom practice by helping beginning teachers achieve a level of professionalism. To examine this improvement, one must first define what professionalism in teaching means. The following section will describe teaching profession standards that can be used to gauge changes in teacher practice, and methods used to measure changes. Standards describing the characteristics of a professional teacher have been written by three nationally recognized organizations: the Interstate New Teacher Assessment and Support Consortium (INTASC), the National Board for Professional Teaching Standards (NBPTS), and the National Council for Accreditation of Teacher Education (NCATE). As the name implies, INTASC provides standards for a newly certified teacher, but does not include standards for new teachers whose practice is evolving through professional development. For the purpose of defining professionalism for induction, the NBPTS standards (Appendix A) and the NCATE standards (Appendix B) are most informative.

Feiman-Nemser (2001) synthesized these standards to develop a continuum of practice for teachers at three stages of their careers. She identifies Central Tasks of Learning to Teach (Table 2) during three phases of teaching, Preservice, Induction and Continuing Professional Development. Her synthesis of standards, along with similar standards drafted by the National Science Teachers Association, was used as a base for developing teacher outcome goals of the eMSS program. To maintain this connection to the eMSS program, Feiman-Nemser's tasks (Table 2) serve as a guide

in organizing the emergent themes of research on induction for the present literature review.

Table 2 Central Tasks of Learning to Teach

Preservice	Induction	Continuing Professional Development
1. Examine beliefs critically in relation to vision of good teaching	1. Learn the context - students, curriculum, school community	1. Extend and deepen subject matter knowledge for teaching
2. Develop subject matter knowledge for teaching	2. Design responsive instructional program	2. Extend and refine repertoire in curriculum, instruction, and assessment
3. Develop an understanding of learners, learning, and issues of diversity	3. Create a classroom learning community	3. Strengthen skills and dispositions to study and improve teaching
4. Develop a beginning repertoire	4. Enact a beginning repertoire	4. Expand responsibilities and develop leadership skills
5. Develop the tools and dispositions to study teaching	5. Develop a professional identity	

Feiman-Nemser (2001)

The Level of Teacher Practice Correlates to the Level of Student Learning

The eMSS project seeks to affect student learning by changing teacher practice along the continuum presented by Feiman-Nemser. The project hoped to support the growth of mentees along a continuum starting with the preservice column, as many of the program's mentees appeared to still be mastering tasks at this level,

and moving into the induction column. In this study I did not observe the beginning teachers' teaching practice directly. However, I did analyze mentee and mentor dialogue, and interview comments, showing participants' understandings in these critical areas identified by Feiman-Nemser: vision of good teaching, especially as it relates to working with diverse student populations; understanding of learners in general, especially regarding issues of diversity; learning about students in the specific context of the beginning teacher's new school and community; designing and enacting a responsive instructional program, with an emphasis on diverse students' learning; and developing a professional identity as a teacher, especially the disposition to study and develop tools pertaining to diverse learners.

The findings described later in this dissertation indicate that some of the beginning teachers were moving along Feiman-Nemser's continuum in ways that would affect their teaching practice with respect to diverse learners. There is modest yet promising evidence in the literature that changes in teacher quality as measured by observed classroom practice and related indicators lead to improvements in student learning. If the growth in mentees' knowledge and dispositions around diverse learners, as observed in this study, leads to enduring changes in classroom practice - a recommended focus for a future study - then it follows that student learning will improve correspondingly.

In one of a handful of investigations directly linking teacher practice with student achievement, Clare & Aschbacher (2001) studied 26 classroom teachers to measure the quality of teacher practice and how it relates to student achievement.

Realizing the inefficiency of conducting a large volume of classroom observations when studying relatively large numbers of teachers, they attempted to determine a more manageable approach involving a cluster of indicators. They rated classroom practice during two lessons taught by each teacher using an observation protocol; evaluated teacher lesson descriptions on a number of criteria; and rated student work using a rubric developed with teacher input. Once data were compiled, they examined relationships between the three measurements to determine how lessons and student work related to observed instruction. They found that quality of students' reading and writing, as measured by teacher assessment rubrics, corresponded directly with quality measured through observation of direct teacher practice using a classroom observation protocol. Teacher classroom observations were conducted using a protocol designed to measure teaching quality through student time on task, student interaction with the teacher and responsiveness to teacher questions. Results showed that the observed quality of teaching practice correlates positively (overall correlation = .31, $p < .001$) to measured student achievement.

In addition to Clare & Aschbacher, several older studies (Duhamel, Cyze, Lamacraft & Larocque, 1979; Evertson & Holley, 1981) determined that observation based outcomes are valid indicators of the quality teacher of practice. Using this background information and their own research, Rymhs, Allston & Schulz (1993) argue that particular teacher classroom behaviors, "have shown a consistently high correlation with learning outcomes and should, therefore, be included as criteria to determine teacher quality" (p. 195).

Review of Mentoring and Induction Literature

In this thorough review of the mentoring and induction literature, I identified themes considered to affect beginning teacher practice, and by implication, student learning. There are various ways of organizing and making sense of induction literature. For this review I used the curriculum as an anchor. This is appropriate since this study focused on beginning teacher learning from the overall eMSS curriculum, as well as the curriculum of a module on diversity. In addition, each of the programs reported in the literature reviewed implemented a mentoring and induction curriculum, although these varied widely in scope and formality. The initial section on induction in this review examines why curriculum is important to induction, as well as why adapting curriculum to changing needs is important. The second section examines what curriculum for induction looks like, what it is designed to accomplish, and how it is implemented in the induction programs studied, and effects when reported. As a guide to organize the literature reviewed, Feiman-Nemser's preservice and induction tasks are useful. These can be used to make sense of the induction needs served, or ignored, in the studies reported. Secondly, using these tasks to organize discussion of the literature highlights induction issues that are thoroughly investigated and those that are not. A chart presenting the studies included in this section of the literature review is provided in Table 3.

Table 3 Themes of Induction Programs Found in Research

Themes	Summary of Findings	Sources	Research Needed:
Part One: The Induction Curriculum			
Need for curriculum	Beginning teachers need assistance in different areas of teacher knowledge and practice at varying times during induction. These changing areas of support may be thought of as a curriculum that grows and evolves along with the new teacher. There are clear patterns in the sequence and essential elements of the curriculum needed.	Feiman-Nemser et al., 1993, 2001	How do new teacher benefits change according to the presence and nature of the induction curriculum?
Adapting curriculum to changing teacher needs		Gratch, 1998 Pleeger & Mertz, 1995 Ralph, 2002 Stansbury & Zimmerman, 2000	

Table 3 (continued) Themes of Induction Programs Found in Research

Themes	Summary of Findings	Sources	Research Needed:
Part Two: Goals and Components of Induction Programs			
Learn the context – students, curriculum, school community (Feiman-Nemser Induction Task 1)	Although the induction literature states that beginning teachers must get to know their immediate context, including their students, their school curriculum and local school culture, no research was found that addressed this.	No studies found	How does a beginning teacher develop a better understanding of his or her specific teaching context? How does this affect practice?
Design responsive instructional program (implies understanding disciplinary content, which is not a major focus of induction research, as well as understanding of needs of diverse learners as examined later in this literature review) Feiman-Nemser Induction Task 2	<i>Pedagogical Knowledge</i> - The observed and reported needs of beginning teachers centered on pedagogical knowledge needs for instructional control such as classroom management, understanding student needs and comprehending the main ideas of teaching practice. <i>Pedagogical Content Knowledge</i> - Beginning teachers need to begin the transition from focusing on very basic pedagogical issues (i.e. Survival skills) to focusing on more advanced pedagogy, including learning to teach subject matter content more effectively	Eisenman & Thornton, 1999 Odell, 1986 Ralph, 2002 Upson & Koballa, 2004 Luft & Patterson, 2002 Luft, Roehrig & Patterson, 2003	Measured outcomes of teacher change What do new teachers need to know about integrating content and pedagogy? What content knowledge base is needed?
Develop and enact a beginning repertoire of strategies and resources (Feiman-Nemser Preservice and Induction Tasks 4)	Beginning teachers desire teaching strategies and resources, and grow professionally when provided with support as they adapt, use, and evaluate these in their classrooms	Odell, 1986 Mariage & Garmon, 2003 Valencia & Killion, 1988	How do programs/mentors provide strategies for beginning teachers' classroom use in ways that promote their growth as reflective practitioners?

Table 3 (continued) Themes of Induction Programs Found in Research

Themes		Summary of Findings	Sources	Research Needed:
Create a classroom learning community* (Feiman-Nemser, Induction Task 3)	Build a classroom learning community in the new teachers' own classroom	Although national standards in science and mathematics call for classrooms in which students are engaged and contributing members of the learning community, no induction research addresses this.	No studies found	How does a novice teacher build a learning community of his/her students?
	Participate in a learning community with peers and mentors	The interaction among participants in an induction program, including beginning teachers, mentor teachers, professional developers and administrators can enhance teacher practice.	Abell, 1995 Britton, et al., 2003 Burton, 2003 Feiman-Nemser, 1998 Gersten & Dimino, 2001 Gratch, 1998 Odell & Ferraro, 1992 Sillman, 2003 Stansbury & Zimmerman, 2000 VanHanegan, Pruet & Bamberger, 2004	Defining and examining aspects of collaboration Does collaboration foster growth itself or provide support for individual's self-driven growth?
	Interpersonal relationships			
	Collaboration			
Develop a professional identity through examination of ones own teaching Feiman-Nemser Induction task 5	Reflection on teaching practice	Beginning teachers grow and mature as professionals when conducting self-reflection on their teaching	Flecknoe, 2000 Britton, et al., 2003	How to initiate/measure metacognition.
	Action research			How to promote and assess self-reflection in beginning teachers.

Part One: The Induction Curriculum

The Need for an Intentional Curriculum. The eMSS induction program uses structured curriculum in professional development modules designed to help students learn a specific context. Mentoring systems consisting of only emotional support (buddy system) are not enough to promote teacher development (Feiman-Nemser, Parker & Zeichner; 1993). This is not to say that support from a mentor should be excluded from an induction program. The caution is that to affect beginning teacher practice, induction programs should provide more than support alone from a buddy mentor. Knowledge gain in induction, or any learning program, is greatest with facilitation by a knowledgeable expert's guidance (Gunawardena, Plass, & Salisbury, 2001; Vygotsky, 1978).

Feiman-Nemser (2001) writes that many induction programs have no specific curriculum. To link induction learning with teacher preparation and professional development, an informed curriculum may be very beneficial. As Luft (2003, 2002) points out, this curriculum will be most successful if developed with pedagogical content knowledge as a key component.

In a study by Pfleeger & Mertz (1995) of mentoring for women and minorities in computer science, only three of 15 mentor-mentee pairs met the researchers' criteria for successful mentoring. The researchers concluded that "mentoring is very difficult" and that some structure must be in place for successful mentoring. Although this study did not directly call for a formal mentoring curriculum, it implied

the need for guiding the mentoring relationship through a sequence of topics or curriculum.

Adapting Curriculum as New Teacher Needs Change. It is worthwhile to note a characteristic not overtly seen in research, but seemingly underlying successful induction programs, that of change. As the needs of the beginning teacher change, the characteristics of mentoring may need to change as well to best support the practice of the beginning teacher. Stansbury & Zimmerman (2000) described the development of beginning teachers along a continuum from survival to professional practice. They cite research findings by Veenman (1984) and Britton, Paine & Raizen (1999) as a basis for their contention that beginning teachers needs change from initial personal and emotional support, through task-focused support to critical reflection on teaching practice. They contend that the self-reflection developed through an induction program, “can lead directly to improved teaching and learning in the beginning teachers’ classroom” (p. 5). A well designed teacher induction program can increase teacher effectiveness during the early years of a beginning teachers’ career (Glass & Moir, 2001; National Commission on Teaching and America’s Future, 2003; Weiss & Weiss, 1999).

A study by Ralph (2002) illustrates the need for an induction curriculum to change as the needs of the beginning teacher alter. Ralph interviewed 145 mentor/mentee pairs in a unique mentoring program. The one on one (mentor/mentee) program used the Contextual Supervision approach, in which mentoring is designed to be structured and implemented according to the needs of the beginning teacher’s

practice. Mentors are trained in assessing the level of support beginning teachers require. This model works on the continuum of support being inversely proportional to mentee confidence, and need for cognitive tasks (resources for teachers) inversely proportional to mentee teaching competence. Using this model in an 11 week trial, 68% of mentees expressed increased confidence in their classroom practice due to mentor support. Many of those not expressing increased confidence reported that their mentor was not able to adequately judge the beginning teachers needs. In interviews, mentors reported beginning teachers required emotional support initially, but their needs shifted over time to support of pedagogical content knowledge needs.

In Gratch's (1998) study of 10 mentored beginning teachers (described in detail in a later section) she found that beginning teachers determined the type and degree of support they needed from mentors along a continuum like that described by Stansbury & Zimmerman (2000). She also found that the mentored teachers did not progress along the continuum of development at the same rate.

Part Two: Goals and Components of Induction Programs

Learn The Context - Students, Curriculum, School Community (Feiman-Nemser Induction Task 1). Although the induction literature states that beginning teachers must get to know their immediate context, including their students, their school curriculum and local school culture, no research was found that addressed this. This omission in the literature is important because many beginning teachers, including those in the eMSS program, begin their teaching careers in settings quite

different than the schools they knew growing up or encountered in preservice field experiences in a university town. A later section of this literature review looks at what beginning and experienced teachers know and need to learn about the diverse students they teach.

Designing a Responsive Instructional Program (Feiman-Nemser Induction Task 2): Pedagogical Knowledge. Teachers at all levels require relatively complex general pedagogical knowledge as well as pedagogical content knowledge in order to design a responsive instructional program. The ability to design such a program also requires knowledge of the cultural, ethnic and socio-economic characteristics of students. This aspect of teachers' knowledge is examined in a later section of this literature review.

Pedagogical knowledge encompasses knowledge of the context of teaching. A concise definition of pedagogical knowledge for review of literature is difficult to provide. The Interstate New Teacher Assessment and Support Consortium (INTASC) Principles (Appendix C) provide a useable list of the skills and abilities teachers need to know about generally pedagogy. This list (Dalton, 2005) includes:

- The teacher understands how children learn and develop, and can provide learning opportunities that support a child's intellectual, social, and personal development.
- The teacher understands and uses a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.
- The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.
- The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

In a case study of mentor-mentee pairs participating in an induction program, Upson & Koballa (2004) examined the needs of beginning teachers. This relatively unstructured mentoring program paired an experienced teacher with a beginning science teacher. The mentoring period lasted approximately one academic year. The researchers (Upson & Koballa) visited each mentor/mentee pair approximately weekly. During these visits, they collected data in the form of interviews, archival data such as handouts, lesson plans, and field notes regarding all four participating pairs. Interview transcripts were coded by topic to find patterns regarding the nature of conversations between mentors and mentees. Analysis of narratives of all four participants showed that the majority of conversations focused on pedagogical knowledge needs of the beginning teachers, specifically understanding how students learn and the use of instructional strategies.

Eisenman & Thornton (1999) conducted a study based on interviews with 27 first year teachers. These teachers had all graduated the previous year from the teacher preparation program in which Eisenman and Thornton were faculty. The study was designed to evaluate changes made to the pre-service program through lessons learned in the induction training instituted by the same university. The program facilitated an ongoing dialogue beginning teachers between master teachers, university faculty and beginning teachers to encourage and develop reflective thinking about practice.

Eisenman and Thornton conducted personal interviews and focus group interviews with these teachers before, during and after participation in the one-year

email and list-serve based mentoring program managed by the university. Analysis of interviews revealed consistent reporting of several pedagogical concerns by beginning teachers, touching on several of the INTASC skills and abilities such as understanding instructional strategies and student behavior. Students' motivation/classroom management was reported as their major concern. In addition, many teachers expressed concern regarding the challenges of teaching math to students with differing abilities and needs, and assessing student learning.

Research (Fideler & Haselkorn, 1999, Gratch, 1998, Koetsier & Wubbels, 1995; Ralph, 2002) shows a progressive continuum of beginning teachers' needs that starts with pedagogical knowledge (e.g., student motivation, classroom management) and moves to pedagogical content knowledge (e.g., knowledge of materials and activities for learning, presenting material in proper sequence). Understanding how to assess a beginning teacher's location along this continuum and provide appropriate assistance can impact the growth of a beginning teachers practice.

Halim & Meerah (2002) point out that for teachers to grow in understanding of content and teaching of content, they must have well developed pedagogical content knowledge from which to draw. Shulman (1987) writes that it is pedagogical content knowledge that distinguishes a teacher from a non-teaching content specialist as shown by the ability of a teacher to transform content knowledge into forms that can be assimilated by students.

Ralph's (2002) study of 145 mentor-mentee pairs illustrates that beginning teachers' initial needs are centered on emotional support and pedagogical needs in the

areas of classroom management and student motivation. Odell's (1986) study of 160 mentored beginning teachers produced similar findings to Ralph's and others. Odell asked training mentors to report on beginning teachers' needs. Mentors reported that the needs in the first semester of teaching were for emotional support and aspects of classroom instruction (student behavior, classroom management).

Using a comprehensive framework for competencies of pedagogical knowledge such as that provided in Table 11 (p. 169) in this study, we see that the induction research knowledge only addresses limited aspects of pedagogy. For example, studies to date look at instruction use and control (including classroom management), and developing a representational repertoire and omit potentially critical areas of new teacher learning such as adaptation for diverse student needs and evaluation of student learning.

Designing a Responsive Instructional Program (Feiman-Nemser Induction Task 2): Pedagogical Content Knowledge. Although the induction literature focuses more on beginning teachers' acquisition and application of increasingly advanced general pedagogical knowledge in their first classrooms, some authors also recommend integrating aspects of pedagogical content knowledge (i.e., comprehension of main ideas, representations for teaching content) into induction programs. The INTASC standards (Dalton, 2005), provide a succinct definition of pedagogical content knowledge:

The teacher understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

An expanded description of pedagogical content knowledge in science was developed by Horizon Research, Inc. (2005), and includes elements ranging from aspects teachers understand early in the induction phase such as comprehending main ideas and knowledge of activities and scenarios for learning, to aspects in which understanding is developed later, such as selection of best instructional methods, presenting instruction in proper sequence and adaptation for student learning needs. I used Horizon's description to develop the competencies of pedagogical content knowledge used as a framework for understanding the growth in this area by participants in this study (see Table 11).

In the late 1990's, the Alternative Support for Induction Science Teachers (ASIST) was developed as an induction program for secondary science teachers in southern Arizona to improve their knowledge of teaching science (Luft, Patterson, 2002; Luft, Roehrig & Patterson, 2003). In a 2002 study of ASIST, Luft & Patterson found evidence of improvement in the practice of beginning teachers of science who participated in the induction program. Fifty one teachers participated in the induction program that year; all were part of the study. A multi-method approach was used to evaluate the program. Methods of data collection included Likert scaled instruments, interviews, observations and artifact collection. Luft and Patterson found that approximately 75% of participants felt the induction program challenged their ideologies about teaching science and helped them improve their practice. In the

critical constructivist view of learning, challenging existing ideas is key to constructing new knowledge (Strike & Posner, 1992).

In a related focus study of the ASIST induction program, Luft, Roehrig & Patterson (2003) closely observed 18 beginning science teachers during up to 10 randomly selected weeks of instruction. This study compared teaching practice of six teachers who participated in ASIST induction, six teachers in general support programs and six teachers without access to induction support. Results of classroom practice observation and interviews showed the ASIST teachers were more confident in their knowledge of science teaching. Classroom observation provided evidence of quality teacher practice through teachers' more frequent use of inquiry and laboratory based learning strategies, along with a greater range of learning and material use compared to non-mentored teachers. In interviews, the ASIST teachers expressed more comfort with classroom management and school experiences, stating that they had more time and energy to focus on instruction. It should be noted that research on this theme area is not extensive.

Develop and Enact a Beginning Repertoire (Feiman-Nemser Preservice and Induction Task 4). To help beginning teachers enact their own beginning repertoire and increase that repertoire requires providing them with content related classroom strategies and resources. The eMSS Diversity Module provides participants with resources and strategies to use in their classroom for their diverse students. There were no relevant induction studies concerning resources and strategies, so I examined professional development (PD) research to inform this component of growth by new

teachers. Research in this area shows that providing teachers with resources and assistance to help them build their repertoire of pedagogical methods yields increased student achievement and is often cited as an important factor in teacher practice growth (Athanases & Achinstein, 2003; Valencia & Killon, 1988; VanHanegan, Pruet & Bamberger, 2004). Mariage & Garmon's (2003) study of the PREPARE project showed the effect cognitive resources can have on student achievement. In this program, researchers and teachers collaborated to develop strategies that teachers can easily use in their classrooms as interventions to increase student learning in reading and mathematics. The resources included methods to reach the lower achieving students in the schools and increase student participation.

Results of the PREPARE study showed significant increases in student learning that were sustained over time. Standardized tests in reading and mathematics taken by fourth graders in a rural Michigan school were used to measure the intervention outcomes. Test scores were compared for each of the five years of the program. Over the course of the study, the numbers of students scoring satisfactorily rose from 18% to 43% in reading and from 26% to 53% in mathematics. Helping teachers build and understand their repertoire of strategies for their particular students positively impacted student learning.

Valencia & Killion (1988) examined a district level professional development program designed specifically to remedy the problem of poorly designed professional development for teaching content. The initial step of the program was to identify deficiencies in curriculum (grades 7-9) through curriculum mapping. Once

deficiencies were identified, strategies were developed through a university-school district partnership. The collaborators developed a framework to develop resources with specific interventions for improvement in reading and writing achievement.

During professional development sessions, new instructional techniques were demonstrated and then practiced by teachers on each other. Comparing learning students receiving the professional development interventions to those in a control group, Valencia & Killion (1988) reported significant achievement gains by the intervention group whose teachers received the targeted professional development.

Odell (1986) conducted a large-scale study of an elementary school induction program to determine what beginning teachers need from induction. In this program, nine veteran teachers on full release from the classroom served as mentors to approximately 160 beginning teachers from eight elementary schools. Mentors were trained and were guided by the university based induction director. Of the 160 beginning teachers, 86 were involved in this study.

In order to learn from the perspective of experienced teachers, rather than ask the beginning teachers what they needed, Odell obtained data from mentors. All mentors were instructed to record the type of help asked for by beginning teachers. Odell used this documented record to assess the needs of the beginning teachers. Results indicate that beginning teachers had three major categories of needs. The highest need in the first semester was locating and collecting classroom resources, followed by the need for emotional support and instructional support (teaching strategies). In the second semester, beginning teachers' needs shifted, and

instructional support was the highest need followed by the need for resources in the new teachers' assigned subject areas.

Create A Classroom Learning Community (Feiman-Nemser Induction Task

3). No studies were found that describe teachers developing a learning community in their classroom. The themes within this section do not inform teachers' development of a classroom community. Rather they inform teachers' membership in a learning community. While the research on induction does not clearly show how teachers can build communities within their classrooms, there is significant research on how learning communities of teachers can be established and nurtured in induction programs. Research informing the development of teacher learning communities may inform the development of classroom learning communities by teachers.

In the eMSS program, two types of relationships between beginning teachers and others are developed: the mentor-mentee paired relationship, and the collaborative learning group. Participants are expected to interact in both groups, with the understanding beginning teachers will use the avenue that best meets their needs. This review of literature on developing a community is divided into two sections to match the two types of relationships in eMSS. The interpersonal relationship section examined mentor-mentee relationships and the following section on collaboration examines relationships in larger groups.

Interpersonal Relationships. There is evidence (Stacey, 1999; Stansbury & Zimmerman, 2000; Whitaker, 2000) of a continuum of support over the course of

induction from emotional support, though support in helping beginning teachers develop knowledge of pedagogical and pedagogical content knowledge (including resources), to reciprocal support with peers in evaluating and improving classroom practice. Evidence from these studies shows beginning teachers advance along this continuum at a (often) self-directed pace.

Science teachers must understand their content in order to provide the best teaching for their students (NBPT Standards, 2005; INTASC Standards, 2005). Understanding content, combined with other pedagogical skills can help teachers provide quality instruction. Similarly, teachers who gain an understanding of interpersonal relationships can apply their knowledge to helping their students develop as a learning community as well.

To examine support structures, Gratch (1998) interviewed 10 beginning teachers who participated in a support based mentoring program. Beginning teachers were paired with mentors in the same building. The close proximity is reported to enhance the personal relationship of the mentor-mentee pair. Through analysis of interviews with mentors and mentees, it was determined that personal support was critical to the development of the beginning teachers' practice.

Mentors in Gratch's study reported providing emotional support for varied lengths of time according to the professional development of the mentee. Illustrating the need for positive relationships, in interviews, one beginning teacher, who was not perceived to have developed professionally as quickly as most others, reported frustration with his mentor for not providing the support the mentee felt he needed.

In 1992, Odell & Ferraro conducted an attitude survey about induction. Their subjects consisted of two cohorts of beginning teachers ($n = 160$), surveyed four years after their mentored first year of teaching. Of the 100 teachers responding, 96% were still teaching. The germane aspect of this study is a question asking respondents to rate the importance of seven aspects of mentoring support during their first year of teaching. Respondents rated emotional support from mentors and peers as the most valuable aspect.

The relationship between the mentor and mentee is important to success for the beginning teacher. Abell, et al. (1995) conducted a case study (using interviews) of 29 mentor-mentee pairs, in which all mentees were beginning teachers in their first year of teaching. This study was designed to evaluate the effectiveness of a state mandated mentoring program in Indiana in the early 1990's. This study, to see if mentored teachers were more effective, was conducted after the program had been operating for three years.

One focus of Abell's study was to describe relationships between mentor and mentee. Results showed that respect for each other in the mentor-mentee relationship was very important. Interviewed participants reported increased success when the mentee expressed respect for the mentor. When the mentees lacked professional respect for mentors, the mentoring relationship was considered less successful.

In an international study of mentoring programs, Britton, et al., (2003), found a major focus of induction in New Zealand and Shanghai is to "encourage the new teacher to see and approach colleagues in their department and building as resources,"

(p. 308), that is to build professional relationships. In the Shanghai study, researchers found that through thoughtful interaction with mentor teachers, beginning teachers could learn about teaching by internalizing the experiences of their mentors (Paine, Fang & Wilson, 2003).

Collaboration. Virtually all research reviewed for this study determined collaboration to be a characteristic of induction, whether online or face to face. Various researchers use the term collaboration, but with different meaning, from simply conversing to developing a common language as a group. For the purpose of this review, collaboration is considered a group (more than two individuals) working together toward a common goal. The nature and results of collaboration are dynamic over the course of time in many induction programs. Beginning teachers (generally in the first semester of teaching) need and use collaboration in an emotional support manner (Flecknoe, 2001; Koetsier & Wubblels, 1995; Whitaker, 2000). Professional development at this stage generally consists of pedagogical knowledge in the form of classroom management skills and specific district or school building requirements.

A Swiss study (Raizen, Huntley & Britton, 2003) was conducted comparing a collaborative group induction program, to a non-collaborative program. In this 1998 study, 76% of participating teachers in the collaborative program considered their induction experience of high quality, while 17% of participants in the non-collaborative study considered the experience of high quality. A study of induction in Shanghai described by Paine, Fang & Wilson (2003) concluded collaborative groups to be a central component of successful induction. Research by Burton (2003), Luft,

Roehrig & Patterson, (2003) and Van Hanegan, Pruet & Bamberger (2004), among others, shows that a collaborative network of peers that develop learning together is reported as a significant factor in improving teacher practice.

Sillman (2003) conducted a long term interpretive case study following one individual teacher through induction in his first year of teaching and interviewing him at the end of his fifth year of teaching. The teacher was hired as part of a collaborative teaching team for second grade classrooms. Data sources were transcripts of 15 interviews, 20 reflective journals, and documents such as lesson reflections and philosophy statements. The researcher's journal, field notes and videotapes of observed lessons were also analyzed.

The beginning teacher was mentored by his collaborative team and his roommate, a fellow teacher. While this mentoring was not formally developed, the new teacher attributed his "purposeful reflection" to collaboration with these colleagues. At the end of the fifth year, this teacher was considered very successful (measured as attaining leadership roles faster than peers within the teaching community). His success was self-attributed to the "collaborative learning communities" fostering reflection of his teaching practice. Sillman (2003) illustrated that collaborative reflection was evident throughout the documentation of the beginning teacher's practice.

Burton (2003) studied a professional development program designed to increase elementary teachers' ability to use technology in classroom practice. The intervention was collaborative professional development in which cohorts of teachers

from the same building attended professional development offerings together, discussed learning, and collaboratively developed classroom projects and strategies. Collaborative dialogue was initiated in professional development sessions, and was continued without outside facilitation during prep periods and grade level planning meetings. Teachers reported focused collaborative discourse on new instructional strategies and challenges in the classroom, decreased teacher isolation and enhanced classroom practice.

VanHanegan, Pruet & Bamberger, (2004) found that participation in collaborative professional development was related to changes in teacher practice that resulted in increases in student achievement. This longitudinal study was conducted in classrooms in six low achieving, diverse schools in Alabama. In four of these schools, teachers participated in a collaborative professional development program. In two control schools, no professional development took place. Student mathematics achievement was measured using TIMMS and SAT-9 test scores. Students in the professional development schools scored one-third to one full standard deviation better on these tests than the control schools. Students in the professional development schools also showed improvement on tests taken two years later.

The increase in student achievement was attributed by VanHanegan, Pruet & Bamberger to a structured professional development program, which included collaboration as a major component. A collaborative group developed among the teachers after they had attended an intense two week intervention development. Researchers cited the development of a common language of learning through the

experience of the intense face to face meeting that caused the group to grow into a cohesive learning community.

Feiman-Nemser (1998) studied 24 mentor/novice pairs of teachers in three countries (U.S, England and China). The study focused on how novices learn to teach in the company of mentor teachers. Data was collected by local researchers and included autobiographical interviews and observations of classroom practice of mentors and mentees, observations of pair conferences and interactions logs filled out jointly by pairs.

In this study, Feiman-Nemser found that the most effective mentors all had some kind of collaborative learning opportunity to develop their own ideas about learning and teaching. The most effective British mentors met regularly with university colleagues to talk about what and how the beginning teachers needed to learn.

Athanses & Achinstein (2003) studied 37 beginning teachers and their mentors in a California induction program that placed mentor and mentee pairs in collaborative networks. Through interviews and surveys, the researchers found that when beginning teachers worked in collaboration with mentoring groups, “new teachers at times developed frames for next-steps instruction for the full class, and adapted and tailored work for individual learners, particularly those identified as low performers.” (p. 1513). This growth in teaching practice for diverse learners was seen in almost all beginning teachers in the study.

Gersten & Dimino (2001) studied a curriculum-based, collaborative professional development program in elementary and middle schools with beginning and experienced teachers. The schools, in partnership with university researchers, conducted a needs assessment of the schools' curricula. Following the needs assessment the group developed specific reading interventions that were shared through ongoing professional development with all teachers. This professional development was conducted collaboratively by district teachers with university directors serving in a "back seat" role to the teachers. Scheduled professional development meetings included reflection on classroom practice to determine methods to best apply new strategies. To gauge the effectiveness of the professional development and prescribed intervention, teachers engaged in action research in their classrooms. This action research consisted of reading pre-tests by students, interventions and reading post-tests. Following professional development, teacher-researchers reported statistically significant improvements in student performance on reading assessments compared to results of assessments completed prior to the professional development intervention.

In addition to effects on beginning teachers, collaborative induction networks can positively affect mentor teacher classroom practice. In Wollman-Bonilla's (1997) study, all mentors reported that the collaborative mentoring network had contributed to their own professional development. A significant finding in this study was that collaboration with peers enhanced all teachers' (beginning and mentor) "attention to and reflection upon their own teaching." (p. 3). Specifically, teachers reported group

discussions of ways to use different forms of instruction and how to add curricular components to enhance their practice.

Develop The Tools To Study Teaching In Order To Develop A Professional Identity (Feiman-Nemser Preservice and Induction Task 5). Examination of how teachers can develop a professional identity, or even the components of a professional identity, is not evident in induction research. However, Feiman-Nemser's Preservice task in this area requires teachers to develop the tools to study their own teaching. In Feiman-Nemser's description, a teacher obtains a professional identity when he/she is able to evaluate his/her own teaching and improve by applying knowledge of components of quality teaching practice. Research on self reflection on classroom practice and teacher growth is available. I am taking the liberty of presenting research on teacher self reflection in this section to illustrate the importance of reflection in growth as a professional teacher. Like the term collaboration, reflection is used by various authors, but in this case the meaning - a metacognitive examination of a teacher's own practice - is consistently described. Many induction programs describe reflection as a component, yet may not actually promote reflection about teaching practice as a means of growth. The following review examines induction that actively promotes the process of teachers developing metacognition by examining their own teaching practice.

Reflection about ones own teaching has been shown to impact practice in a positive way (Fideler, Haslkorn, 1999; Gersten & Dimino, 2001; Kwakman, 2002; Rhym, Allston & Schulz, 1993). A collaborative network to improve teaching

practice may cause reflection on the use of existing or proposed classroom methods. Action research by teachers is also cited as a method to induce teacher reflection. The nature of action research requires teachers to examine their own practice in the “lab” setting of their classroom, often causing them to reflect on their teaching practice (Feldman & Minstrell, 2000).

Flecknoe (2000) interviewed 31 teachers who completed a collaborative professional development program designed to raise student achievement. The teachers evaluated student achievement gains due to the professional development intervention through action research projects. Teachers reported that action research results showed student improvements in test scores and writing and reading comprehension skills. Almost all teachers reported that the action research process caused them to reflect more on student achievement. Further, the reflection was attributed by teachers as a cause to be more open to new ideas and applications for practice.

In a study (Raizen, Huntley & Britton, 2003) of induction in three Swiss cantons (states), reflection on practice was found to be a “crucial part” of induction; in fact, it was found to be a critical part of pre-service training as well as during induction. Reflection is promoted by mentors, who are trained in facilitating useful reflection. In the Swiss induction programs, the reflective process of *Standortbestimmung* (determining where I stand) is central to mentoring beginning teachers. Standortbestimmung about teaching practice is facilitated in required collaborative groups as well as by individual teachers. Observers found teachers

willing to share their reflections on classroom practice and the impact their personal lives had on their teaching. Within studies of international induction programs such as the Swiss program, Britton, et al., (2003) found a positive relationship between reflection about teaching practice and enhanced classroom instruction.

Summary

Induction has been shown to stem attrition of beginning teachers (Odell & Ferraro, 1992), and improve their classroom practice (Britton, et al., 2003; Ralph, 2002; Stansbury & Zimmerman, 2000). Feiman-Nemser, et al. (1995, 1998) contends that to best learn how to teach, a beginning teacher must be engaged in teaching practice, illustrating the importance of induction for development of teachers. Several factors are cited as important for successful induction: knowledge of pedagogy and content; useful strategies and resources; and relationships with other beginning teachers, mentors, professional developers and administrators.

Research by Eisenman & Thornton (1999), Luft, et al. (2002, 2003), Odell (1986) and Upson & Koballa (2004) indicates that beginning teachers have changing knowledge needs as they progress through the induction phase of their teaching career. Beginning teachers who are in the first year of teaching often require growth in knowledge of pedagogy to allay fears and lack of knowledge of managing their classrooms and workload. As teachers progress in their experience, their knowledge needs shift to pedagogical content knowledge and helping all of their students understand content. Assessing and understanding these needs may lead to successful mentoring and induction.

Many successful induction and mentoring programs are successful in part due to the use of structure and professional development curriculum (Mariage & Garmon, 2003; Ralph, 2002; Wollman-Bonilla, 1997). Beginning teachers need personal support (Gratch, 1998; Whitaker, 2000), but the greatest growth in teaching practice has been shown when induction is based on curriculum for pedagogical knowledge and pedagogical content knowledge growth (Luft, et al., 2002, 2003; Pfleeger & Mertz, 1995). When the curriculum allows beginning teachers and their experienced mentors to collaboratively develop or adapt resources for learning and teaching, teaching practice improvements are evident (Mariage & Garmon, 2003).

While the need for induction curriculum is clearly seen, relationships are needed in order for the curriculum to be effective (Abell, 1995; Odell & Ferraro, 1992). Stansbury & Zimmerman (2000) contend that beginning teachers have different support needs over the course of the induction phase from initial emotional comforting through peer collaboration and professional relationships. Mentoring based on a “buddy system” of personal support is not enough to foster significant growth in beginning teacher practice (Feiman-Nemser, Parker & Zeichner, 1993). For professional development at the highest levels, collaboration in a well planned learning environment is needed (Athanses & Achinstein, 2003; Feiman-Nemser, 1998; Wollman-Bonilla, 1997). When collaboration is a major component of induction, significant growth in teacher practice can occur (Van Hanegan, Pruet & Bamberger, 2004; Burton, 2003; Luft, Roehrig & Patterson, 2003).

The knowledge of induction gained in this review is reflected in the design of the eMSS induction program, including the design of the Diversity Module implemented in this study. All modules in eMSS are currently being developed with a focus on reflective, collaborative discussion, which has been shown to be successful in induction programs, as well as in online instruction. Studying aspects of the eMSS program will provide information on distance delivered induction programs to add to the existing body of induction research.

Distance Education

Distance learning methods, especially computer-mediated conferencing (CMC), have opened up new pathways to higher-level thinking via discourse, reflection, and negotiated meaning. Distance education may include the use of interactive video, broadcast media, correspondence by hard copy mail, email, computer-mediated-conferencing or telephone communication. This literature review examines distance education using a definition of CMC that is limited to using internet communication through computers. Further, the type of distance education examined in this review uses collaborative asynchronous discussion between participants and instructor and between participants only.

The asynchronous nature of CMC in the eMSS program allows participants to post questions to a content qualified, trained mentor at any time of day. Responses from a community of teachers, as well as professional scientists, may also be posted to the beginning teacher at any time. CMC also allows participants to frame and edit

thoughts before sharing with others, possibly bringing discourse to a higher level of critical thought and reflection.

In addition to its usefulness to participants, CMC supplies new tools for investigation and analysis in the form of archived discussion transcripts that allow researchers to “observe” the discussion in the same way participants experienced it. Topical threads can be followed within a discussion, or several different discussions can be studied for comparison or to track changes in attitudes or learning behaviors over time.

Research on distance education that measures learner outcomes has been produced primarily since 2000 (perhaps in reply to literature reviews by Rourke, et al, (2001) and Phipps & Merisotis (1999) calling for such research), but much of this research is not well defined or structured methodologically. The lack of measurements of participant learning in online settings may also be attributed to the nature of the online experiences studied. Many of the studies examine learning in graduate level courses or conferences of professionals, in which appropriate measurement of participant learning is challenging to determine.

Research articles that measure the process of learning online often contain careful measurement and analysis to determine if learning is taking place. Gunawardena, Lowe & Anderson (1997), Garrison, Anderson & Archer (2001), and Kanuka & Anderson (1998) are several of these researchers. Although they may not always provide measurable outcomes of the individual learner, their accurate

assessment of construction and presence of learning across the group serve to inform the understanding of distance education.

Phipps & Merisotis (1999) conducted an extensive review of distance learning research in education settings in the 1990's. They found that only 40 of nearly 400 articles examined conducted empirical research dedicated to explaining or predicting phenomena related to distance learning. These 40 articles included various methods of distance delivery (interactive video, correspondence through paper and/or one way video, broadcast media and computer mediated communication). Furthermore, Phipps & Merisotis found that approximately 25% of original distance education research is focused on CMC based delivery. Research cited by Phipps & Merisotis included evaluation of success through measuring learning outcomes, as well as measuring the process of learning.

Review of Significant Research

Findings from the literature on distance education can be grouped according to whether the focus is on the instructor, the individual participant or the group. Findings pertain to the role of the individual, or group in an online learning environment. These roles are illustrated in Table 4.

This review is not designed to compare roles in face to face instruction and online instruction. Rather, it examines successful online instruction per se. Several of the studies examined here (Gunawardena, Plass & Salisbury, 2001; Hillman, 1999; Lavooy & Newlin, 2003) include comparisons of face to face and online instruction. One can learn from the comparisons, but since many variables can account for quality

of instruction, and quality of instruction is not well defined in these studies, comparison studies should be interpreted critically. In this review, comparison studies are examined primarily for information about online learning.

Table 4 Perspectives to Examine Distance Education

Distance Education Learner Roles	Components of Learner Roles	Synopsis of Learner Roles
Instructor	Facilitation Community membership	As in face to face instruction, the role of the instructor in online learning is key to successful student learning
Individual learner	Cognitive presence Active participation	The learner in an online environment takes an active role in building knowledge and may impact the learning of peers
Group (Collaboration)	Social construction of knowledge Development of a learning community	Learners support, assist, interact and gain from the knowledge of peers

Role of the Instructor. Quality reform education using face to face and online methods can exhibit similarities. The role of the instructor in distance education is crucial like that in face to face instruction. In successful distance education the instructor works as a facilitator during instruction rather than as a presenter of knowledge as may be seen in lecture based traditional instruction (Grooms, 2003; Hillman, 1999). The instructor must possess the skills to foster reflection and learning

in students, and ideally to also develop a collaborative learning community in which participants learn from one another.

The role of the instructor was examined in Chyung & Stepich's (2003) case study, in which they conducted discourse analysis to gauge online learning of 126 students. Evidence supported cognitive presence of learners developing online, leading to enhanced learning of course material. Garrison, Anderson & Archer (2001) define cognitive presence as, "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication." (p. 89) Chyung & Stepich used Bloom's taxonomy of learning (modified for online instruction) to develop congruent online instruction, in which objectives, activities and assessment are designed to complement each other in building knowledge in online learners. The role of the instructor in courses in this study was found to be two-fold: developing congruent instruction and facilitating active online learning.

While the instructors' role in developing online curriculum was not found to be significantly different than in traditional instruction (save that activities must be applied online), the development of cognitive presence in online discourse requires skillful, focused facilitation (Chyung & Stepich, 2003). By design and practice, successful online instructors reinforce student awareness of course material, while facilitating discussion that enhances the cognitive presence of learners. (Garrison, Anderson & Archer (2001) cite cognitive presence as a requirement for higher level learning.) Discourse analysis revealed that student development of cognitive presence

led to increased learning through discussion. Further, Chyung & Stepich (2003) found that, through careful design and facilitation, the instructor could help develop the cognitive presence of learners.

In the online environment, and some types of face to face instruction, the role of the instructor is minimized in terms of visible participation, as he or she moves from the sage on the stage to the guide *within*. In this role, the instructor is seen as a member of the learning group, rather than the sole provider of knowledge. Grooms (2003) conducted a study of the role of faculty in online group learning processes. In her exploratory study of online courses, Grooms surveyed participants about their course experiences. Students in online courses expressed a need for, and a satisfaction with, instructor feedback delivered through email and online discussion. Further examination of the role of the instructor as perceived by the student pointed to the importance of the instructor engaging in intellectual dialogue with learners. Students described this collaborative relationship as a community of inquiry, in which all community members discuss learning the topic at hand. Through surveys, Grooms found that students considered faculty a part of the community of learners, citing a shift from traditional lecture to “the more learner-centered and learner controlled environment with the professor acting as learning facilitator.” (p. 8).

Hillman (1999) used content analysis to examine discourse from four face to face (FTF) courses and two CMC courses in a graduate level university management program. Hillman cites research (Dillon, 1999; Flanders, 1970; Graddol, 1989) that shows two thirds of the talking in FTF courses is done by the instructor. In his study,

Hillman found the CMC instructor posted 41% of the sentences. Hillman further found that students used a lecture mode (Hillman's term lecture is more generally understood as expository writing, in which the author freely writes extended messages, expounding on a subject), in CMC in 59% of their sentences compared to 7% by FTF students. Hillman suggests this is attributed to CMC students' greater opportunity to speak at length due to their peer relationship with the facilitator in the learning community.

Gunawardena, Plass & Salisbury (2001) found that collaborative discussions do not occur spontaneously in online courses. Just as an instructor initiates and moderates classroom discussions in a traditional face to face classroom, he/she must also do so in an online course. In their case study, two experienced teachers in traditional settings (two of the study authors) developed and facilitated their first hybrid online course offering (there were four face to face meetings that complemented the online delivered course). Gunawardena, Plass & Salisbury (2001) found their students were better prepared when approaching online coursework compared to FTF. The structure of the researchers' online courses did not include the instructor "covering" the assigned reading material as often happens in face to face classrooms. The researchers noted that students would not waste their own time by going to online activities unprepared. Without the covering of the assigned material, students did not perform as well in online activities if they did not prepare ahead.

The researchers in Gunawardena, Plass & Salisbury's study viewed online discussion as a forum for students to share ideas and knowledge, with little need for

continuous interaction with instructors. In interviews, students considered this online discussion a waste of time, participating only on a cursory level, with learning levels less than expected. Dialogue analysis and student comments led the researchers to determine that online discussion must be facilitated to be meaningful and meet course learning objectives. Following examination of student work along with analysis of discourse and surveys, the researchers determined, “We need to develop our online moderating skills and teach our students how to moderate their discussions as well.” (p. 43) Results showed facilitators of online learning need to develop a “unique set of skills” in order for students to exhibit high levels of learning.

Like Gunawardena, Plass & Salisbury (2001), Lavooy & Newlin (2003) found that effective online discussion should be facilitated by the instructor. They conducted discourse analysis of both face to face and online courses (similar content) over a five year period. Analysis of online learner assessments (assignments and final projects) showed a positive relationship between increased interaction and level of learning. Preliminary results also show a positive relationship between the quantity of online interaction and grades in assignments and overall course final grades.

Examining discourse from three one-week exchanges in two graduate level online courses, Garrison, Anderson & Archer (2001) found that for computer mediated discussion to progress from unreflective, random exchanges to higher order learning, facilitators needed to understand the medium of communication and the “critical role of teaching presence” within the medium. They found a low number of messages in the cognitive presence category of integration and resolution of

information, attributing the low number of higher order thinking messages to the curriculum and to instructor facilitation. The researchers argue that instructor facilitation may not have shaped discourse toward the higher order activities. Garrison, Anderson & Archer determined that to develop students' higher order thinking requires that facilitators' understand online communication and maintain continuous online presence.

In analysis of an online course, Hara, Bonk & Angeli (2000) found that students, not the instructor, dominated discussion. The instructor (not one of the study authors) was found to be purposely creating a learning environment in which students were in charge of their own learning. The researchers suggest that individual students forced into the role of instructor through facilitated discussion became more engaged and comfortable with learning methods, producing increased cognitive growth. Increasing ownership of learning allows participants to construct knowledge online.

Role of The Individual Learner (Cognitive Presence). The distance education research literature explores the role of the instructor, and that of the collaborative learning group very thoroughly. Research on the nature of learning online by individuals is not as complete. One part of the present study examines online learning by individuals, and thus addresses this lack of research. Evidence of cognitive presence by individuals is described in many studies examined for this paper, specifically, in studies by Stacey (1999); Garrison, Anderson & Archer (2001), and Hara, Bonk & Angeli (2000).

Garrison, Anderson & Archer (2001), used discourse content analysis to assess individual cognitive presence in three one-week exchanges from two semester-long graduate level online courses. Their coding instrument established four message types in two categories. Most messages were coded as *triggering events*, those messages that initiate a discussion, identify or recognize problems, but contain no evidence of cognitive presence. The other three message types illustrate cognitive presence: *exploration*, an inquisitive and divergent process in a sense-making search; *integration*, the construction of possible solutions, and *resolution*, committing to, and testing solutions. In their study, Garrison, Anderson & Archer found that messages illustrating cognitive presence made up nearly 60% of all messages. Exploration accounted for 42% of messages, showing students are sharing insights and contributing relevant information to the learning community. The authors contend that these findings illustrate an extensive cognitive presence by individuals in the online learning community.

Stacey (1999) studied 31 graduate students' participation in an online course, documenting the effects of group collaboration through analysis of discourse and interviews. She documented evidence of cognitive presence demonstrated by individual students. Stacey's findings showed that conversation between participants provided evidence of cognitive presence, and also served to foster cognitive presence in individual participants. Interviews and discourse analysis led Stacey to the finding that social construction of knowledge was taking place. The individual learners, through considering the ideas of others, constructed their own knowledge. She found

that when students constructed meaning in online discussions, they showed a correspondingly higher level of knowledge.

Hara, Bonk & Angeli (2000) document cognitive presence in online learning by analyzing messages within the context of an online college course. Discussions from four randomly selected weeks of a 15 week course were analyzed for cognitive skills, such as critical thinking and reflection on learning, demonstrated by participants. They analyzed discourse using a combination of Henri's (1992) framework for analyzing cognitive skills online combined with Bloom's taxonomy of learning. Hara, Bonk & Angeli discovered that 70% of messages illustrated cognitive presence by participants. The researchers determined that the curriculum and facilitation of the course were constructed in such a way to demand that students process information at a high level to be successful in the course. The online course was deemed successful by evidence of cognitively deep student conversations and the high level of processing of course content by individuals.

One reason proposed for the higher cognitive levels shown in online learning is the method of using the computer as a communication tool. Asynchronous computer mediated learning allows a speaker to hold the floor for as long as he/she likes since there are not time constraints like those in face to face interactions. As Wertsch (2002) found, computer mediation gives rise to "critical new properties" of social communication. He compared the "rapid-fire, face to face dialogue where utterances are often fragmentary and interrupted" to CMC's "extended, maximally explicit, fully developed, and uninterrupted utterances." Citing results of this

comparison, Wertsch argues that the nature of CMC based instruction allows learners to develop and share a higher level of cognitive presence than they could in face to face instruction.

Role of the Group (Collaboration). To make the examination of a learning community in distance education most useful to the present study, defining what a learning community is will help. In an attempt at coherence in examination of induction and distance literature, a definition can be taken from induction standards (INTASC, NCATE and NBPTS), which are discussed in the induction section of this literature review. Membership in a learning community is a common standard in all three of the reviewed sets of standards. Definitions are very similar among the three standards, yet the NCATE standard is the clearest to apply to an examination of distance education research. NCATE describes a learning community as a collaborative group of individuals sharing a common context. In NCATE standards, this group is teachers who work in the same or similar settings, in the present study, the group is teacher participants in a specific online induction program, who develop a common vision and agree to collaborate in learning. NCATE further describes the learning community as one whose members learn as individuals through collaboration while supporting the learning of the group as a community.

Evidence that a cohesive learning community can be developed is illustrated in Stacey's (1999) study of 31 MBA students in an online program. She conducted analysis of discourse as well as pre and post (course) interviews of all students. In post course interviews, students described the value of the group for "sharing others'

perspectives, exchanging ideas, and developing thoughts in a way that they could not achieve as an individual learning in isolation.” (p. 22) Stacey’s discourse analysis provided evidence that participants were willing to generously share resources with fellow participants. Members of the course developed a common language of learning over the course of the semester.

By the end of the academic year, members wanted to keep together in their established groups, attempting to study similar subjects in succeeding courses to continue the community they developed online. Ways that membership in an online community supports the learning process are shown with similar evidence in studies by Grooms (2003), Kanuka & Anderson (1998), Ludwig-Harman (2003), Lavooy & Newlin (2003) and Hara, Bonk & Angeli (2000).

Stacey (1999) found that a collaborative support network developed through participants’ sharing personal anecdotes and supportive comments. Dialogue analysis and interview results revealed support among students as shown in the following comment considered common among participants,

I think it [online support] gives us better contact with our fellow students and it takes away the isolation of distance education. And certainly the group that we had running here in the second semester is a fairly tight knit group now and the interaction with the computer has actually brought us together both from an education point of view and probably socially as well. (p. 25)

To answer the research question of how participants learn online an examination of the formation of a learning community is warranted. The major data collection method in the present study is discourse analysis. This method has been used often in research to gauge the development and learning within a collaborative

learning community. Among the major benefits of an online community of learners are providing personal and professional support for group members and higher level thinking. Development of a collaborative community may be difficult to accomplish (Gunawardena, Plass & Salisbury, 2001; Kanuka & Anderson, 1998) yet can lead to high levels of interaction (Hara, Bonk & Angeli, 2000) and greater learning (Lavooy & Newlin, 2003).

When Vygotsky (1978) wrote of learning through social interaction, and Piaget (1974) wrote about causality in social interactions, computer mediated communication did not exist. Clearly, social interaction is a characteristic of learning in general, regardless of the medium of delivery. Piaget (1950) points out that social learning opportunities provide the learner with a new set of values, as is seen in the eMSS program through thoughts posted by content experts or experienced mentors. Often, the new values contradict the existing knowledge, resulting in a cognitive conflict, which the learner can resolve by assimilating new ideas with existing knowledge, or accommodate the new values into his/her own understanding (Strike and Posner, 1992). Regardless of the method of learning, the social transmission of learning from expert to peer can be a component of online learning.

Hillman (1998), in his study comparing CMC learning with face-to-face learning cautions against comparing the amount of interaction between the two instructional methods, arguing that interaction within each method will take different forms. Online learning may foster the social construction of learning, as shown in Fahy's (2003) discovery that participants in a CMC environment are very likely to

respond to messages from peers. Garrison, Anderson, & Archer (2001) suggest that higher-level thinking is enabled in a “critical community of inquiry”, a reflective and collaborative discourse environment where ideas are challenged and subject matter analyzed. In Hillman’s (1998) study, he confirmed the research of Mabrito (1991) and Mason (1989), showing that students in CMC based courses are likely to express themselves as part of the community.

One of Hillman’s (1998) indicators for social discourse is *humanizing*, in which the participant is attempting to create and maintain an atmosphere conducive to collaborative learning. Findings in Hillman’s study showed that a community was building in a CMC course as discourse contained a larger percentage of humanizing messages than face-to-face discourse. A second category in Hillman’s analysis is *opinioning*, in which the participant offers opinions based on understanding of the material discussed. Hillman concluded that the greater use of opinioning messages, indicating CMC participants’ confidence to express opinions openly, indicated a greater comfort with peers, compared to face-to-face students.

In a discourse analysis study of online courses conducted over a five year period, Lavooy & Newlin (2003) found that students’ learning is enhanced by interaction with a community of peers in an online discussion format. They found that online instructor led chat-based discussion produced greater interaction than traditional classroom instruction. Their study of college courses delivered face-to-face and online (by the same instructors), shows a higher level of participation and interaction between students online compared to face-to-face.

Evidence gathered through discourse analysis and interviews supports their finding that a learning community develops through thoughtful course design and facilitated discussion online. Participants reported developing a feeling of community with peers and a connection to the course itself. Comparing levels of discussion with course grades, the researchers found a positive correlation between the level of student participation online and grades on assignments and final projects.

Gunawardena, Lowe & Anderson (1997) developed an instrument to gauge social construction of knowledge in online settings. This instrument was developed through examination of an online debate between education professionals. Kanuka & Anderson (1998) applied this instrument to a collaborative, non-debate forum in an online college course. They found that students construct knowledge in an online environment through social interchange with fellow learners as illustrated in a student excerpt,

Well in simplistic terms you expose your arguments to others (maybe in a part progressive way . . . an outline here, a paragraph there). This in turn allows others (peers and tutors) to react to your thoughts . . . you continue. Your mind changes . . . somebody makes it succinct . . . a piece of reading you haven't thought of . . . Well this seems to be CMC written large to me. (p. 424)

After the online forum was completed, Kanuka & Anderson (1998) surveyed participants about their perception of online learning. Results indicated that participants perceived the online forum successful in providing opportunities for reflection and exposure to multiple perspectives provided by others in the forum. Interviews of forum participants confirmed the views expressed in surveys that success of the forum was attributed to sharing of ideas through discussion with peers.

Dialogue analysis of the online forum revealed a small amount of new knowledge construction by participants. However, a key finding was the benefit of social interaction. Participants demonstrated acquisition of new information that was compatible with existing knowledge, but they did not replace existing knowledge as required in Posner & Strike's (1992) definition of conceptual change in learning. While learners did not alter their basic understanding of pertinent concepts, they did increase their overall knowledge base through interaction with the online learning community. Evidence showed that individuals increased their knowledge while the learning community constructed knowledge in common (demonstrated by common language of learning) as well. Kanuka & Anderson (1998) interviewed participants in a graduate level online forum. Participants reported the greatest value of the online forum was the social aspect of networking with peers.

Kanuka & Anderson (1998) found evidence that a community that effectively furthers learning is not necessarily socially supportive. They conducted a three week online forum for learning center managers in Canada. Kanuka & Anderson's study of knowledge construction in this forum was conducted using discourse analysis, an online survey and a telephone survey. Surveys revealed interesting information about the community. First, participants expressed disassociation with other forum members, shown by comments including; "sometimes difficult to identify with others" and "could not always relate to others." The participants also expressed dissatisfaction with the ability to network with members of the community. Discourse analysis provided evidence of knowledge construction by participants in this online

environment. Kanuka & Anderson (1998) attribute this learning to cognitive dissonance (critical constructivism) arrived at through social interaction in the community. This research provides information that a community of learners may not necessarily be supportive in nature, yet still contribute to learning by members.

Kanuka & Anderson (1998) note, “The learning process, then, is transformed from a personal activity to a social activity as we are exposed to challenges and confrontations of our own meanings through interactions with others.” (p. 72)

Gunawardena, Plass & Salisbury (2001) conducted a critical evaluation of the initial offering of an online course two of the researchers developed and taught. They analyzed dialogue and conducted interviews after the course was completed and grades assigned. Through analysis, they identified several shortcomings of the course development and delivery. One concern they cited as of primary importance is the lack of building a learning community. The instructors had provided a discussion area in the online course for participants’ (including the instructors) discussion, but had not considered that discussion beneficial to learning may require leadership and facilitation. The discussion area received very little use. Analysis of student responses led Gunawardena, Plass & Salisbury (2001) to conclude that simply creating a conference area online is not enough, “a community must be built and activities moderated.” (p. 42).

In a study using discourse content analysis, Hara, Bonk & Angeli (2000) examined the engagement shown in messages posted by 22 students in a 15 week online course. They determined through the evolution of student engagement with an

extended number of participants that a successful community had developed in about eight weeks. They found that students became more engaged when forced to reflect/interact by a facilitator in the online course.

Discourse analysis by Hara Bonk & Angeli (2000) showed that prior to building a learning community, participants only posted the minimum required one message per week. The messages posted across the group became much more interconnected as the course progressed. A graphic representation of how message responses were connected to prompting messages showed little interconnectivity early in the course, with a response of only one message sometimes resulting from a prompt message. As the community of learners developed, a graphic representation of messages was much more complex. Participants regarded the thoughts of several peers with each response they posted. Evidence of the community was seen in the more widely distributed interactions, each responding to thoughts of multiple peers. Figure 1 illustrates this growing interactivity using diagrams from Hara, Bonk & Angeli's (2000) study.

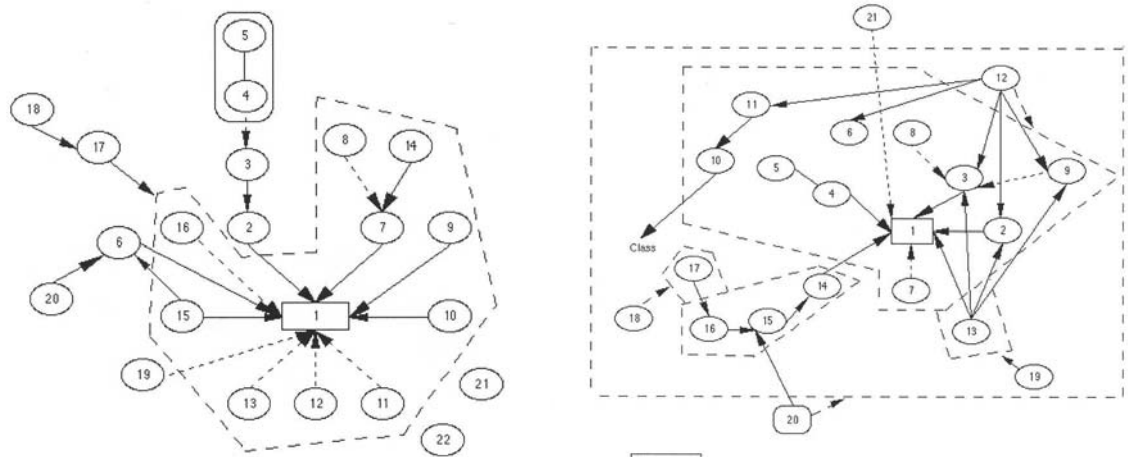


Figure 1 The two diagrams in this figure are from Hara, Bonk & Angeli (2000). In the diagram on the left from early in the program, the arrows show direction of response. This diagram shows most responses directed to the initial prompt in the rectangular box labeled 1. The right diagram from later in the program shows more responses directed toward peers and relatively less to the initial prompt. (Figures reproduced with permission)

Hara, Bonk & Angeli's (2000) results illustrate that participants collaborated in a learning effort that was "greater than the sum of individual efforts." (p. 129).

They found that as the group became more cohesive, the number of references to the thoughts of others increased significantly. Messages became less formal as well as the sense of being a group developed. Interviews of participating students revealed that participants printed and kept messages containing the thoughts of fellow learning community members for later reflection.

Several studies (Fahy, 2003; Hara, Bonk & Angeli 2000; Stacey, 1999) examined the members' support of each other. These studies show that support of fellow learners allows trust to develop over time, with the hypothesis that trust helps the community develop, enhancing socially constructed online learning. Stacey

(1999), through interviews of online graduate students determined that there was a network of supportive interaction that underlay the mutual respect and trust needed for a successful collaborative learning community. Students reported that this support helped motivate them to apply themselves more fully in the online course.

Summary

Anyone who has participated in traditional education can attest that there is a range of quality. There is no reason not to expect the same range of quality in distance education. Studies of distance education, including the present study, can provide information to help increase the quality of distance education through informing research.

Several factors shape the effectiveness of learning in distance education methods. Distance education can be examined through three roles, the role of the instructor, the individual learner and the learning community. The role of the instructor in distance education is different than that in traditional instruction. Skills in developing collaborative learning are more essential in distance education, as the role of a successful distance instructor could be more accurately described as that of facilitator (Grooms, 2003, Hillman, 1999). Gunawardena, Plass & Salisbury (2003) found that individual online students are better prepared than in traditional instruction.

Like that of the instructor, the role of the individual student may be different online compared to in a traditional face to face setting. The asynchronous nature of most online instruction allows students to frame their thoughts before sharing them in

discussion (Hara, Bonk & Angeli, 2000). Garrison, Anderson & Archer (2001), and Kanuka & Anderson (1998) cite the ability to develop thoughts before presenting them as cause for the higher level of critical thought seen in successful distance education. Facilitated discussion at a high level can increase learning and help develop a collaborative community of learners (Stacey, 1999; Wertsch, 2002).

Studies by Gunawardena, Lowe & Anderson (1997), Kanuka & Anderson (1998) and Hillman (1998) provide evidence that learning can be enhanced through collaboration within a learning community. Fahy (2001, 2002), Hillman (1998) and Kanuka & Anderson (1998) have examined online learning communities for interaction patterns for social and individual learning. Findings indicate that learning within a collaborative community can enhance construction and retention of learning.

In the eMSS induction program the Diversity Module I developed as an intervention for this study is structured to make the best use of the knowledge gained from this literature review. The facilitators for the module were trained in methods of guiding learning based on knowledge gained from literature reviewed in this study. Building upon the research-based understanding of learning communities, eMSS professional development is designed to maximize collaboration among mentor/mentee pairs as well as small group peer collaboration.

Education for Diverse Learners

This section presents a review of multicultural education from literature based upon researchers' and practitioners' experience. For the purpose of this paper,

multicultural education is defined as teaching students whose culture or ethnic background is different from that of the teacher. This review of the literature is divided into two sections. The first section, Critical Concerns for Minority Education, examines research findings concerning the education of minority populations. The second section, Addressing Critical Concerns for Minority Education, examines research-supported methods to improve minority student achievement (Table 5).

Table 5 Format of Multicultural Education Literature Review

Section	Components
Critical Concerns for Minority Education	Minority Students Are Not Being Taught Well Concerns specific to Native American education An Achievement Gap Exists Colorblindness in Education (Ignoring Culture) Is An Ineffective Strategy
Addressing Critical Concerns for Minority Education	Teacher Awareness of Self Culture Teacher Awareness of Student Culture Diverse students ways of understanding Concerns specific to Native American education Understanding student learning characteristics Concerns specific to Native American education Induction for Teachers of Minority Students

Two key points will help to clarify the organization of this section of the literature review. First, whenever possible, I start each section with literature relevant to the education of all diverse students and follow that with an examination of research findings specifically related to the education of Native American students. I

chose to focus on concerns specific to Native American education because the majority of students taught by participants in this study are Native American. The second key point is that research in this review was chosen for inclusion if it helped to shed light on increasing the effectiveness of induction of teachers of diverse students.

Review of Significant Research

Critical Concerns for Minority Education

Minority Students Are Not Being Taught Well. Teachers' expectations can strongly influence the learning of diverse students (Secada, 1992; Dreeben, 1987). Beady & Hansell (1981) asked teachers to rate their expectations for their diverse students' learning within the first few weeks of the school year. Findings indicated that teachers whose ethnicity matched that of the students had higher expectations for their students than teachers whose students were of a different ethnicity.

Teacher practice was shown to have a greater influence on student achievement than student ability in Dreeben's (1987) study of 30 first graders in several Chicago schools. He found that student learning was strongly influenced by the amount of time teachers' devoted to basal instruction and the amount of material covered. Dreeben found that aptitude served as the basis to form reading groups, in which teachers applied instruction according to perceived aptitude. The highest ability group in Dreeben's study was in a low SES Black neighborhood, but the teacher spent little time on basal instruction because the students were perceived to have low ability. Dreeben concluded that student achievement corresponds strongly

to quality of instruction; even low ability students respond well to good instruction and students of teachers who had the time for instruction and proper materials were more successful.

According to Secada (1992), opportunities for learning are often based on perception of student ability, especially concerning placement within tracking systems. In his study, students were placed in working groups according to teachers' perception of student ability. Secada found that teachers and administrators often make decisions about individual students' ability without a clear understanding of the students' ways of learning.

Students with low perceived ability often perform poorly on assessments that do not match their learning styles (Solano-Flores & Nelson-Barber, 2001). Poor performance on a biased assessment may result in students being incorrectly placed in low-level tracked groups.

Student learning may also be affected by teacher's willingness to adapt to student needs. Stodolsky & Grossman (2000) conducted a case study of eight experienced teachers of Mathematics and English in a newly integrated high school. The teachers studied were either willing or unwilling to change their curriculum for the cultural differences of their new students. The teachers who made changes for new students held broad goals relating to their students as individuals (personal, social and academic) while the teachers unwilling to change focused almost exclusively on academic achievement using techniques "perfected years ago."

Examining teacher support structures, Stodolsky & Grossman (2000) found that the teachers willing to change had access to new ideas, resources and instructional techniques that the unwilling teachers were not able to access. As a part of this study, Stodolsky & Grossman also surveyed 700 teachers in the same geographic area. Results showed positive relationships between teachers' commitment to adaptation and personal growth and human relations goals for students. Thus, it appears that teachers who understand the individual needs of their students were more willing to adapt their classroom practice to meet students' needs.

Monetary resources can be a part of the quality of education. Oakes, Joseph & Muir (2001) found that students in high poverty rural schools are more likely to have less qualified teachers than their suburban peers. In high poverty schools, 40% of mathematics teachers and 20% of science teachers teach out of field, compared to 28% and 14% respectively for low poverty schools.

Money for higher salaries is not always an option to keep qualified teachers, especially for multicultural, rural and/or isolated schools. In these situations, the best option for student success may be to prepare and develop teachers with close ties and commitment to the community. Ferguson (1991) found the single most important measurable cause of increased student learning was teacher expertise. Ferguson also found that school district expenditures (when regional cost differences are accounted for) correlated with student achievement. With Ferguson's (1991) and Dreeben's (1987) findings in mind, Darling-Hammond (1995) argues that equal salaries will not attract equally qualified teachers to dissimilar school districts; teachers prefer, and

transfer to when possible, school districts with higher SES students. Thus, Darling-Hammond (1995) contends that a state policy of salary differentials is necessary, paying teachers more to stay in low SES schools. Darling-Hammond (1995) noted that when Connecticut raised and equalized teacher salaries in 1986, teacher shortages, including those in urban schools, disappeared.

The term “resource” in education encompasses more than simply money. The amount of money allotted for schools can make a large difference in the quality of the buildings, teachers, materials and instruction (Kozol, 1991). Resources for professional development and teacher salaries are important aspects of education quality. However, a valuable resource for beginning teachers is another teacher with more experience. Administrators can serve as resources for culturally relevant pedagogy in their schools. Perhaps the most important resource for multicultural education is quality, on going professional development for teachers.

Darling-Hammond (1995) observed that students in urban schools are likely to be taught by “inadequately prepared, inexperienced and ill qualified teachers.” There are exceptions to Darling-Hammonds’ observations. Saldana & Waxman (1997) studied 76 teachers from 12 multicultural schools. Researchers found that many of the teachers were very experienced, with over 50% having earned advanced degrees. Keeping skilled teachers in these schools was attributed to the district’s recruitment and retention efforts focused on increased salaries and monetary advantages for teaching in the high needs schools. While studying middle school teachers on two reservations in Montana, Woolbaugh (2004) found that more than 60% of teachers

had more than five years of experience, and that their science teaching practices compared favorably to those of a national comparison group.

Minority Students Are Not Being Taught Well: Concerns Specific To Native American Education. Native American students typically score lowest among minorities on standardized tests (Montana Office of Public Instruction, 2004; U.S. Department of Education, 2003; Nelson-Barber, Estrin, 1995). In a 2004 report compiled by the Montana Office of Public Instruction, Native American students scored lower on the Iowa Test of Basic Skills (ITBS) than any other group, excluding students with disabilities or limited English language proficiency. ITBS scores from 2001 through 2004 show Native American students placed in the 30th and 40th percentiles. During the same testing period, European American students typically scored in the 70th percentile. Over the course of the four years of this report, test scores show some increase over time at the 4th and 8th grade level for Native Americans, but showed a decrease at the 11th grade level.

Native people have experienced difficulty accommodating to the White US culture of education (Mann, 1982; Snipp, 1995). The standard of living for Native Americans in general is typically shown to be equivalent to African Americans, well below that of Whites of European ancestry (Snipp, 1995). Indigenous American populations are estimated to have been between three and 18 million in 1492, but dropped to a low of 250,000 in 1890. Ogbu (1995) classified Native Americans as involuntary minorities in the US, citing the oppression of their culture and ways of learning by White Americans. The present study takes place in Montana, where

Native Americans make up the largest minority population (11.2% of statewide K-12 student population), thus examination of Native American education is relevant.

An Achievement Gap Exists

The face of diversity in U.S. education is changing. The most recent (2004) NCES data reports that in 2003, ethnic and cultural minorities made up 40% of the overall public school population (NCES, 2004). Before the middle of the 21st century, projections report that students of European ancestry will no longer make up the majority in U.S. schools. Current minorities will comprise more than 50% of the U.S. student population, with Latino/a students estimated to become the largest of the minorities (Secada, 1992; Tate, 1997).

As the composition of the U.S. population changes, achievement patterns by students are changing as well. Between the years of 1973 and 1992, National Assessment of Educational Progress (NAEP) scores changed significantly among three ethnic groups as shown in Table 6. NAEP mathematics scores indicate the amount of mathematics knowledge a student accumulates over their academic career. The more complex a students' understanding and ability to apply mathematics concepts, the greater the NAEP test score on a scale from 0 to 500. The NAEP science assessment is similarly cumulative.

NAEP science and mathematics scores, along with other measures of student learning, have been increasing in the past decades (Darling-Hammond, 2000, Tate, 1997). Disaggregation of assessment data by ethnic and cultural groups offers evidence of a narrowing of the achievement gap between ethnic groups, yet a gap in

scores still exists. Table 6 illustrates the closing gap with African and Latino/a groups realizing larger increases from 1973 to 1992 compared to Europeans.

Table 6 NAEP Score changes from 1973 to 1992

Group	Average math proficiency increase from 1973 to 1992 in scale points on NAEP assessment		
	Age 9	Age 13	Age 17
European American	10	5	2
African American	18	22	16
Latino/a	10	20	15

From Tate, 1997

Oakes, Joseph & Muir (2003), examined available NAEP demographic and survey statistics and found that students in low SES/rural schools are less likely to have the opportunity to take advanced courses. In addition to course availability, tracking of students through lower level courses can negatively influence the achievement of individuals in a cultural group. In Koba's (1996) study, she identified tracking as a reason for achievement gaps between ethnic groups. The number of students of color enrolled in honors, or higher academic track science courses, was low in the studied high school (Omaha, NE). More students of color were taking lower level classes, and were failing classes at a higher rate than white students.

Koba (1996) found the percentage of students of color in higher-level classes was well below their school population representation. Tracking was cited as the cause of the achievement gap - rather than teacher instruction practice - since teachers were trained in teaching diverse students. To resolve the tracking problem, the school

placed all students in a two-year course of integrated science, providing all students the same opportunity in science learning.

For two years of this study, all students took two years of integrated science, which used a number of methods and styles of teaching. Much of the learning was hands-on and student centered. All integrated science classrooms included heterogeneous grouping and constructivist methods that build on each student's present knowledge. Coursework and assessments were conducted using varied tasks and learning styles. This intervention resulted in narrowing of the achievement gap in this school.

Colorblindness in Education (Ignoring Culture) Is an Ineffective Strategy

Some multicultural education literature calls for teaching to be 'colorblind', or presenting the same curriculum in the same manner for all students regardless of ethnicity, culture or gender (Howard, 2001, Koba, 1996). The justification for colorblind education is that it should provide equal opportunity for all students. However, evidence shows that colorblind education is not effective for all students since they may come to the classroom with different learning characteristics, knowledge and skills (Howard, 2001; Bailey & Boykin, 2001; Darling-Hammond, 1995).

Blair (1999) examined practice in a number of schools in England to identify the characteristics of a successful multicultural school. Blair defined successful schools as those with minimal achievement gaps between students of different

cultures. Blair found that policies in successful schools were geared toward the concerns of all students, with the understanding that the same type of learning experiences for all students does not maximize learning for each student. Several administrators of successful schools expressed the belief that ethnic minority students are not entirely responsible for problems that beset them at schools, some responsibility must be taken by the school and provisions for students made. Blair (1999) also found a positive relationship between measured academic achievement and the level of academic expectations that teachers have of ethnically diverse students.

Deyhle (1992) conducted an ethnographic study of Navajo and Ute students who left school before graduation. Over half of the 168 school leavers interviewed or surveyed expressed that their teachers did not care about them as cultural individuals. Analysis of research data revealed a positive correlation between reporting of non-caring teachers and the feeling that school did not relate to Native American culture. Nearly half of the respondents reported that school did not teach what was important to them as Native Americans. Participants reported that school officials did not encourage Native American students to compete for professional jobs, which respondents viewed as “White jobs”; rather Natives felt encouraged to strive for unskilled labor “Navajo jobs.”

Addressing Critical Concerns for Minority Education

Multicultural education literature (Darling-Hammond, 1995; Dreeben, 1987; Herman, 2000; Howard, 2001) cites the need for teachers’ understanding of culture in

two ways. Teachers must understand their own culture in order to provide a framework for understanding the culture of their students. This dual understanding has shown to be important for the proper adaptation of curriculum and teacher practice for diverse students (Deyhle, 1997; Herman, 2000; Haukoos & LeBeau, 1992; Madhere, 1998).

Teacher Awareness of Self-Culture. The importance of self-awareness in multicultural teaching can be illustrated in a quote from Nieto (2000), “Becoming a multicultural teacher . . . means first becoming a multicultural person.” In order for teachers to increase awareness of the culture of their students, a self-awareness of culture by the teacher is necessary (Gay & Kirkland, 2003, Neuwirth, 2003; Lipka, 1991; Larke, Wiseman & Bradley, 1990).

McCalister & Irvine (2000) argue that for teachers to be effective with diverse students, it is crucial that they recognize their own cultural views because only then will they be able to understand the worldviews of their students. Gay & Kirkland (2003) argue that in order to make teaching more relevant to diverse students, teachers need to have a thorough understanding of their own cultures and the cultures of different ethnic groups as well as how this affects learning behaviors. They point out that many teachers assume that feeling guilty about racism is sufficient to make them worthy promoters of equality and social justice in their classrooms.

Gaining awareness of one's own culture is not as easy task. Luky, Cuevas, Lambert & Lee (2005) found that teachers have difficulty meeting the cultural needs of students without an awareness of their own culture. They studied teachers in a

professional development program (four separate day-long workshops conducted over the course of an academic year) designed to help teachers provide standards-based inquiry science teaching for diverse students. The professional development began with helping teachers understand culture and how it relates to instruction. Using teacher self-reporting, researchers found that after training, teachers were able to apply the idea of culture to others, but not themselves. Surveys conducted before the training, and post surveys conducted after the last training, showed no significant difference in the teachers' knowledge of incorporating student culture in the classroom or the importance of doing so.

This study also included classroom observation of teacher practice. After professional development, the teacher's incorporation of diversity most often consisted of allowing students to tell stories and to offer cultural examples. Observations revealed no evidence of incorporation of cultural information in curriculum or teacher practice. In follow up interviews, teachers expressed resistance to incorporating cultural diversity in classroom practice because many of them considered culture irrelevant to science and learning. Many teachers expressed the idea that teaching culture is "not our job" and is not necessary as the students become assimilated anyway. One wonders if results would be different if teachers were aware of the significance of their own culture in their developing of practices to support student learning.

Self-perception of culture can be changed through professional development. Bell (2000), surveyed 21 student teachers before, during, immediately after and one

year following a one week in-school practicum experience for cultural diversity. The mostly White student teachers spent six entire days in a school with 85% African American students shadowing teachers, working with students and participating in seminars. Participants increased their perceived interpersonal competency in working with diverse students in the post survey. Longitudinal scores one year later showed continued increases in teachers' awareness of culture and perceived ability to work with diverse students. An important finding is that during the one-week practicum preservice teachers' perceived relationship ability with students decreased initially before increasing. Bell attributes this decrease to participants becoming aware of their own cultural biases.

Haukoos & LeBeaus' (1992) conducted a 2-week professional development institute for 154 elementary teachers from Native American reservation schools. The foremost strategy in the institute design was to persuade participants to recognize their current teaching behavior in relation to the diversity of their students. Once current behaviors were recognized and reflected upon, alternative strategies that integrated culture and science in the classroom were presented and assessed. Once changes in teaching practice were presented in training, participants were required to reflect on and discuss their own current beliefs related to desired changes in practice. Citing the teachers' ability to build on their understanding the culture of their students, Haukoos & LeBeau (1992) documented successful multicultural professional development.

Nelson-Barber & Estrin (1995) found that a teachers' understanding of his/her own culture is important for successful understanding of the culture of diverse learners. The researchers point out that many Native American students have extensive knowledge of mathematics and science based on their naturalist traditions and culture. The problem, according to Nelson-Barber & Estrin (1995), is that without understanding their own culture as a base for comparison to the students' culture, teachers are unable to recognize the Indian students' knowledge and learning characteristics.

Multicultural education literature clearly places the onus of culturally relevant education on cultural knowledge growth by the teacher (Lukyx, Cuevas, Lambert & Lee, 2005; Howard, 2001; Nelson-Barber & Estrin, 1995). Successful strategies in multicultural education include helping teachers become aware of their own culture as well as the culture of their students, and providing resources to help teachers learn to accommodate diverse students.

Teacher Awareness of Student Culture in Relation to Culturally Responsive Practice. Understanding the culture of diverse students is not as easy task, and some teachers do not take it on willingly. Research findings are clear in showing that awareness of the culture of teachers' students is not enough for successful multicultural education (Gay, Kirkland, 2003; Agbo, 2001; Howard, 2001). In addition to awareness, pedagogical knowledge and skills are required. While some pedagogical knowledge and skills promote student success across cultures, some approaches are especially vital or effective with a given culture. Understanding

students' culture may help teachers integrate culturally relevant pedagogy in their curriculum. Sue, Arredondo & McDavis (1992) found that students of racial and ethnic minorities function in at least two different cultural contexts, that of the home culture and the culture of the school (often White, middle class). Student learning difficulty occurs when the teacher is operating in only the one culture of the school and not connecting with the culture of his/her students.

Culturally responsive pedagogy is based on developing educational methods that are situated in students' cultural experiences. Understanding students' ways of knowing and traditional knowledge are critical to achieving a culturally relevant curriculum (Solano-Flores & Nelson-Barber, 2001). Understanding diverse students' ways of learning is a key to successful teaching (Solano-Flores & Nelson-Barber, 2001). Teachers may lack the skills to understand student learning, causing them to make erroneous judgments about students' achievement and ability (Boykin & Bailey, 1998; Howard, 2001).

The teacher, through awareness of student culture and willingness to accommodate student learning characteristics can overcome student reluctance to cooperate in classrooms. Larimore (2000) conducted a study with Native American students in urban classrooms. He found that the students, although not located near a reservation, share many of the same learning style preferences of their counterparts on reservations. Specifically, students convey disengagement when teachers stress verbal instruction. They also avoided peer competition and showed uneasiness in demonstrating new skills without adequate practice. Larimore (2000) noted that when

students were placed in the classrooms of teachers who stressed collaborative group work, urban Native American students were willing to take more risks and perform new skills compared to classrooms in which teachers practiced more traditional teaching, emphasizing lecture and individual, competitive performance.

It should be noted that understanding a student's culture and that student's ways of learning might not be the same thing. The following section examines teacher awareness of student culture in two parts. The first part, *Diverse students' ways of understanding*, examines teacher understanding of a students' culture, which allows teachers and students to develop a mutually respectful relationship. The second part of this review, *Understanding student learning characteristics*, examines teacher understanding of student learning characteristics, which may, combined with understanding of culture, help the teacher prepare, deliver and assess culturally relevant classroom learning.

Diverse Students' Ways of Understanding. Solano-Flores & Nelson-Barber (2001) write of the importance of examining student understanding to assess student learning. With the current implementation of high stakes assessment in education, understanding students for assessment takes on a high level of importance. Through analysis of research on culturally meaningful assessments, Solano-Flores & Nelson-Barber argue that assessment cannot measure learning properly if the assessment developer does not understand the ways of learning , and of demonstrating learning, of the students being assessed. They further contend that socio-cultural influences

shape student thinking. Influences include values, beliefs, experiences, cultural backgrounds and prevailing socioeconomic conditions.

The knowledge and skills students gain through their home and community culture contribute to the establishment of group learning characteristics (Pewewardy, 2002; Boykin & Bailey, 1998). Learning characteristics research has undergone much debate in literature; some argue for the value of learning styles, while others argue against it (Lomawaima, 2004; Pewewardy, 2001, 2002). The underlying contention is that no single learning style can be strictly associated with one cultural or ethnic group. However, Pewewardy (2002) cautions against dismissing generalities about ethnic group learning characteristics, as these generalities provide a place for teachers to start to build an understanding of student culture. Understanding learning characteristics, along with an understanding of the culture of a specific group, can inform meaningful pedagogical practices by providing a starting point for understanding and accommodating students (Pewewardy, 2002).

In a study to understand student's ways of perception, Greenfield (1997a) administered an assessment to non-schooled children in Senegal to gain understanding of their operational comprehension. The same assessment was previously used with students in the United States. In this assessment, researchers poured water from one beaker to another, different shaped beaker in front of non-schooled Senegalese children. The children were asked in their native language if the amount of water was the same. When they responded yes, they were then asked to explain why they *think* the level did not change. The children did not respond. To be

clear in their understanding, researchers rephrased the question to ask why the amount of water *is* the same. To this question, students responded with clear, accurate explanations.

Researchers found that the Senegalese children exhibited a different way of thinking compared to the U.S. children previously tested. The children from Senegal ignored the abstract thought concerning what they *think*, and responded only to the question based in their reality of what *is*. Failure to understand the way of learning and understanding in the Senegalese children may have led researchers to conclude that these children were deficient in concrete operations.

To understand how successful teachers of minority students function, Howard (2001) selected four teachers of African American students to observe and interview regarding their multicultural teaching practices. These four teachers were selected because the African American students in their elementary classes were successful on standardized tests in reading, math, and other subjects. Three strategies of the successful teachers emerged:

- Holistic instructional strategies: teachers taught moral and societal strategies as well as academic;
- Language strategies: teachers used languages and discourse patterns (Black English Vernacular, or Ebonics) students were familiar with to connect out of school experiences with school content;
- Skill building strategies: teachers created opportunities for students to build skills necessary to acquire the knowledge needed for school success. As one teacher reported, “It isn’t enough to tell a child you can do it. You have to show the child how he can do it.”

Language is a common theme in culturally relevant education research. In Howard’s study, the teachers’ use of Ebonics was important to the teacher-student

relationship. It should be noted, however, that the teachers realized the need for Standard English in society at large. Successful teachers, as a component of the holistic instruction, connected with students in a “native” language, yet helped students understand the need for Standard English use in academics and advancement in the larger American society.

Solano-Flores & Nelson-Barber (2001) found that English language learners (ELL) face a compounded difficulty in learning, especially in the disciplines of mathematics and science. The basis of their argument is that in addition to using the English language in school that is not their own native language, ELL students must also deal with specialized concepts within a second language that are specific to the discipline being studied.

Irvine (2003) contends that a major reason for an ethnic achievement gap is that the language and culture of middle class White students is more likely to be compatible with school than the language and culture of, African American students, or any other ethnic minority group. Irvine cites language as a major barrier to success in academics for culturally diverse students. She argues that students whose primary language is not Standard English have difficulties in school because their language is not compatible with the language of the school. Irvine writes about the CULTURES professional development program, in which teachers study cultures different from their own. The most valuable attribute of the program reported by participating teachers was immersion in culture through exposure to community aspects of student culture such as language, community events, church, restaurants, home visits, etc.

Several months after completing CULTURES professional development, participants were interviewed about their teaching practice. All teachers expressed that their CULTURES experiences influenced their classroom practice and enhanced student learning. Teachers expressed their commitment to study cultures different from their own and include study of diverse cultures in their curriculum. In addition, they committed to use their knowledge of culture in developing lessons and strategies for learning in their classrooms.

Research suggests that when teachers develop interpersonal relationships with students, increased learning can occur (Agbo, 2001; Howard, 2001; Holm & Holm, 1995, Lipka, 1991). Herman & Tucker (2000) argue that nurturing engagement encourages students to notice times when school is enjoyable and stimulating, increasing achievement and reducing risk of student's leaving school. From a review of background research, they argue that Latino/a students exhibit a stronger association between engagement, or school belonging, and achievement motivation than European American or African American students.

In their study of 248 at-risk Latino students with Latino and White teachers, student achievement was measured using teacher reports and student GPA. Findings revealed student engagement is a significant predictor of both student participation and student achievement. Herman & Tucker found that successful teachers focused on process rather than outcome; this allowed students to enjoy classroom time more, which in turn increased engagement. Observation of classrooms revealed that

engagement could be nurtured by focusing on the process of learning rather than the outcome.

Washington (1981) conducted a study of a professional development program conducted over five days during the summer for teachers of low SES, urban, African American students. Teachers in the program were either African American or White. The program of professional development consisted of researcher-led seminars and workshops in which participants collaborated on developing culturally responsive lesson designs. Washington found no significant change in attitude among the teachers regarding the race of students; however, teachers did report a better understanding of the needs of low SES students. Like Herman & Tucker (2000), after the first several days of the seminar, teachers expressed anger concerning race issues. By the end of the seminar, anger was replaced by cooperation between participants.

Diverse Students' Ways of Understanding: Concerns Specific To Native American Education. Lipka (1991) advocates classroom practice that considers the culture of the students, and he advocates teachers and students be of the same culture if possible. In Alaskan Yup'ik schools, 90% of the teachers are from outside of Alaska and not of Yup'ik culture. In an attempt to improve cultural relevance of the teaching of non-Native instructors, Lipka videotaped a Yup'ik teacher teaching lessons in a culturally responsive manner. The non-native teachers initially considered many of the cultural aspects of the lessons to be poor teaching practice. Presentation of and reflection on videotaped lessons provided teachers with training and acclimation to Yup'ik culture. Lipka reported this PD helped teachers understand

and develop culturally relevant social relationships with Yup'ik students. Better relationships allowed teachers to teach students in a culturally relevant way that enhanced learning. In a more recent update on his research, Lipka (2002) determined that through community based professional development Yup'ik community members, researchers and teachers have demonstrated successful ways to connect cultural knowledge to the math curriculum.

Agbo (2001) studied the development of an instructional program for Mohawk reservation students in which a culturally relevant, standards based curriculum was developed and implemented. The curriculum was developed through a series of meetings between university researchers, school officials and community members. There were two components of the program; one was ethnic education, in which students learned and maintained Mohawk culture, and the second was bi-cultural education, in which Mohawk students acquired the same learning and life skills as mainstream American society.

In Agbo's (2001) study, community members taught Mohawk language and culture in the school, while other teachers intertwined culture in general curriculum and practice according to guidance from the development team. Twenty cultural topics (Clan systems, medicines, etc.) were developed by the committee and each was included in the general curriculum at different grade levels. In order to teach in the two studied schools, all teachers were required to learn the Mohawk alphabet and sounds to properly pronounce names, understand and respect cultural norms and ceremonies and use the clan system when necessary in dealing with student

management. Parents and community members were required to work with teachers to help them to gain an understanding of community culture. Student outcomes were not reported in this study, but the development of curriculum standards was considered successful because of the collaboration between the school and the community.

The problem of language may be further compounded in Native American cultures. In an informal interview, an administrator (personal communication, March 11, 2004) for a Montana School district located near a reservation with a large percentage of Native American students, stated that language is a tremendous concern for Native students, especially in assessment. Many of the students in this district live on the reservation, in homes where their Native language is the primary language. The concern expressed by the administrator is that parents' lack of education precludes them from speaking the Native language well, in addition to a very poor understanding of English. With poor language skills in the home, these Native students do not come to school speaking either their Native language or English well.

Lowery & Mattiani (1999) examined the methods of learning of Native American students on several reservations. They found that in the Native American cultures studied, knowledge is viewed as a type of power. The power of knowledge is considered a gift that is to be used and shared with the community. Study participants expressed that sharing this power allows Native people to learn cooperatively and to look upon each other as a source of knowledge. This collaboration allows students to realize they have power and knowledge to share, contrary to the competitive nature of

white, middle class teaching structures (Boykin, Bailey, 1998; Agbo, 2001; Ogbu, 1998). The sense of community and shared stakeholder responsibility in the education of students is central in Native American culture according to Lowery & Mattiani (1999). They found that all members of the learning community might collaborate in bringing some value to education.

In another examination of community involvement in education, Coggins, Williams & Radin (1997) studied 19 Ojibwa families through interviews and surveys to examine the relationship between mothers' and fathers' levels of holding traditional values and their children's academic and social functioning in school. Findings revealed a positive correlation between the mother's level of holding traditional values and children's school achievement. The traditional value holding of the father was not significantly related to children's achievement. Interviews revealed that strong female leadership in the family and community has long been a part of the local culture. Coggins, Williams & Radin (1997) contend that adults secure in their identities as Native Americans with traditional tribal values may help provide a solid cultural core for their children.

Pewewardy & Hammer (2003) interviewed Native parents about their perceived value of education for their children. Results showed that parents play a key role in the reasons why some children adapt differently to various classroom conditions. Parents impart to their children different cultural identity ideals and advice on what it takes to be a good cultural community member and a good student in school. Parents also guide children's thinking about when to value one over the

other. Results of parent interviews showed that while they value education for long term benefits, Native parents will resist aspects of their children's education that are perceived to harm children's' cultural development and will advise their children to resist as well.

House (2001) examined the predictive relationship between Native American students' self-beliefs and mathematics achievement. House surveyed 121 Native American college freshmen during orientation before courses began. The survey gauged student self expectancies for mathematics achievement and student belief in self. Results showed belief in self statements were highly correlated with self rated expectancies and self confidence. At the end of the year, House compared actual mathematics achievement (grades) of the students with survey results. Comparison showed self ratings of overall ability and mathematical ability significantly correlated with academic achievement.

Yellow Bird, (2001) and Garret & Wilbur (1999) determined that although it is impossible to describe a common set of cultural values for all Native American groups, most share common characteristics such as non-interference, cooperation, coexistence with nature and extended family structure. Cajete's (2000) observational research confirmed that Native peoples' ways of learning encourage curiosity about the natural world, which is consistent with the Cajete's finding that Native children "learn by doing and experiencing." However, Pewewardy (2002) warns that educators must guard against stereotypical views of culture and learning characteristics that ignore the dynamic realities of individual learners. Generalities about learning

characteristics of cultural groups should be considered only a first step, and must be supplemented with local community knowledge through culturally relevant interaction with students, parents and the community (MacIvor, 1999).

Understanding Student Learning Characteristics. In a study by Boykin & Bailey (1998), the researchers examined ways in which African American students' learning differed from European American students' learning. Their study also accounted for socio-economic level concerning learning. Observing the learning characteristics of 128 African American and European American second graders, researchers found distinct differences in the way students learn. Evaluation of learning was determined by assessing students' ability to recall the relationships between two or more story facts, which the researchers considered a level of higher-order thinking. For instance, African American students in low income families performed significantly better in this assessment when learning involved music and movement. When researchers read the stories with animation, African American students scored better on the study assessment, while European American students scored poorly. Opposite results were seen when stories were read without accompanying animation; European students scored better than African American students.

In a review of Boykin & Bailey's (1998) research, Miller-Jones (1989) recommends that assessment for students of color should follow the type of stimulation in their home environment and should be made of multiple tasks to match the varied stimuli students experience at home. Another learning and assessment

concern raised by Miller-Jones is that the method of assessment should match the culture. In other words, cultural learning differences should be accounted for in teaching and assessing culturally diverse students.

In a 1998 study, Malloy & Jones examined the learning characteristics of African American eighth grade students through observation and analysis of student work. As in Boykin & Bailey's (1998) study, Malloy & Jones found that African American students learn best in an environment characterized by social and affective interaction, community involvement, and expression. The authors further described African Americans' math learning involving verbal and motor skills from their environment to communicate math concepts. Their study found that African American students learn holistically, deriving meaning from the whole concept, rather than analyzing components. One student expressed problems with third grade math because her teacher did not teach the way the student learned. The student further remarked that the teacher did not understand the way the student thought.

The authors also examined student self-confidence in their math learning. The students in their study exhibited self confidence in math skills, but in a manner different than European American populations. Most of the students expressing self confidence did not do so because they checked calculations and analyzed their answers. They were confident because they holistically knew the answer was correct. Even if the answers contained errors, students still expressed confidence in their learning at a higher level than European American students.

Understanding Student Learning Characteristics: Concerns Specific to Native American Education. Pewewardy (2002), himself Native American, notes that research literature indicates that there is no generic "Indian Learning Style." He does define tendencies toward learning characteristics in Native Americans however, due to shared culture, which he contends can serve as a basis for developing understanding of student learning needs. Pewewardy has found that field dependence (learning from one's surroundings) is a learning style tendency among Native Americans. Nuby et al. (2001) found that field dependence is likely to occur in cultures that are highly collective and family oriented, as are many Native American cultures (Pewewardy, 2002; Mann, 1982). DuBray (1993) found that field independence occurs in cultures in which personal autonomy and formal organization are emphasized, as in most White, middle class cultures. Pewewardy (2002) contends that Native American students placed in a field independent oriented classroom will be at a distinct learning disadvantage.

In a literature review by Swisher & Dehyle (1989), the authors cite a number of studies that identify learning characteristics for specific tribal communities or Native Americans in general. Recent research has confirmed findings cited by Swisher & Dehyle. Native American learning styles include students preferring to observe an activity repeatedly before attempting it (Appleton, 1983; Lomawaima, 2004; Longstreet, 1978; Pewewardy, 2002; Wax, Wax & Dumont, 1964); learning best cooperatively (Lomawaima, 2004) and learning better with visual instruction than with verbal (Lomawaima, 2004; McLaughlin, 1995). Swisher & Dehyle argue

that this information is valuable to teaching, and that teachers of Native American students should adapt the curriculum and activities to match the learning style patterns of their students.

Induction For Teachers of Minority Students

This section describes research that provides ideas for induction for beginning teachers of minority students. From personal teaching experience, and research by Feiman-Nemser, (1999, 2001), beginning teachers often receive the most difficult assignments, as experienced teachers have earned the right to teach the easier assignments. Difficult assignments often consist of multicultural classrooms. As with any assignment, induction and/or professional development will help teachers learn how to improve instruction in their teaching assignment.

A problem associated with urban, rural, and low SES schools is teacher relocation because it can be difficult to keep experienced teachers from moving to a “better” school. Relocation results in a continual placing of less experienced beginning teachers in the high needs classrooms of students in low SES schools. The lack of experienced teachers may often result in a lower level of learning by students (Stodolsky & Grossman, 2000; Darling-Hammond, 1995; Ferguson, 1991).

Language can be a barrier to learning when students’ primary language is different than that of the teacher. A professional development program studied by Lee, Hart, Cuevas & Enders (2004) was designed to help teachers develop methods to increase learning of ELL students. The professional development program had two major components: to help teachers learn about the role of students’ home culture and

language in regard to learning; and to develop inquiry-based, hands-on activities that are less dependent on mastery of English to understand the content. After training, teachers reported that ELL students were better able to show their learning without the emphasis on writing. The evidence of increased learning by students, along with increased confidence in using inquiry activities by teachers, was cited as a reason that teachers increased their willingness to use hands on activities.

Several successful multicultural PD programs are centered on teacher immersion in a diverse culture. Larke, Wiseman & Bradley (1990) studied an immersion mentoring program placing preservice teachers with at-risk African American and Latino/a students. The program was designed to provide cultural experiences for teachers and academic and social support for students. Mentors attended seminars, met one-on-one with their students and attended community cultural events with their assigned student and his/her family. In a pre-program attitude survey, 81% of the pre-service teachers indicated negative perceptions about minority students. After one year in the program, 84% of the teachers expressed positive perceptions about minority students. Teachers in the program also kept journals with at least one entry per week. Examination of these journals showed the importance of teachers' reflection on their own culture. As one White participant wrote, "Honestly, I never considered the White race to be a culture ... Now that I am aware of the differences, I feel that I will be able to teach children according to their needs without imposing my own beliefs on them, feeling that those beliefs are what is right for everyone." (p. 9).

Larke, Wiseman & Bradley (1990) drew three conclusions from examination of all teacher-mentor journals. First, in order for teachers to develop more positive attitudes about other cultural groups, a review of their knowledge of their own culture is crucial. Second, preservice teachers need a cultural knowledge base. Finally, teachers need quality, positive experiences obtained through personal interactions between them and students from other cultures.

Induction For Teachers of Minority Students: Concerns Specific To Native American Education

Professional development for teachers of Native American students involves understanding student culture as well as the ability to provide culturally relevant classroom practice. Haukoos & LeBeau (1992) found that after self-reflection on culture, teachers participating in cultural awareness professional development were persuaded to accept new methods of teaching diverse students. Newly trained teachers reported an ability to understand the applicability of culturally based methods for their students. The professional development training studied by Haukoos & LeBeau (1992) helped teachers learn to use hands on learning methods and ways to make learning relevant to the experiences of Native students. Native community members participated in the professional development and instruction. Teachers reported increased knowledge of culturally relevant education through awareness and learning new teaching practice skills.

Lipka (2002) points out that indigenous communities vary in their cultural, linguistic and geographical circumstances as well as their educational goals. For this

reason, he argues it is not possible to prescribe specific curriculum for such a diverse array of cultures. Lipka points out that teaching of Native American students, since the passage of the Indian Education Act in 1972, increasingly uses indigenous language and knowledge to meet both local and western educational goals. Lipka cites research (Deyhle & Swisher, 1997; Holm & Holm, 1995; Brenner, 1998) that supports the beneficial use of local language, knowledge and understanding in developing culturally responsive curriculum.

Language immersion, as well as community involvement, can help teachers develop culturally relevant practice. McLaughlin (1995) studied the Rock Point (AZ) bilingual program on the Navajo reservation. In this language immersion program (similar to the Fort Defiance, AZ program), Navajo elementary students are taught most or all subjects in Navajo language. As he examined the development of the program and interviewed the participants, McLaughlin (1995) distilled the following guidelines for Native education: Local control and development of standards is essential in order to align curriculum with cultural knowledge and hierarchy of administrators. Teachers and teacher's aides should be set at the same hierarchical level of deference as non-certified community-based Natives and non-Natives to provide equality among teachers and community members. Resources to develop standards and professional development should include members of the tribal community. Furthermore, community members participated in the program to see, understand and assist with program development and support. Together with teachers, administrators and researchers, community members helped develop and implement

culturally relevant teaching resources. Successful professional development and immersion programs cited by Agbo (2001), Holm & Holm (1995), Irvine (2003, 1995) and others were successful in part because the professional development used a variety of resources from research, education professionals and the local community.

Community involvement was central to the immersion program examined by Mahan & Rains (1990). Participating teachers (n = 45) lived on the Navajo reservation for six to eight weeks in the summer with families that had school aged children in the home. This experience required teachers to learn about Navajo culture while assisting at-risk students. In addition, teachers attended seminars and a practicum. Participants reported learning about the political/social situation on the reservation in addition to traditions, ceremonies and cultural knowledge. Participating teachers reported reflecting on their own culture, which Hoopes (1980) labeled as "cultural self awareness."

In training seminars during the practicum, teachers reported producing culturally relevant plans and ideas for applying what they learned in their own classrooms. Later in the following school year, half of the participants were interviewed about the affect the immersion experience had on their classroom practice. All reported making their professional activities more multicultural compared to before the immersion experience.

Salzman (2000) conducted a study of a mentoring program that placed mentors (graduate counseling students, non-Native) with mentees (11-15 year old Native American students) in a cultural immersion program. Seven mentor-mentee

pairs were followed over the two year study. A faculty coordinator guided relationships. The mentors and mentees met one hour per week during the school year in addition to attending community events together. At community events, mentors reported the new experience of being a cultural minority.

During interviews, mentors reported they gained awareness of cultural differences between themselves and their mentees, as well as learning specific history and culture of the Native community in which they were immersed. Mentors reported new awareness of their misconceptions, misunderstandings and anxieties about cultural differences. In surveys, 90% of mentees expressed that mentors respected their level of cultural awareness, and encouraged the mentees to develop a more positive understanding of Native American culture.

Researchers attribute the success of the program to the guidance policy of helping mentors understand the bidirectional nature of the immersion learning experience instead of adopting the “missionary” attitude of trying to save or fix the Native American students. Salzman notes that the program failed in the third year under the direction of a new faculty coordinator who adopted the “missionary” attitude for the program.

Holm & Holm (1995) examined evidence from two immersion programs on the Navajo reservation. In both voluntary programs, (Rock Point and Fort Defiance) students were taught almost exclusively in Navajo language in kindergarten and first grades. In later primary grades, students were taught using a mix of Navajo and English. In addition to language immersion, students at Rock Point were taught how

to ask questions and respond in school as well as how to work in groups. Some of these skills were contrary to what students learned at home.

Holm & Holm (1995) compared results of standardized tests taken in 5th grade in English and mathematics by the immersion group and students taught in traditional English language only classrooms. After participation in the language immersion program, students tested at equivalent levels to other students in English language use. At the same time, immersion students tested significantly higher in mathematics than non-immersion students.

Much of the research presented here concerning induction for teachers of Native American students is centered in immersion in Native culture. Certainly, immersion can be a costly process and not available to everyone. Immersion is examined here because of the potential for improving student achievement.

Summary

Teachers whose students are from a culture different from their own face a unique set of challenges. Students from diverse cultures may have different learning preferences and needs (Pewewardy, 2002; Banks, 1995; Ogbu, 1995). To meet the needs of culturally diverse students, teachers need awareness of their own and their student's culture, professional development, opportunities for reflection and resources.

Several studies (Gay & Kirkland, 2003; Neuwirth, 2003; Lipka, 1991; Larke, Wiseman & Bradley, 1990) cite the need and benefit of teachers becoming aware of their own culture. Researchers in these studies have found that when teachers are

aware of their own culture, they have a basis upon which to build understanding of students' culturally based learning needs.

Teaching based on stereotypical student learning characteristics alone may not result in successful student learning (Agbo, 2001; Howard, 2001). Understanding learning characteristics related to culture can serve as a beneficial way to develop teaching strategies based on diverse students' learning needs (Boykin & Bailey, 1998; Pewewardy, 2002). However, understanding student and community culture is not enough, teachers need professional development help to best use their cultural knowledge.

Dreeben (1987) and Ferguson (1991) found that teacher professional development has a significant effect on students' achievement. The success of professional development in multicultural education, like any other professional development, is dependent on the quality of the curriculum and procedures of the PD. Stodolsky & Grossman (2000) suggest that the availability of quality professional development is a significant factor in teachers' ability to work with diverse students.

Findings from this review of multicultural education literature helped to shape the development of the curriculum for the Diversity Module used in this study. Citing findings in this review, the Diversity Module curriculum uses three main activities:

- Teachers increase awareness of their own culture
- Teachers increase awareness of their students' culture
- Teachers develop and assess strategies and resources to best meet the needs of their diverse students.

Confidence in the usefulness and applicability of the Diversity Module to improve classroom practice is supported by the research reviewed here. Applying relevant

research findings as part of the curriculum development process confirms the usefulness of empirical research for classroom practice.

Tying Together Distance, Induction and Multicultural Education

I have found no single research study that places the three elements of distance education, induction and multicultural education together. The eMSS Diversity Module at the center of this study combines these three aspects. I used information from the review of these separate aspects to inform the development of the online Diversity Module

Specifically, the reflection requirement for distance learning cited by Garrison, Anderson & Archer (2001) and Kanuka & Anderson (1998) is a central concept in the Diversity Module design. In addition to reflection, facilitation of discussion is also important in this module development. As shown by Gunawardena, Plass & Salisbury (2003), thoughtful dialogue does not happen without effort by facilitators. Finally, from distance education research, collaboration with peers (Garrison, Anderson & Archer. 2001; Kanuka & Anderson, 1998) should be useful in online learning about multicultural education.

Findings from induction research show that an intentional curriculum is an important component of an induction program (Mariage & Garmon, 2003; Ralph, 2002; Wollman- Bonilla, 1997). In addition to such a curriculum, personal relationships are an important aspect of induction (Abell, 1995; Odell & Ferraro, 1992). Moving past personal relationships, development of a collaborative

environment for honest and cognitively rich discussion is an important aspect of induction (Athanses & Achinstein, 2003; Feiman-Nemser, 1998; Wollman-Bonilla, 1997).

The initial Diversity Module curriculum activity had teachers develop awareness of their own culture, which is important to increase the ability to meet the learning needs of diverse students (Gay & Kirkland, 2003; Neuwirth, 2003; Lipka, 1991; Larke, Wiseman & Bradley, 1990). The second module activity had teachers examine the culture of their students, which is also an important aspect of teaching diverse students (Agbo, 2001; Boykin & Bailey, 1998; Howard, 2001; Pewewardy, 2002). Finally, the last curriculum activities are based on findings that illustrate the importance of developing and reflecting on relevant classroom strategies (Dreeben, 1987; Ferguson, 1991; Stodolsky and Grossman, 2000).

The Diversity Module combined the important distance education features of collaboration and reflection with the critical induction features of developing classroom strategies, and the key multicultural educational components of awareness of culture and student learning characteristics.

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter I describe the design of this study and provide pertinent information to inform the reader of what has been done, how it was done, and what quality measures were in place. In the context section, I describe the eMSS program and the Diversity Module, which I developed as one of the eMSS module choices. The Diversity Module is central to this study in that the learning being examined is guided by the Diversity Module curriculum. Following description of the program, the persons involved in this study are examined. The method used to select cases is described as well as the cases themselves. As a trustworthiness measure, I describe myself, as the researcher, in regard to this study.

Data collection methods are described next followed by a summary of two pilot studies that inform the methods of analysis in the present study. Analysis methods are described followed by an examination of the quality measures that were applied to this study to improve trustworthiness, credibility and transferability of findings.

This qualitative study is descriptive (Marshall & Rossman, 1989) designed to document the phenomenon of online induction with a focus on what participants learn

online about educating diverse students. Research questions attempt to help inform understanding of the salient structures, processes and beliefs involved in learning by teachers in this study. Two examinations were employed: Analysis of the Diversity Module discourse was used to examine learning of all module participants and the learning of five beginning teachers who participated in a case study.

Walker (2002) describes case study as a way of developing an understanding, which can be compared to a known landscape represented in research. Case study in Walker's view should be used as a point of reference for the continual development of educational practice. Evidence from this case study can serve as a point of reference for development of practice in multicultural education, distance education and induction. I selected case study subjects from participants in the eMSS induction program using strict selection criteria described in the Sample Selection section of this chapter.

Two data collection procedures were employed in this study; discourse analysis and interview. Analysis of discourse provided information on online learning by eMSS participants. Interviews provided a deeper understanding of the learning activities. The choice was made to not include classroom observations in this study. However, the focus of this study was several extensive sets of online dialogue. In addition to the 160 messages posted in the Diversity Module discussion, I conducted

an in-depth analysis of two years' worth case study participants' Pair Place dialogue. Two interviews were conducted with each case study participant and their mentors were interviewed as well.

Knowledge construction by case study teachers was analyzed for understanding of multicultural education knowledge and skills, and application of this understanding. Irvine (2003) contends that a key variable to affecting the school achievement of culturally diverse students is the teacher, who must be sensitive to the needs interests and abilities of his/her students. Irvine (2003), Neuwirth (2003), Gay (2003) and Blair (1999) found that professional development that caused teachers to reflect on their own culture as well as that of their students yields successful classroom learning by diverse students. Discourse and interview responses by participating teachers in this study were examined for evidence of reflective learning about their own as well as their students' culture. As seen in the flow chart in Figure 2, this study consists of two examinations: Analysis of the entire Diversity Module discourse examining the learning of all module participants, and, examination of the learning of the teachers selected as cases through discourse analysis and interview.

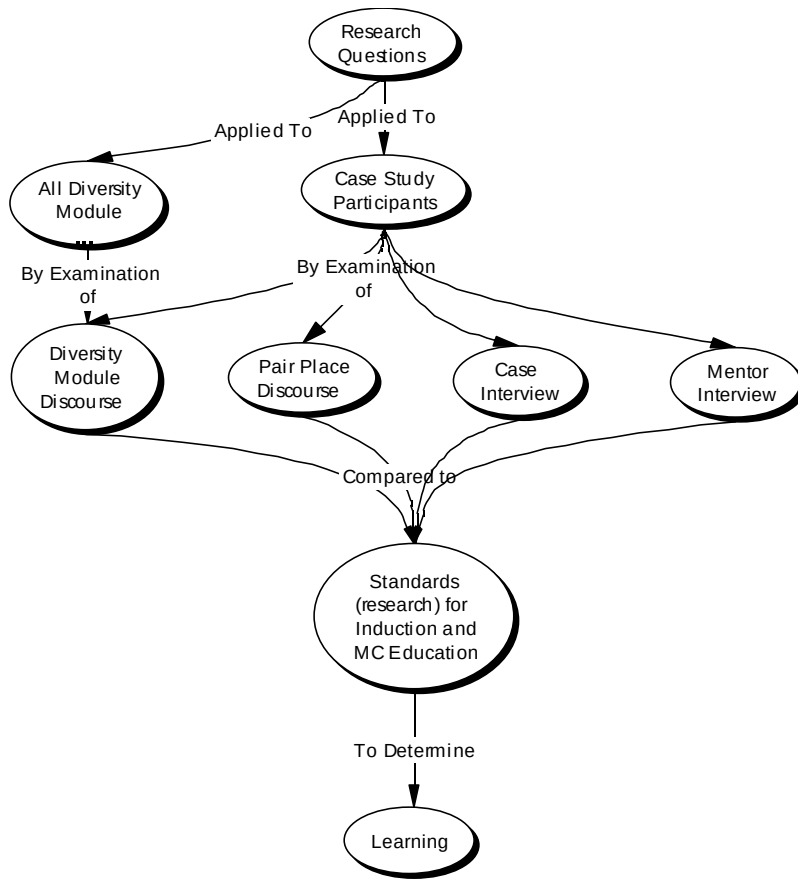


Figure 2. This flowchart illustrates the examination of data in the present study. The primary flow of the examination centers on the five case study participants. To provide information on the Diversity Module, a limited examination of discourse by all Diversity Module participants was also conducted.

Context

eMSS Program Description

This study used cases selected from participating teachers in the e-Mentoring for Student Success (eMSS) induction program. The National Science Foundation funds this program, a partnership of the National Science Teachers Association, the Science Math Resource Center at Montana State University and the New Teacher

Center at the University of California at Santa Cruz. The eMSS project is designed to explore the feasibility of mentoring beginning science and mathematics teachers using a Computer Mediated Conferencing (CMC) approach. eMSS is designed to assist beginning teachers of science and mathematics in going beyond the survival mode to that of a successful teacher through reflective growth in teaching practice using online discourse.

After a year of developing the online components of the program, the eMSS program formally began in the fall of 2003 with approximately 70 mentor/mentee pairs. Each mentor was assigned one beginning teacher mentee. Mentor-mentee pair assignments were made based on the content areas and grade levels taught by both mentor and mentee. In the fall of 2004, approximately 95 mentor-mentee pairs began or continued in the program.

Recruitment of mentors began in the spring of 2003. Initial mentors were recruited through solicitation of the Montana Science Teachers Association and Montana Council of Teachers of Mathematics. Experienced teachers applied to serve as mentors. Only those teachers with considerable classroom experience were accepted. Mentors were also screened for online experience and potential to work effectively with beginning teachers. Mentors received a \$1400 annual stipend in return for attending mentor training, two face to face workshops, and agreeing to spend three to five hours per week participating in eMSS activity.

Beginning teachers also applied to the program to participate as mentees. Recruitment of mentees began in the summer of 2003. eMSS staff members contacted

school administrators for access to beginning science and mathematics teachers. Recruitment continued throughout the school year by telephone contact and presentations at teacher meetings such as the Montana Education Association annual conference. Beginning teachers were screened only to assure they met program requirements of content (science and mathematics), grade level taught (secondary), and teaching experience (less than three years in content area). Mentees were provided a \$500 annual stipend in return for agreeing to attend two face to face workshops and to spend at least one hour per week participating in online eMSS activities.

Efforts were made to recruit and accept beginning teachers in communities with underserved populations. These communities were identified in California as relatively close to the San Jose and the San Francisco Bay areas, with a large number of Latino/a students (19-73%), many of whom are English Language Learners. In Montana, almost all of these communities are rural and some are on or near Native American reservations with a population of Native American students equal to or greater than the state-wide Native American school-age population of 11.2% (Montana OPI, 2004). Sixty percent of the Native American students in Montana attend the schools located on or near reservations, and many enter school with more fluency in their native language than English. Thus a need for multicultural education professional development in these schools is established (Montana OPI, 2004).

The mentoring program included mathematics and science teachers in Montana and science teachers only in California. All participants from both states

worked together in common discussion areas within the online program, mentors were matched with mentees only from their state. Program directors felt the standards based curriculum required intra-state matching.

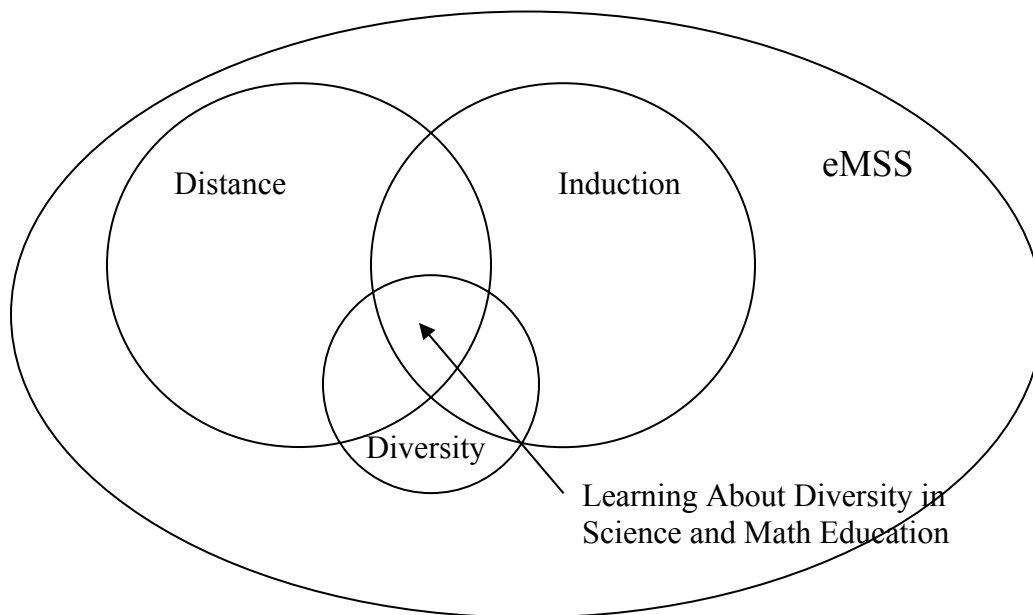


Figure 3. This diagram represents the three components of the distance induction system in this study. This study focuses on the intersection between distance education, and a professional development intervention that focuses on supporting the science and mathematics learning of diverse students.

The eMSS program functions primarily in a CMC mode using the WebCT web based platform. The program is multifaceted, using modules designed to foster learning through specific curriculum, guided and non-guided interactive discussion threads, content specialists and paired mentor-mentee discussion to gain content and pedagogical information.

In a typical academic year, a participating mentee will work through several curriculum based modules, with his/her mentor in addition to discussing in Pair Place. The general sequence of the 2004-2005 academic year in eMSS is shown in Table 7.

Table 7 Sequence of the 2004-2005 eMSS Academic Year

	Fall Module			Spring Module
	Mentee chooses one from several options:			Mentee chooses one from several options:
Getting Started Module	Managing Student Behavior	Winter Break	Content Specialist led PCK discussions	Lesson Design
	Classroom Procedures			Looking at Student Understanding
	Effective Labs			Diversity
	Understanding Students as Learners			Design Your Own
Pair Place Discussions				
Sep-Oct	Nov-Dec	Dec	Jan-Feb	Mar-Apr

Online dialogue takes place in several focused discussion areas on the eMSS website. Some areas are designed for facilitated group discussion in specific curriculum areas or modules, while one area, titled Pair Place, is designed for private discussion between a single mentor and mentee.

Description of the Diversity Module

A major component of the eMSS induction program (described in the section: eMSS Program Description) is the several curriculum based “modules” that participants collaboratively work through. The modules use a guided inquiry method in which participants are provided with readings based in research, activities to carry out in their classroom or school, and prompts for collaborative discussion of learning. Each module is designed to help beginning teachers increase learning about a specific aspect of teacher practice. During the spring, 2005 semester, three modules were made available to participants, including one focusing on teaching practice for diverse learners. This study involved the Diversity Module, which was designed to increase teachers’ understanding of multicultural education.

The Diversity Module consists of four major sections. The first section engages teachers in examining their understanding of their own culture. In the second section, teachers examine the diversity of their students. The third section has teachers try a classroom strategy designed to increase learning for their students. Finally, the fourth section involves assessment and reflection on the strategy they used in section three. All sections involve collaborative discussion facilitated to increase learning through dialogue.

Beginning teachers selected one of three modules to participate in during the spring semester. Those selecting the Diversity Module were allowed access, with their mentor, to the Diversity Module area on the eMSS website. They were entered into a discussion area with all other participants in the Diversity Module. Mentor and

Mentee pairs read activity directions, participated in a reflective activity and discussed results with other participants. Participants repeated this process for each of the activities within the module. A fifth activity asked participants to reflect on the design and implementation of the module for evaluation purposes. An outline of the Diversity Module activities is included as Appendix E.

The present study examined the learning by case study participants through data collection and analysis methods described in this chapter. In addition, analysis of the entire Diversity Module discourse was conducted to examine the learning of mentors and mentees who participated in the Diversity Module.

Sample Selection

In the 2004-2005 academic year, 95 mentor-mentee pairs participated in the eMSS program. Some mentors were paired with two mentees, for a total of 160 program participants. I selected the case study participants for this research from those 160 participants using the following criteria:

- Montana secondary science or mathematics teacher in first three years of content teaching
- Participating beginning teacher in eMSS program
- Teach on or near a Native American reservation or in a school where student population is culturally different from that of the teacher

(Culturally different student population is defined as exceeding at least one of the following State population averages:
11.2% Native American
15% Non-White

35% low SES (free and reduced lunch)

- Participate in online discourse
- Willing to participate in interviews for study

I selected case study participants using purposeful sampling (Dereshiwsky, 2003) among subjects who possess the desired selection criteria. This group included only beginning mathematics and science teachers of diverse students in Montana who were participating in the online induction program.

Transferability of cases selected and credibility of results can be enhanced through thick description of selected cases (Patton, 2002; Walford, 2001). The following is an attempt to provide a detailed description of case selection. A detailed description of the selected cases is included in the next section.

Considering the population of 160 participants in the eMSS program for the 2004-2005 academic year, approximately 42 met the requirement of a Montana beginning teacher of secondary science or mathematics. All 42 of these teachers participated at some level in the eMSS program. Of the 42 beginning teachers, 10 had student populations consisting of at least 15% non-White students (state average). Online messages posted by the 10 teachers meeting the first three criteria for selection were examined.

Of the 10 possible cases, two posted fewer than five messages during the timeframe from August, 2004 through January, 2005. These two were not considered for study due to a lack of online participation. The remaining eight possible cases were contacted to for interviewing. Four of the eight consented to be interviewed for

this study. I modified the original criteria to add another interesting case. Although this teacher did not teach near a reservation and the percentage of Native students in her school was approximately 7%, she was included because the percentage of low SES students in her school was relatively high at 45%. This was much higher than the Montana average of 35% (Montana OPI, 2004). Her student population was also the most diverse, including students born in at least three foreign countries. Low SES was determined by the percentage of students in free and reduced lunch. These five teachers are considered the cases in this study.

Data collection methods for case study participants included monitoring online discourse and conducting interviews. Discourse data was available for all teachers in the eMSS program and was used as needed to fill in the picture of how beginning teachers learn in an online environment.

The Institutional Review Board (IRB) of Montana State University granted an exemption to requirements of the IRB for this study. Requirements for the protection of human subjects were addressed in the application for exemption for this study. All university requirements were met in the methodology of this study. All case study participants were provided a consent form (Appendix D) as required by the Montana State University IRB. Signed consent forms were securely filed. All case study participants in this study signed consent forms. The names of all participants were changed to protect their identities.

To assure quality in this study, case study selection concerns were addressed. Dereshiowsky (2003) describes selection bias as a means to select cases for study that

will produce desired results. Selection bias is not a concern since all eMSS participants meeting the selection criteria have been selected for study. Every attempt was made to avoid evaluation apprehension (Dereshiwsky, 2003) by participants as well. When contacted for interview and inclusion in the study as participants, I explained that the present study is strictly for my dissertation and possible later article publication. All participants were informed that this study does not evaluate their participation in the eMSS program and would have no reflection on them or their teaching. Participants were also informed that results would not be provided to their school or district administrators.

No compensation was provided to the teachers for participation in this study. All participants in the eMSS program are provided a stipend, which is not affected by participation in this study. Participants were made aware of compensation issues.

Description of Cases

A thick, rich description of each of the cases provides the foundation for qualitative analysis and reporting (Patton, 2002). A good description can provide the reader with the knowledge to understand the case study participant, helping the reader develop a sense of empathy for the subject. Stake (1994) cautions, however, that the value of the research is not likely to outweigh damage to the person exposed. As Stake points out, the researcher is a guest in the private spaces of the world of the case study participant. Only 10 of the 42 Montana beginning teachers met the initial criteria for selection as a case in this study. Such a limited population increases the

likelihood of identification of individuals selected for study. To best meet the needs of the reader and the confidentiality of participants, I provide a description without identifying which individuals matched descriptive elements.

All five case study participants were white females, none of whom described themselves as Native American. Two teach high school mathematics, one teaches middle school mathematics and English, one teaches high school science and one teaches multiple middle levels with an emphasis on science. Four began the eMSS program in their first year of teaching, and in the first year of eMSS, and all four continued the program into their second year of teaching. The fifth was in her eighth year of teaching, but second teaching mathematics. She began eMSS participation in the second year of the eMSS program. All teach in classrooms with a minority student population greater than the state average.

Four of the participants teach either on a reservation or adjacent to a reservation, and their Native American student populations range from 40% to 100%. The remainder of the student population in these teachers' classroom is primarily White. One participant teaches in a larger Montana community, with a small percentage of Native American students, but the greatest classroom diversity of the five participants, with students who were born in at least three non-English speaking countries. All participants have a large number of low SES students, ranging from 37% of students on free and reduced lunch to 96%. One of the participants was not renewed after her first year of teaching. She attributed her non-renewal to the school administrator's decision to hire Native American teachers in place of White teachers.

During her second year of eMSS participation she worked as a substitute teacher in a number of middle school classrooms.

Three of the participants live in the community in which they teach, although none of them lives on a reservation. The few participants who commute both teach on a reservation, driving at least 30 minutes from home to school. Four of the participants were born and raised in Montana; one of them lived much of her childhood in the community in which she now teaches.

One of the second year participants in eMSS had a different mentor in each of the two years due to her first mentor discontinuing participation in eMSS. All other participants have worked with only one mentor. All of the participants attended at least one of the eMSS face to face meetings each year of participation, although none of them attended all meetings.

Positionality

In this section, I describe my position as a researcher and member of the eMSS team. How we account for ourselves as researchers is key in assuring believability in ethnographic research (Altheide & Johnson, 1998). Patton (2002) contends that the credibility of the researcher is advanced by the presentation of self. Although not currently teaching, I am a certified (in Arizona) science teacher, with five years experience teaching secondary life sciences. Teaching experience similar to eMSS participants provided me an understanding of their situations. I have also become familiar with eMSS participants through my work in the program

All participants are familiar with me because of my participation in management and training for the eMSS program, primarily in the first year. During the first year of the eMSS program I was very visible and interacted with all participants closely, both in person and online in a variety of situations. During the second year of the eMSS program, I have had little interaction with participants. My role in management was taken over by another graduate student, who is very visible and highly interactive with participants. My reduced interaction and visibility may have allowed participants to see me in a diminished capacity in relation to management in the eMSS program. The familiarity I developed with eMSS participants may help interviewed subjects feel relaxed, while the distance established in year two may preclude the Hawthorne effect of participants shaping responses for the benefit of an eMSS management team member.

Data Collection Methods

Data collection was accomplished using two methods: compiling discourse and interview. Many of the research articles cited in the literature review for this study involved multiple methods. In particular, many online learning studies using discourse analysis as a primary method also used interviews of participants (Fahy, 2003, 2002; Lavooy & Newlin, 2003; Stacey & Rice, 2002; Garrison, Anderson & Archer, 2001; Hara, Bonk & Angeli, 2001; Kanuka & Anderson, 1998). The initial collection method, discourse compilation, was conducted to examine discussions to determine if learning was taking place and in what context (knowledge type, content

area, etc.) learning was happening. Interviews were conducted to inform the type of learning and to help provide a depth of understanding of learning by participants.

Discourse

Discourse analysis is an appropriate and well tested method for study of online learning (Herring, 2003; Jarvela & Hakkinen, 2002; Kanuka & Anderson, 1998). With the onset of internet based computer mediated communication (CMC), discourse analysis was applied to online business learning situations in the 1980's with studies by Murray (1985) and Eklundh (1986). Since the mid 1990's CMC research has expanded at a rapid rate (Herring, 2003). In various forms, discourse analysis has been applied by a number of researchers to online learning to gauge participant learning (Fahy, 2003, 2002; Gunawardena, Plass & Salisbury, 2003; Lavooy & Newlin, 2003; Stacey & Rice, 2002; Garrison, Anderson & Archer, 2001; Hara, Bonk & Angeli, 2001; Kanuka & Anderson, 1998; Gunawardena, Lowe & Anderson, 1997, Henri, 1992). All of these studies conducted after 1997 also included a second method of data collection such as interview or survey to expand knowledge gained from gathering and analyzing discourse.

Henri (1992) conducted an early study of online learning using discourse analysis. Henri developed an instrument to examine the social development of the learning process in an online forum. In her study, she developed a method to examine five dimensions of the online learning process in order to provide useful information to improve instructor – student interactions. She considered these interactions important to learning online. The instrument developed by Henri placed a strong

emphasis on understanding the social interactions of learners within a collaborative community with a common learning goal.

Using Henri's work as a base to build on, Gunawardena, Anderson & Lowe (1997) developed a method to examine online discourse for social construction of knowledge in an online forum among education professionals. Gunawardena et al. found that online discourse does provide evidence of learning, and described the process of learning among participants. Kanuka & Anderson (1998) applied Gunawardena et al.'s model of discourse analysis to a graduate level online education setting. Their analysis provided evidence of construction of knowledge through development of an online community of learners. Kanuka & Anderson supported their discourse analysis findings by conducting interviews and surveys of participants.

Garrison, Anderson & Archers (2001) examined online discourse among participants in a CMC based conference. Their analysis provided evidence of learning online through examination of cognitive presence by participants. Their analysis also supports the key role of the instructor/facilitator in developing the level of interaction necessary for development of high level cognitive presence.

Discourse data collection for the examination of learning in the Diversity Module consisted of simply compiling all messages posted. Discourse data collection for the case study consisted of compiling Diversity Module messages and all Pair Place messages posted by the cases and their mentors.

Discourse data collection in this study took place primarily during the activity of the Diversity Module, from early March, 2005 through late April 2005. Discourse

was also available for analysis for the duration of the eMSS program, from September 2003 through May 2005. All discourse is stored electronically in various discussion forums on the eMSS website. Messages posted by participants were collected, compiled and downloaded to the author's personal computer for storage and analysis. Messages were printed for ease of analysis.

The number of Diversity Module messages analyzed (160) was determined by the level of participation in the Diversity Module. All messages posted in discussions in association with this module were analyzed, whether posted by case study participants or other participants. Previous research by this author cited in pilot studies has shown that learning can best be monitored by examining messages in the context of the threaded discussion.

Interview

Discourse analysis provided information on learning by participants, yet it did not tell the whole story. Interviews were conducted to gain a deeper understanding of the participants' learning. Patton (2002) describes the purpose of interviews as, "to allow us to enter the other person's perspective." (p. 341) Participants identified for case study were interviewed twice during the course of this study. Initial interviews were conducted during the first week of the Diversity Module. Follow up interviews were conducted when the Diversity Module was completed, during the first week of May. Mentors for each of the case study participants were also interviewed during the first week of May.

One interview was conducted in person, with a group of three eMSS participants, including two of the case study participants. All other interviews were conducted one-on-one by phone. All interviews were recorded on audio tape and transcribed. The author performed transcription of all case study participant interviews and several mentor interviews. A trained staff member in the Science Math Resource Center office transcribed three of the mentor interviews. Transcription took place within two days of the interview. This allowed for review of the transcript and timely follow up contact with participants for clarification and confirmation of their statements (Patton, 2002). Several transcripts were sent to interviewees to allow them to confirm their statements. No corrections were required in this confirmation process.

Interviews followed a semi-structured outline, (Merriam, 1998); ideally they resembled a discussion between teachers (the author is an experienced secondary teacher) about teaching. Probing questions allowed me to explore emerging thoughts of interview participants. This type of interview provided a balance between systematic data collection and keeping interviews conversational in approach (Patton, 2002). Interview questions were primarily of the experience/behavior and knowledge types (Patton, 2002). Experience/behavior questions were designed to elicit behaviors and experiences pertaining to participants' teaching practice that would have been observed had the interviewer been present in the participants' classroom. This type of question was also used to understand the participants' perceptions of personal and professional benefits of eMSS participation. Knowledge type interview questions

attempted to ascertain what the participant knows. In the present study, knowledge is that of teaching practice, specifically in regard to culturally diverse students.

The less structured approach was designed with the goal of understanding participants' thinking rather than garnering direct answers to the interviewer's questions. While there were specific guiding questions, the goal was to involve participants in a discussion to gather their ideas about teaching their students and the value of the mentoring program to their practice. Warren (2002) cites qualitative interviewing as viewing the participants as meaning makers, rather than retrieving information from a collection of answers. Evidence of knowledge found in dialogue analysis was verified and expanded through interviews.

Each interview was designed to last approximately 15 minutes. Actual interviews lasted between 20 and 40 minutes. Interview questions were composed to gather information from beginning teachers about their practice - specifically regarding the culture of their students - and how it has been affected by participation in the eMSS induction program. Initial interview questions included:

1. Please describe the cultural backgrounds of your students.
2. Please describe any things you do as an instructor to match the cultural backgrounds of your students.
3. Please describe your relationship with your mentor in the eMSS program.
In what ways, if any, is this relationship helpful to you?
Tell me about any ways in which you think the relationship benefits your mentor.
4. Please describe any ways that your relationship with your mentor has affected your classroom practice.
5. Describe any ways that the eMSS program as a whole has affected your

classroom practice.

Interviews scheduled after completion of the diversity module are designed to examine participants' impressions of and response to the module, including knowledge they constructed during the module that affected their classroom practice.

Follow up interview questions included:

1. Please describe the main things you learned by participating in the diversity module.
2. Please describe any changes in you have made in your teaching as a results of participation in the diversity module.

If "yes": Please evaluate how these changes have affected the involvement or learning of your students. Be as specific as possible.
3. How often do you and your mentor discuss strategies for teaching your particular students?

Please describe any ways this has changed your instruction.
4. What parts of the eMSS program have been most beneficial to you and your students? Least beneficial?
5. Has participation in eMSS caused you to make changes in your teaching for your specific students? Please explain.
6. What should I have asked that I did not ask?

In order to learn as much about the mentoring process for the participating mentees, each participant's mentor was also interviewed. These interviews took place after the follow up interviews on participants were completed. Interview questions for mentors are:

1. Can you describe your relationship with your mentee?
2. Do you think your mentee has learned about teaching culturally diverse students?

If yes, how has she learned?
What impact has mentoring had?

3. Have you noticed any change in your mentee's knowledge of teaching diverse students?

General?
Science/math?

4. Have you and your mentee discussed her classroom practice?
If yes, in what way?

5. Have you and your mentee discussed changes in his/her classroom practice regarding her diverse students?
What have you noticed?

6. How do you think your mentee has gained from being in eMSS?
In what way?

Results of Pilot Studies

I conducted several pilot studies prior to the present study, two of these pilot studies are described here. The method of analysis for the two studies is different, but both examine online discourse from the eMSS program. These two studies directly informed the methodology used in the present study, thus description of them is appropriate.

Pilot 1: Pair Place Study

This study examined four mentor-mentee pairs using discourse analysis. The eMSS program website consists of several curricular and discussion elements. One element is called Pair Place. In this discussion area, a mentor-mentee pair can converse privately, and no other participants have access to their conversations. Pair Place is used for personal dialogue as well as for discussion of program content and

curriculum driven dialogue. This study examined the type of learning taking place in paired discussions in an online induction program.

Data collection for this study consisted of coding all 133 messages in the four Pair Places posted over the first semester (August through December) of the 2003-2004 academic year. Messages were coded for knowledge type using types based on Shulman (1987) and for level of knowledge construction using Gunawardena, et al.'s (1997) rubric.

Comparison was made between the knowledge type in discussion and the level of knowledge construction in all messages. Inter-rater reliability was measured by comparing coding of messages by this researcher with coding of two other researchers. Kappa tests of coding for knowledge construction (Gunawardena, et al. instrument) comparing my coding with that of two other researchers yielded results of .74 with one researcher and .80 with another. Kline (1990) considers Kappa results of .75 and above as indicating strong agreement. Thus, one can be confident of the inter-rater reliability of coding in this study.

Data analysis included comparing the learning of different pairs to each other. The mean knowledge level of construction coding was compared between pairs using a one way analysis of variance (ANOVA). Results were not significant between groups. Qualitative discourse analysis was also used to examine the evidence of learning through discourse.

Findings indicated the level of knowledge construction was related to the knowledge type being discussed. Coding for knowledge type shows that most

messages providing evidence of co-construction of knowledge are defined in the Pedagogical Knowledge category. Of the small number of messages coded at co-construction level of 3 or higher, six (87%) are in the Pedagogical Knowledge Category. Figure 4 illustrates these findings.

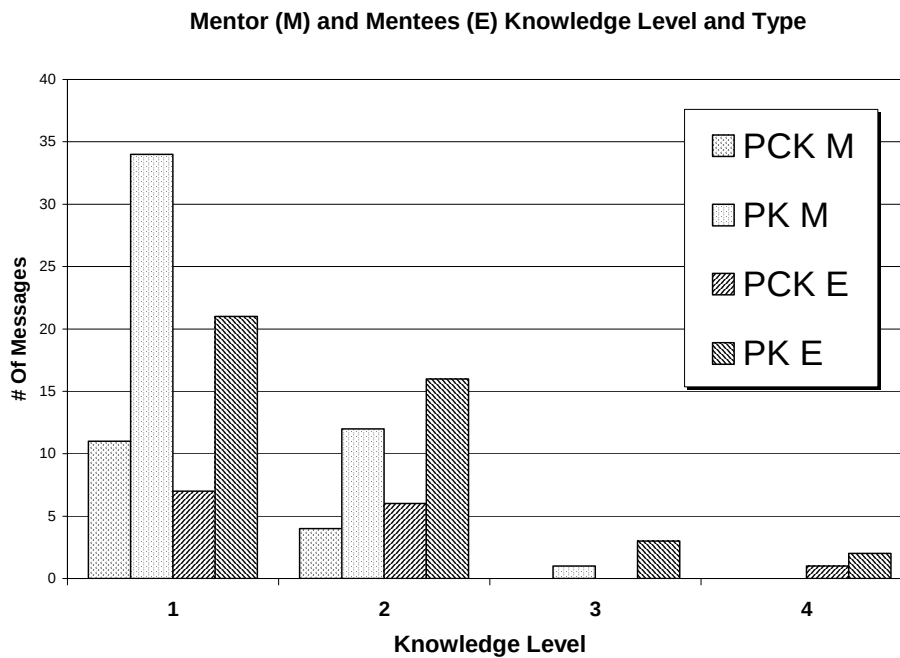


Figure 4. The number of messages coded for each knowledge construction level found in the discussion record according to knowledge type category and mentor/mentee status. This chart shows mentees (diagonally striped bars) experiencing greater knowledge construction activity compared to mentors. It also illustrates the larger number of messages relating to pedagogical knowledge.

Findings also indicated the mentor influences the knowledge construction of the mentee through thoughtful questioning messages. There is evidence that mentors are supporting growth through interactions with mentees. This study examined data collected in the first semester of the eMSS program. Interactions at this time primarily involved mentors questioning the mentees in areas of basic pedagogical knowledge.

As the program progressed, more questions were posed by mentees asking mentors for advice.

Findings concerning the influence of social interaction were not as expected. We expected to find learning resulting from collaborative exchange of ideas among the group. Instead, evidence shows that knowledge construction was due to advice from the mentor and trial or reflection by the mentee, rather than an ongoing exchange of different perspectives in the small group discussions in which mentors and mentees participated. Reflection on practice was shown to be a factor in learning by beginning teachers.

This pilot study informs the present study in two areas: 1) By providing a test bed for methods to examine discourse; and 2) by providing preliminary evidence that the level of knowledge construction varies according to the knowledge type. This pilot study shows the limitations of using the Gunawardena et al. rubric when analyzing learning through discourse. The rubric helps one discern social construction of knowledge, but is limited because it focuses on single messages rather than longer conversations. Analyzing messages in the context of threaded discussions provided a more holistic examination of learning, and proved to be more appropriate in the present study. In addition, this pilot study showed that the Pair Place discussion area is a prime avenue to build support and trust between mentor and mentee, but constructing new knowledge is not evident in abundance in Pair Place.

Pilot 2: Random Sample Quantitative Study

In the summer of 2004, this author conducted a quantitative study of the eMSS program to answer three research questions:

- What is the relationship between the level of knowledge construction demonstrated in discussion messages and participant status (mentor or mentee)?
- What is the relationship between the level of knowledge construction demonstrated in online discussion messages and knowledge type of the message?
- What is the relationship between the level of knowledge construction demonstrated in online discussion messages and the time (measured by month in the program) the message is posted?

This study was conducted at the end of the first year of the eMSS online induction program. Approximately 8000 messages were posted in the course of the program over the academic year from August through May. Three hundred and sixty-one of 8000 messages were analyzed in this study. The number of messages chosen for analysis is the number required to achieve a 2% error rate according to Suskie (1996). Like the previously described Pair Place study, messages were coded using Shulman's knowledge types and Gunawardena's instrument for knowledge construction.

Sixteen percent of the messages were coded at a knowledge construction level of 3 or higher, indicating construction of knowledge by participants. Gunawardena's

instrument has five levels, hierarchically arranged from one to five. Level four and level five messages illustrate construction of knowledge, while level three and below illustrate sharing and discussing information. See Table 8 for a distribution of coding by knowledge construction level for mentors and mentees. An analysis of covariance (ANCOVA) was conducted to determine the main effect on the dependent variable by each of the three independent variables. An interaction term was included to determine the interaction effect of the independent variables.

Table 8 Messages by Knowledge Level

Level	1	2	3	4	5
#/%of Messages	240 (66%)	64 (18%)	36 (10%)	20 (6%)	1 (<1%)
	Mentor/Mentee	Mentor/Mentee	Mentor/Mentee	Mentor/Mentee	Mentor/Mentee
	182/58	46/18	23/13	10/10	1/0

Findings indicated no significant relationship between construction of knowledge and the time of year when the message was posted. There was an important, but non-significant relationship between mentor/mentee status and the level of knowledge construction. Mentees demonstrated a higher mean level of construction of knowledge compared to mentors.

Examination of knowledge type and knowledge construction level showed a significant relationship between the two. Discussions about pedagogical knowledge provided the greatest level of learning, followed closely by pedagogical content

knowledge with a non-significant relationship. Knowledge level for pedagogical knowledge type ($M = 1.96$) is significantly higher than that of content knowledge ($M = 1.40$), but not significantly higher than pedagogical content knowledge ($M = 1.72$). Figure 5 illustrates these findings.

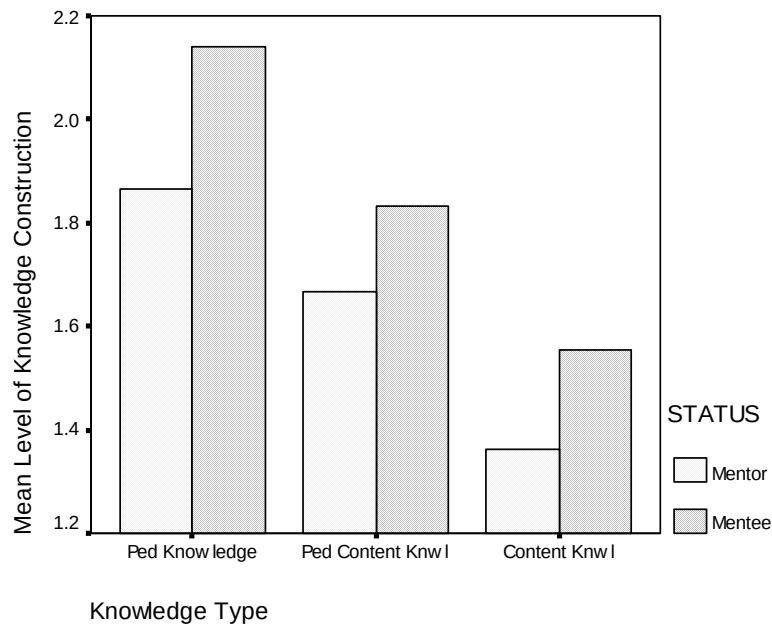


Figure 5. Knowledge Level compared to Knowledge Type and Status. The relative mean knowledge level for three knowledge types is shown, separated by status. Knowledge level Means for Pedagogical Knowledge are Mentor = 1.86, Mentee = 2.14. Means for Pedagogical Content Knowledge are Mentor = 1.67, Mentee = 1.83. Means for Content Knowledge are Mentor = 1.35, Mentee = 1.56.

The mean level of knowledge construction for beginning teachers is higher in the three knowledge types considered most important by the eMSS program. From a standpoint of learning about teaching by interacting with mentors, mentees are gaining from this experience. From a program evaluation standpoint, it seems the model of using mentors to foster reflective thinking about teaching in beginning

teachers is successful. Garrison, Anderson & Archer (2001) relate knowledge construction to higher level thought. Positive results showing high levels of knowledge co-construction indicate higher level thought by participants in the eMSS program.

ANOVA results indicate a significant effect on level of knowledge construction by knowledge type. The best level of knowledge construction results were attained when the discussion focused on pedagogy, with similar results, but to a lesser extent, when pedagogical content knowledge or content knowledge was focused upon.

There were no qualitative measures used during this study, as it was partially an exercise in quantitative statistical research. Thus a limitation to this study was the lack of qualitative examination to help understand the development of learning in online discussions.

This pilot study informs the present study by providing significant experience in online discourse collection and analysis as well as statistical methods of analyzing data. This pilot informed the present study by providing evidence of the lack of significant evidence for specific research questions. Findings from this pilot study indicate there is no significant relationship between the time during the school year of message postings, or the status of the message author (mentor or mentee), and the level of knowledge construction attained. This pilot did provide evidence that the type of knowledge being discussed is significant when examining the level of learning by participants.

Data Analysis Methods

Discourse Analysis

Descriptive. Descriptive information on data collected was determined and reported. Information reported included:

- The number of messages read and posted by case study individuals
- The number of postings within a message thread
- Discussion area in which messages are posted
- The number of messages posted pertaining to educating diverse students
- The total number of messages read and posted by eMSS participants.

Qualitative. There is not an agreement in research on what the unit of analysis in discourse analysis should be (Garrison, Anderson & Archer, 2001; Kanuka & Anderson, 1998; Henri, 1992). In Henri's analysis, she divided individual messages into statements corresponding to units of meaning. Therefore, each message could contain several different coded units. There have been several arguments against breaking messages into statements for analysis, one coming from Henri herself.

The arguments put forth by several researchers (Henri, 1992; Newman, 1996; Gunawardena, et al., 1997; Garrison et al., 2001) are all similar: breaking messages down into statements can generate "superficial results" (Gunawardena, et al., 1997, p. 406) without informing the collaborative building of knowledge by the online

community. Garrison, Anderson & Archer (2001) further note that sub-message units are more difficult to identify between coders and can reduce reliability.

The method of discourse analysis used in this study was the same for examining Diversity Module discourse as well as Pair Place dialogue. Discourse analysis in the present study included following the progression of dialogue, rather than examining individual messages in a stand-alone mode. This analysis placed dialogue in the context in which it was written to help understand the meaning of the thought process shown by participants. Pilkington (2001) contends that detailed analysis of dialogue and its position within exchanges between discourse participants can suggest common themes for understanding the reasoning that builds learning.

The model of discourse analysis for this study is one described by Mason (1992). Mason's method involves a thorough reading of the entire set of messages using a lens to discover the skills and abilities participants are displaying or developing. In the present study, the skills and abilities involve classroom practice for diverse students. Using a method similar to Mason's in her analysis of online learning, Henri (1992) produced questions to keep in mind when conducting discourse analysis as described by Mason. Henri's questions served as a model for the questions developed to examine discourse in the present study:

Are participants drawing on their own experiences?

Are participants building on previous messages?

Do they refer to material in the Diversity Module?

Do they refer to their own classroom environment?

Do they exhibit reflection on context?

These questions served as one lens for identifying patterns in online discourse and understanding the nature of participants' learning. Using these questions as well as Patton's (2002) analysis guidelines, and methods described by Gunawardena, Lowe & Anderson (1997); Henri (1992) and Mason (1992), a classification (coding) scheme was developed according to patterns in the data. This classification scheme served as a way to organize findings and help make results coherent.

Analysis of Interviews

Interviews were transcribed and analyzed qualitatively to gain an understanding of learning by individual participants in the program as well as understanding of the development of a community of learners and the characteristics of that community. Examination of interview responses attempted to discern evidence that directly related to research questions.

Interview analysis took place using a guided outline developed by Dereshiwsky (2003) for organizing information about learning from a large amount of data. Dereshiwsky reports basing her model on interview analysis methods described by Patton (1990, 2002). Similar to analysis of discourse, this method involves developing a typology of information. The initial step was to read printed transcripts of interviews. Using the same questions that guided analysis of online discourse above, conceptual themes being developed and the process through which learning occurred became evident in the interview transcripts. Summaries and quotes

from transcript analysis were compared to similar information from discourse analysis to verify and expand on evidence of learning by participants.

Researcher interactivity should be considered in analysis of interview transcripts. Warren (2002) points out that each participant in the interview process incorporates both self and other (i.e., the researcher) into interpretation of meaning. During the interview, this awareness of other may affect the responses by the interviewee. During analysis, the pre-existing knowledge of the researcher may affect interpretation (Warren, 2002). In the present study, the researcher brought specific knowledge of the eMSS program to the interpretation of interview transcripts. As a method to control for this bias, interview transcripts were sent to participants to allow them to clarify the meaning of their statements.

Study Quality Measures

Believability of findings from a qualitative study can be improved by adherence to quality assurance measures (Huberman & Miles, 1998; Lincoln & Guba, 1985; Patton, 2002). Patton (2002) contends that credibility of different types of studies should be examined using quality criteria. He provides two basic elements for organizing criteria for study quality: the researcher and the methods. As a quality assurance method concerning the researcher, Patton (2002) recommends the researcher's presentation of self. I provided this presentation for this study in the positionality section earlier in this chapter. Another quality measure, case study selection bias (Dereshiwsky, 2003), was also addressed previously in this chapter.

For examination of the quality of the methods, Lincoln & Guba (1985) provide guidance under two headings, trustworthiness and credibility. They associate trustworthiness with data collection and analysis measures, and credibility with the process of interpreting results. In the following two sections, I describe the trustworthiness and credibility measures in this study. The final section of this quality measures examination describes transferability of findings from this study.

Trustworthiness

Lincoln & Guba (1985) contend that trustworthiness is a way of convincing readers that findings are worth paying attention to. In their description of building trustworthiness, Lincoln and Guba provide measures that can be employed during data collection and analysis in a qualitative study to increase the probability of trustworthiness in findings. Five of these measures are applicable in this study and I employed them throughout data collection and analysis.

Maintaining a Journal. A daily journal, in the form of a personal log can be used to reflect on personal biases, provide introspective information about the researcher's state of mind, and serve as a method to help the researcher improve trustworthiness (Lincoln & Guba, 1985). I kept a journal throughout the data collection and analysis process. Journaling was especially helpful in the interview process. As I transcribed interviews and examined transcripts, I wrote my reflections on things I was hearing in interview recordings. Journal thoughts were helpful in my technique for subsequent interviews. Journaling helped me realize I needed to

increase wait time for responses, avoid prompting the subject with leading follow up questions, etc. An example of a journal entry (5 May, after transcribing follow up interviews) illustrates the continual adjustments to interview technique, “Transcribing; noticed I am better at waiting, but when I am trying to be conversational, I found myself jumping in to conversation and agreeing with comments.”

Journaling provided insight into my understanding of information from analysis of the data. Journal entries addressed findings as I analyzed data, showing that sometimes findings did not arise as expected. This helped me realize my biases in analyzing data and adjust my hypotheses about what data would reveal.

Mounting Safeguards. Instituting practices to safeguard against distortions in analysis of data may increase the probability of trustworthiness (Lincoln & Guba, 1985). In this study, a potential distortion may arise from the researchers’ involvement with the case study subjects. Lincoln and Guba cite the necessity to build trust and rapport with subjects, but caution against overdoing rapport, or “going native” (p. 282).

This concern is valid in this study due to my close involvement with participants in the first year of their participation in the eMSS program when I participated in management, training and online facilitation. The safeguard was provided through my separation from visible participation in the second year of eMSS participation (the year in which this study was conducted). My reduced interaction with participants may have guarded against creating too much rapport with

participants. As an additional safeguard against distortion, I transcribed all case study interviews myself. I sent several interview transcripts to the interviewee asking them to review the transcript for accuracy of their statements.

Developing and Maintaining an Audit Trail. Lincoln & Guba (1985) cite an audit trail as a very important aspect of trustworthiness. An audit trail is designed to allow the researcher (or auditor) to retrace the process of conducting the study. Important aspects of the audit trail for this study are in three sections.

Data. Discourse data is stored in several ways. All eMSS discourse is stored electronically by the Burns Telecommunication Center (BTC) staff on equipment at the BTC. I also downloaded and stored electronically on my (password-protected) computer discourse pertinent to this study (participant Pair Place dialogue and Diversity Module discourse). In addition, I printed and kept a paper copy of Diversity Module discourse and Pair Place discussions. Interviews are kept in several ways. The original audio tape is stored in a locked cabinet, transcripts are stored electronically on my (password-protected) computer and paper copies of transcripts are stored in a locked cabinet as well.

Process and Development. Process notes include all iterations of the proposal, pilot studies, and working copies of all sections of this dissertation. The primary source of storage is electronic. All documents are stored on my computer, with periodic CD backups made and stored. As the study developed, changes were made to data collection and data analysis tools such as interview questions and discourse

analysis frameworks. No documents were destroyed or erased; each document is dated and saved, providing a chronological progression of work, statements and thoughts.

Gathering Referential Adequacy Materials. In this aspect of trustworthiness, collection of additional material that will not be used in the immediate data analysis is conducted, but saved until the study is essentially completed (Lincoln & Guba, 1985). This allows the researcher to further test findings from the study. Several additional mentor interviews were conducted due to the interesting nature of their discourse postings. These interviews were not used in the study.

Triangulation. This aspect of trustworthiness involves comparing emergent information from one data source with that from other sources. Triangulation may provide a better understanding of information from data, As Stake (1994) contends, triangulation is, “a process of using multiple perceptions to clarify meaning” (p. 241). Patton (2002) asserts that triangulation provides diverse ways of looking at the same phenomenon and adds to trustworthiness by strengthening confidence in conclusions. Patton cites four possible types of triangulation, two of which are appropriate for this study: Methods triangulation, in which consistency is checked through different data collection methods, and, Triangulation of sources, in which multiple data sources are checked using the same method (p. 556). I used both of these methods of triangulation in this study.

Triangulation of methods was accomplished using two methods to collect data: compilation of online discourse, and interviews. I employed both methods of data collection for each of the case study subjects.

Triangulation of sources was accomplished in two ways. After initial analysis of data, I conducted a second analysis in which I examined both discourse and interview transcripts using the same guiding questions. This provided a comparison of findings across the two sources. In addition, I interviewed mentors about the learning of their mentees, providing a third source of information. Triangulation of sources was also accomplished through a cross case analysis. Findings regarding the learning of each case were compared to each of the other cases revealing patterns among cases.

Credibility

Credibility measures were applied after data collection and analysis. Lincoln & Guba (1985) contend that credibility involves insuring that the data and the findings are aligned. Dereshiwsky (2003) argues that providing thick rich descriptions of the setting, participants, program and procedures improves credibility. Throughout this chapter, I have attempted to provide these descriptions, realizing the limits placed on participants' descriptions to assure confidentiality. To increase the likelihood that credible findings and interpretations will be produced in this study, I applied measures to increase credibility described by Lincoln & Guba (1985). They suggest techniques to increase likelihood of credible results, two of which are pertinent to this study and addressed below.

Peer Debriefing. Lincoln and Guba contend that exposing oneself to a disinterested peer allows for the exploration of aspects that may be implicit only in the researcher's mind. I often discussed results with my major professor. Although not a peer, she was able to point out information that I did not present clearly and offered alternative explanations for phenomenon. I also discussed findings with two fellow graduate students with similar consequences.

Member Checks. This technique involves testing findings, interpretations or conclusions with those from whom the data was originally collected. In this study, I used this method to check participants statements and interpretations. I performed this step with interview data. I personally transcribed case study participant interviews within two days of conducting the interview. Once transcribed, I provided several interview subjects with a transcript of their interview, requesting they advise me of any mistakes and asking if I interpreted their statements properly. None of the participants required me to change transcripts.

Transferability

Transferability for a large or diverse population of teachers is not claimed for this study. Participants were selected using detailed criteria. Although evidence from this study may inform research in several areas such as induction, mentoring, distance education and multicultural education, claims for wide transferability are not made. This study provides evidence regarding what was learned, and how the learning took place, in an online induction program for geographically isolated teachers serving

diverse students. The development and implementation of this study were based on preliminary research, which this study now furthers. Readers are cautioned that findings in this study may not apply to participants in face to face models of induction.

CHAPTER 4

RESULTS OF THIS STUDY

In this chapter, I provide an examination of data to inform the research questions for this study:

- Are beginning teachers who participate in a distance mentoring program increasing understanding of their student's culture and subsequently adjusting their classroom practice?
- How does teachers' increased understanding of their student's culture relate to their classroom practice?

These questions are structured to guide examination of the learning about multicultural education by case study participants in the eMSS induction program.

Further, questions are designed to examine the application of learning in the beginning teachers' classrooms. I plan to answer these questions by providing evidence visible in several data sources in which the case study participants were active:

- Diversity Module discourse
- Pair Place discussions
- Interviews of case study participants (two interviews of each participant)
- Interviews of participants' mentors

Answering these questions will provide information about the use and feasibility of online induction and mentoring for beginning teachers of minority students. Several fields of educational research may be informed by results of analysis of data in this study. This chapter is organized into five sections outlined in Table 9.

Table 9 Chapter 4 Organization

Section Title	Description
Teacher competencies	Development of frameworks for: ▪ Competencies of a multicultural teacher ▪ Instructional strategies for teaching diverse science and mathematics students
Description of framework for analyzing online discourse	How the framework for discourse analysis used in this study was developed, applied and tested
Learning within the group	An examination of the entire Diversity Module online discourse, including case study participants and all module participants
Learning by individuals	An examination of learning by the case study participants including all possible data sources
Emerging themes	Themes from data analysis in this study that are supported in other research literature
Distinctive findings	Findings unique to this study, with little or no connection to findings reported in other research studies

I conducted two examinations of learning in this study. First, I examined the discourse of the Diversity Module to assess learning of all module participants and then I analyzed the experiences of the five selected participants. In this study, learning is defined as “the acquisition of new information through a process and/or experience that results in a relatively permanent change in behavior or understanding.” It is important to note that a change in behavior is not clearly

witnessed in discourse analysis. Evidence of change in understanding is seen in discourse analysis and interviews. Wells (1999) notes that “Discourse is a means, not an end in itself...a means towards the achievement of some larger purposes.” Analysis of online discourse lends itself to studying the *process* of learning rather than determining absolutely whether knowledge or behavior changes were attained.

Teacher Competencies

The difference between learning and discussion of learning can be illustrated in an analogy borrowed from a wise mentor of mine. A man may profess to know how to be a good husband, having read and discussed skills and knowledge. He may talk about being a good husband, even help others learn about being a good husband. The man may still be mean and obnoxious at home. He may have gained knowledge, but if he has not changed behavior, he has not internalized his learning.

This study examines the learning and growth in knowledge of multicultural education, pedagogical knowledge and pedagogical content knowledge by eMSS participants. Understanding that culturally relevant education, pedagogical knowledge, and pedagogical content knowledge are broad topics, I developed frameworks to help clarify the areas of participant learning within these broad categories. In the following two sections, I present these frameworks along with the rationale I used for their development.

Competencies of a Multicultural Teacher

In order to aide the clarity of findings in this study, I synthesized a set of competencies for multicultural teaching. In this section, I present a framework of teacher competencies for five categories, which are considered important benchmarks in the development of culturally relevant teachers. I developed these categories using information from a number of sources. First, analysis of data in this study provided evidence of several levels of competence in the case study participants. Secondly, the New Teacher Center has developed a continuum of teacher abilities, which serves as a base for some of the competencies in this study. Finally, several teaching standards (from organizations such as INTASC, NBPT and NCATE) as well as the criteria for evaluating state curriculum standards from the National Association for Multicultural Education (NAME) informed the development of these competencies.

Unlike Feiman-Nemser's (2001) tasks for induction, levels in this framework of competencies are not arranged according to time or phase of the induction process. Rather, these competencies are arranged hierarchically in a continuum of levels of success (left to right on table), based on the premise that that teachers' needs concerning multicultural education knowledge may change throughout their career. Borrowing from Bloom's (1956) taxonomy of educational objectives, the levels are

labeled from lowest to highest: Knowledge, Application and Synthesis. Knowledge is represented by terms such as list, tell, identify, etc. Application is represented by terms such as apply, demonstrate, illustrate, modify, and discover. Synthesis is represented by terms such as integrate, modify, design, formulate and evaluate (the term evaluate is included in the synthesis level rather than a distinct section as included in Bloom's' Taxonomy). These descriptions fit well in the hierarchy of levels along the continuum of mastery of the categories in this framework.

Research (Larke, Wiseman & Bradley, 1990; Luykx, Cuevas, Lambert & Lee, 2005; Pewewardy & Hammer, 2003) suggests a hierarchy of categories by contending that awareness of self needs to happen before a teacher can develop the kind of awareness of students needed to best further student learning. However, a strict hierarchy or sequence of development among the five multicultural categories in my framework was not clearly seen in this study. Thus, an experienced teacher with little diversity in his/her student population may be considered at the knowledge level for some categories, while an inexperienced teacher with diverse students may be at the synthesis level for other categories. This framework is presented in Table 10.

Table 10 Competencies of a Multicultural Teacher

Category	Knowledge	Level Attained	
		Application	Synthesis
Aware of own culture	Aware of cultural differences that make the teacher a unique individual, such as ethnicity, religion, SES or life experiences	Understands how the individual teacher's cultural characteristics shaped his/her personal development and understanding of culture Aware of how his/her culture compares to that of students	Understands the teacher's own culture and applies awareness to understanding the unique needs of students of diverse cultures Uses awareness of self to inform and adapt choices from repertoire of teaching strategies
Aware of student culture	Aware of aspects that make up the culture of students, such as ethnicity, religion, SES or life experiences	Able to help lead students to an understanding of their own cultural identities	Helps students apply their culture to learning opportunities, making learning meaningful to students' lives
Aware of student learning characteristics	Aware of ways student learning characteristics are different from those of the teacher	Understands how students differ in approaches to learning and creates instructional opportunities adapted to diverse learners	Develops learning opportunities that are aligned with learning characteristics and unique learning needs of students
Application of strategies for respect*	Uses a few classroom strategies designed to acknowledge discrimination and disrespect Establishes rapport with individual students	Establishes and models classroom climate of respect for diversity Promotes caring and respectful interactions between students and between student and teacher Encourages students to respect differences	Fosters a safe, inclusive and equitable learning community Helps students participate in maintaining a climate of equity, caring and respect
Application of strategies for learning	Uses instructional strategies designed to increase individual student participation	Designs, and implements instructional strategies that recognize the alternative cultural constructions of students Include culturally relevant activities to make learning pertinent to the lives of students	Develops, implements, evaluates the effectiveness of learning opportunities that include elements of student culture Learning opportunities enhance understanding of student culture simultaneous with enhancing learning of content Learning opportunities are relevant to student's lives and support community values, cultural goals

* Portions of this category are adapted from the NTC Continuum of Teacher Abilities, (2003). All other sections are based on research and standards as described on page 165.

Instructional Competencies for Teaching Diverse
Science and Mathematics Students

Throughout this examination of learning, much attention is focused on pedagogical and pedagogical content knowledge. A clear description of strategies that teachers need to be successful can serve as a standard for understanding participants' learning about teaching practice. Table 11 provides an outline of my interpretation of the strategies of a successful teacher. Strategies for teaching can be divided into two categories. One category, pedagogical knowledge, includes the knowledge and strategies teachers employ to help students learn. Examples of pedagogical knowledge categories are classroom management and knowledge of strategies for teaching. The second category, pedagogical content knowledge, concerns understanding content, and applying content in the general strategies for teaching. The strategies in Table 11 are divided according to these two categories.

Two sources of information serve as a basis for my synthesis of these strategies. Pedagogical knowledge categories are based on information from Shulman (1987). To identify pedagogical content strategies in the most useful way for this study, I matched pedagogical content knowledge categories to those of pedagogical knowledge. This provided a framework to examine learning by study participants using teaching competencies applied to general and content based strategies. The pedagogical content knowledge categories are based on the Dimensions of Content Knowledge, a work in progress by Horizon Research, Inc. (2004, used with permission).

Table 11 Instructional Competencies for Teaching Diverse Science and Mathematics Students

Knowledge Category	Pedagogical Knowledge Competencies		Pedagogical Content Knowledge Competencies	
Comprehension of main ideas	Critical understanding of ideas about teaching and learning inside and outside of education and how they are related		Knowledge of content, how ideas within the content area are created, organized and relate to each other and form concepts	Teacher understands content well enough to assure students are learning the major ideas and not mired in detail
Representations of material for student learning	Use of representational repertoire, including analogies, metaphors, examples and explanations		Knowledge of activities, scenarios, analogies, questions and examples that are likely to elicit and move forward student thinking about specific content	
Instruction use and control	Teacher can create a functional learning environment	Management, presentations, interactions, group work, discipline, questioning, humor and other aspects of active teaching	Teacher creates a safe, functional learning environment Matches teaching/learning methods to content	Teacher manages a safe learning environment using varied methods matched to content requirements (lab, group work, projects, etc.)
Sequencing of learning events	Teacher understands requisite knowledge for construction of complex learning	Knowledge constructed in sequence. Teachers place learning events in proper time and order to match learning needs	Teacher understands the pre-requisites for specific content knowledge and present instruction aligned with sequence	
Selection of best methods	Chooses from among instructional repertoire based on needs for student learning	Understands which teaching/learning strategies best provide learning in a way that is meaningful to students	Knowledge of questions/activities likely to elicit student thinking, and when/how to use them Knowledge that alternative frameworks for thinking about the content exist	Teacher can recognize student understanding that is correct, yet organized differently than teacher would organize it

Table 11 (continued) Instructional Competencies for Teaching Diverse Science and Mathematics Students

Knowledge Category	Pedagogical Knowledge Competencies		Pedagogical Content Knowledge Competencies	
Adaptation for student needs	Consideration of student needs tailoring instruction to meet needs	Needs grouped according to previous knowledge: conceptions; personal traits: motivation, aptitude, ability, interest and attention; and cultural needs concerning gender, culture and social class.	Understanding of prior content knowledge students bring to learning Knowledge of adapting content specific strategies that can move individual student thinking forward	Includes understanding which ideas maybe more difficult for students to master
Evaluation of student learning	Checking for student understanding during interactive teaching, summative testing of student understanding, evaluating one's own performance and adjusting for experiences		Checking for student understanding of content during interactive teaching, summative testing of student understanding, evaluating one's own performance and adjusting for experiences Teacher can discern the ideas students have about content, before, during and after instruction	
Reflection on teaching		Reviewing, reconstructing and critically analyzing, one's own and the class's performance and grounding explanations in evidence		
New Comprehensions of main ideas	Consolidation of new understanding and learning from experience about content, students, teaching and self		New understanding of content, how ideas are related, and how students best learn specific content, gained from evaluation and reflection	

Pedagogical Knowledge categories from Shulman (1987)

Some PCK competencies were adapted from Horizon Research, Inc. (2004, used with permission)

Description of Framework for Analyzing
Online Discourse

In the initial readings of Diversity Module discourse, I developed a framework for analysis of discourse. I did not use Pair Place discussions in development of this framework, and did not apply the framework to Pair Place discourse. In my previous experience, applying discourse analysis rubrics to Pair Place discussions was not efficient in informing the researcher concerning participant learning. Pair Place discussions did not organize into threads, as the diversity discussion did, and many postings consisted of a single question and response between mentor and mentee. The framework I developed from the Diversity Module examined learning opportunities through continuing small group interactions. I consider a small group to be three or more individuals, thus the framework is not applied to the paired dialogue of Pair Place.

Before analysis of discourse can proceed fully, the unit of analysis must be determined. There is not agreement in research literature about the best unit of analysis for online discourse. Gunawardena, Lowe & Anderson (1997) used the complete message as a unit of analysis, as did Garrison, Anderson & Archer (2001). Garrison, Anderson & Archer warned that sub-message units (used by Henri, 1992 and Jarvela & Hakkinen, 2002) are more difficult to identify, thus possibly decreasing reliability. During initial examination of Diversity Module discourse, I used a message as the unit of analysis, in the context of a discussion thread. When examined

as part of a discussion topic, the message served well as unit of analysis and was used consistently in this study.

The first draft of the framework came from a thorough reading of the Diversity Module discourse. As I read, I noted both what participants were discussing (culture of their students, sharing activities, etc) and how they were discussing it (reflective statements, describing experiences, etc.). Discussion threads were organized by topic and I examined threaded discussion as they were organized. Prompts in the Diversity Module initiated most threads, with some threads initiated by participants.

Two aspects of the discourse were analyzed. I wanted to examine what participants were learning and how they were learning it. The topic of what participants were learning was easily seen since each thread discussed a specific topic. Therefore, no framework was needed to analyze what participants were learning. How participants were learning is more complex and required a framework.

Development of the discourse analysis framework for how participants are learning in this study was influenced by other literature. Social development is an important aspect of online learning and can be analyzed using a framework to examine how participants are interacting with each other online (Henri, 1992; Gunawardena, Lowe & Anderson, 1997). Interaction among participants can also be

examined to determine the quality of discourse by how well participants advance topical discourse (Jarvela & Hakkinen, 2002). In addition, the level of critical thought (cognitive presence) expressed in online discourse can also serve as a basis for evaluation of online learning (Garrison, Anderson & Archer, 2001). All of these frameworks cited above helped researchers understand important aspects of online learning and informed the development of my framework.

I proceeded with development of a framework to analyze how learning opportunities were taking place in discussion. Initial reading of discourse provided about nine themes regarding how the discussion occurred. These themes were broken into two sections, called major type and subtype. The major type describes how the message affects the continuance of discussion. For instance, a continuing message contained this passage, “Anyone else have an inclusion activity to share?” Subtypes describe the method(s) the author uses to make his/her point. An example of an acknowledging passage within a message is, “Thanks, Charlie, for sharing the model.” Each message (unit of analysis) received one major code and as many subtype codes as were evident. Several messages received multiple sub-type codes when the author was expressing his/herself in different ways.

My first attempt at developing this framework consisted of two major message types, Continuing and Stand Alone. I separated the continuing type into two new types, Initiating and Advancing. This differentiated the continuing messages that

begin a discussion from those that advance discussion in response to a previous posting. A fellow student experienced in discourse analysis using rubrics provided input on the framework, resulting in further refinement. The final framework, with representative examples from Diversity Module discourse, is in Table 12. After refining the framework, I again applied it to the Diversity Module discourse.

Table 12 Framework for Analyzing Online Discourse

Major Type Code	Description of how message affects discourse	Example from Discourse
Initiating	A statement or question (prompt) in which the author is eliciting a response from others. The statement can be on topic or create a new topic.	“Do you think we have a movement toward learned helplessness because of race or economic status?”
Advancing	Attempt to advance discussion. A statement or question in which the author is responding to a message with a message eliciting a response to continue a discussion thread.	“Thanks, (name), for sharing the ‘2 x 10’ model. I would encourage anyone who hasn’t tried it, to give it a try. It works for all ages, including adults. Anyone else have an inclusion activity like (name)’s to share?”
Stand Alone	No attempt to advance discussion. A statement that does not elicit continuing discussion thread either by design or by providing a seemingly complete answer to a question. Statement does not elicit a response	“I also have attended these workshops and think they are great! It was a great reminder to still try and get to know our students even with the end of the school year creeping up!”

Table 12 (continued) Framework for Analyzing Online Discourse

Sub-type Code	Description of how message author makes point	Example from Discourse
Reflection	Writing about personal or classroom experiences in a way that shows the author is examining value of existing knowledge or practice. Cognitive dissonance may be shown	"It definitely makes me reevaluate and refocus my attention and energy on the reason I became a teacher. It is too easy to get bogged down with the day-to-day tasks of being a teacher and forget about the real priority - the students."
Acknowledging	Acknowledges input of message author, may or may not solicit response.	"Very true. You've made a very valid point that needs emphasizing. I think this is one of the major reasons we should withhold judging anyone until we get to know them ourselves."
Supported Statement	Statement of knowledge or thoughts supported by evidence from classroom or personal experience or from research/practitioner resources	"The level of diversity in my classes and in my district, 49 languages spoken, was somewhat different from what I've noticed in our activity #1 dialog so far. I routinely had classes that were mixed racially & ethnically, included recent immigrants from several different countries, and also included 'mainstreamed' special needs students."
Lecture/ Resource	Statement from knowledge or experience providing information as a resource to others – may not elicit or result in a response.	"Snowball Fight - Give each student a sheet of paper. They are to write something that is true but that few if anyone in the class would know about them. Then they wad it up in a ball and literally throw them around the room. At a given signal everyone grabs a "snowball" near them. Then we sit in a circle, read the page aloud and get 3 guesses who it was. Body language can be very telling in this game."
Exploring	Statement outlining possible classroom applications (may be experimental) asking for review/input	"What (name) was just saying about focusing on individual needs is so important... so you have to prepare yourself when a teacher, administrator, parents says, 'That's not fair... my kid didn't get that opportunity.' How will you answer?"

To provide a test of coding reliability, the same fellow student described above coded a 20-message thread. I conducted a Cohen's Kappa test on coding results to determine how well we agreed. A Kappa test is appropriate since it accounts for chance agreement. The Kappa value comparing coding of major type codes was .58, and the kappa value comparing sub-type codes was .54. Both values indicated moderate agreement (Kline, 1990). Note that the Kappa test accounts for random chance, so a moderate level of agreement is between values of .40 and .74. Level of agreement values above .74 indicates strong agreement (Kline, 1990). To further check reliability, another 20-message thread was coded by the fellow student and compared to my coding. In this test, the Kappa value for the major codes was .76, indicating a strong agreement (Kline, 1990), the Kappa value for sub-type codes was .60, indicating moderate agreement. Not only is the agreement a positive sign of reliability, the increasing value of agreement in the second test illustrates reliability as well.

Frameworks for discourse analysis in other studies (Gunawardena, Lowe & Anderson, 1997; Kanuka & Anderson, 1998; Henri, 1992) helped researchers understand the how learning was constructed in online discourse. In the present study, most case study participants engaged substantially in eMSS discourse, but little in the Diversity Module discussion (with one exception). The question of why they did not participate in Diversity Module discourse, as well as an examination of their learning, is explored through analysis of Pair Place discussions and interviews in a later section.

Learning in the Group

This study consists of two examinations: discourse analysis of all participants in the Diversity Module, and, case study of five participants, consisting of discourse analysis and interview. In this section, I describe the learning by participants in the Diversity Module discourse. This examination directly informed my second research question; “How does teachers’ increased understanding of their students’ culture relate to their classroom practice?” as well as informing all focus questions. In addition, examination of learning in the Diversity Module provides knowledge regarding it’s effectiveness for further eMSS module development and facilitation. In order to examine how new understanding of self and student culture is integrated into classroom practice, I analyzed the online discourse in terms of process and content.

Examining Diversity Module Discourse For How Participants Are Learning

I conducted an examination of the entire Diversity Module discussion, including all 160 messages, regardless of author. Analysis involved two different ways of looking at the progression of the dialogue and the learning process. First, I read through the discourse coding using the major type codes in the framework I developed. I then coded the discourse using the sub-type framework. Finally, I read the read the discourse to discern the topics of discussion and the growth of participants’ ideas around those topics.

One hundred and sixty messages were coded using major type codes (initiating, advancing and stand-alone) and subtype codes (reflection, acknowledging,

supported statement, lecture/resource and exploring). I assigned each message only one major type, while each message was assigned as many subtypes as were seen within the message. I assigned three hundred thirty two total subtype codes. Examples of discourse messages presented in this section were copied and pasted verbatim from the online record. I corrected misspelled words to ease reading and understanding, but grammar and punctuation, and methods of showing emphasis were not changed. I removed or changed all names of participants to maintain confidentiality.

Distribution of Codes. Twelve messages were coded as initiating. Most of these twelve messages were posted by the two facilitators, although other participants posted thread initiating messages, some in response to module activity directions. Advancing messages often contained questions asking for input from others regarding a statement made by the message author. A prompt for discussion may be embedded within an advancing message. A message was considered advancing if the embedded prompt did not change the topic of the thread. If the embedded prompt changed the topic of conversation, the message was coded as initiating. Authors of stand-alone messages did not solicit a response, yet several of these messages received responses. Several discussion threads contained a number of stand-alone messages in which participants told the story of their experiences with diversity, in response to a prompt. Stand-alone messages in these threads were responded to by others with their own

story. These stand-alone messages were replies to an initial thread prompt, not necessarily the one directly preceding it in the thread. Thus, the order of these responses could be changed with no impact on the flow of the discussion. Distribution of message major codes is shown in Figure 6.

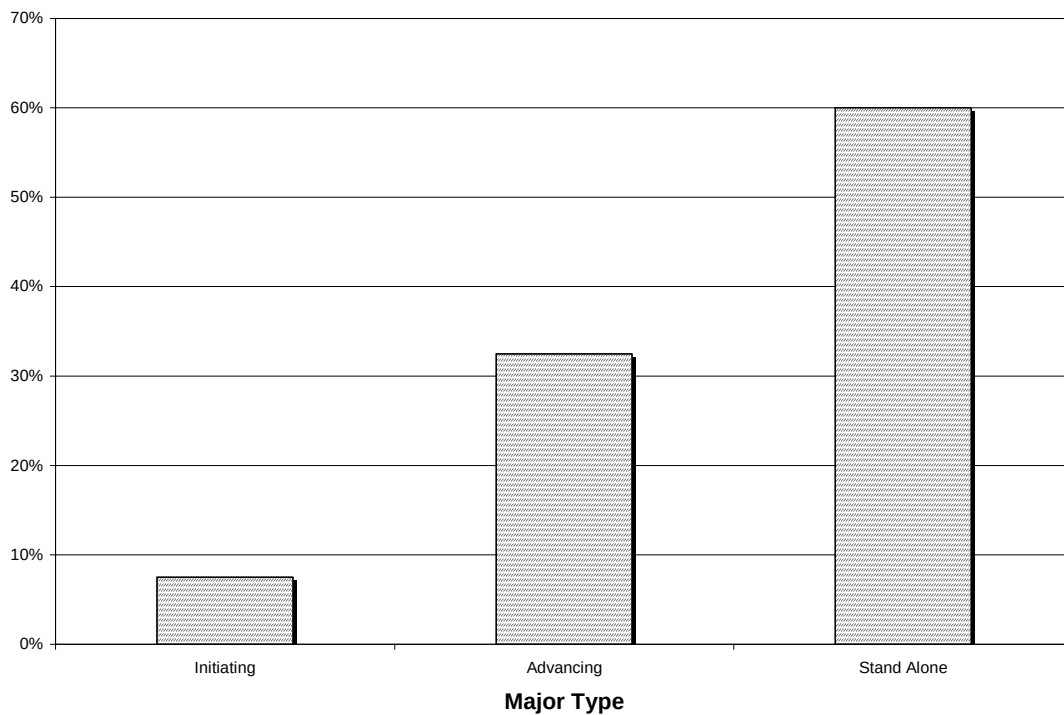


Figure 6. Three major type codes are shown, with the percentage of each that was applied to the 160 messages in the Diversity Module discussion.

Sub-type codes were assigned to a message when the code description was seen anywhere in the message. This resulted in 332 total sub-type codes for the 160 messages. Figure 7 illustrates the percentage of messages coded in each sub-type.

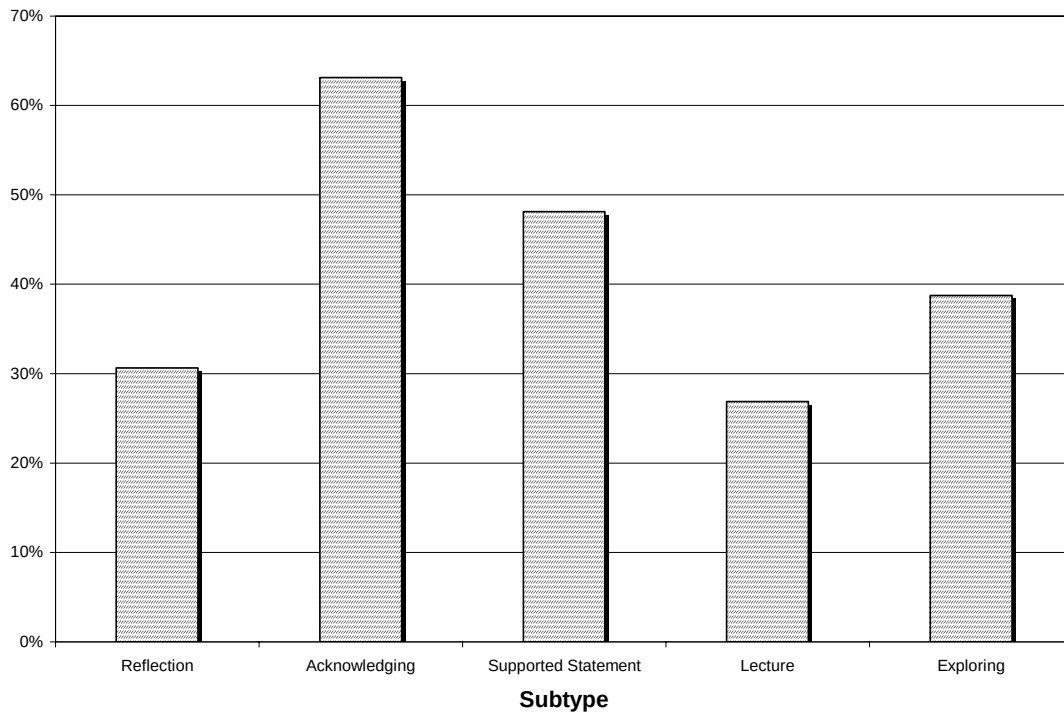


Figure 7. Three hundred and thirty two subtype codes were applied to the 160 messages in the Diversity Module discussion. This figure illustrates the percentage of the 160 messages coded with each of the five subtypes.

Reflection. Reflection was seen in 30% of the messages posted in the Diversity Module. Research by Kanuka & Anderson (1998), Hara, Bonk & Angeli (2000), and Gunawardena, Plass & Salisbury (2001) indicates the positive effect reflection has in online learning. One of the case study participants reflected on experiences in her adolescent years that informed her awareness of culture,

My most diverse classes were choir and PE. At one point my parents offered me the opportunity to attend a private school, and in the end we decided that none of wanted to isolate ourselves from what we saw as “the real world.” Tension was often high, we learned much more than academics in those critical years. There is no question that my experience had a huge influence on my attitude toward diversity.

During interviews, participants universally confirmed that they reflected during online collaboration and that reflection increased their understanding of concepts being discussed.

Acknowledging. In Hara, Bonk & Angeli's (2000) study, the authors found an indication of group cohesion in the number of references to the thoughts of others. Sixty percent of the Diversity Module messages were coded as acknowledging, in which the author acknowledges the thoughts of others, indicating cohesion in the group. Some messages provided positive acknowledgement, "Very powerful comments. I am not familiar with the book you referenced. I'll have to check it out." Acknowledging messages were often seen with other message types such as this example of an acknowledging statement that provided a supported statement as well, "(Name), I can understand your point because I think as humans we tend to categorize people and things. I had a wonderful experience this year...." Participants not only acknowledged each other, they interacted though asking questions of each other and reflecting in their messages. Interaction like this was seen by Lavooy and Newlin (2003) in a study in which they found that students' online learning is enhanced by interaction with a community of peers.

Supported statements. Nearly 50% of the messages were coded as supported statements, in which the author provides information from his/her classroom experience. These messages are often stand-alone statements providing support for a comment or question posted by others. For example, one participant acknowledged another participant's question with an experience from her classroom,

Boy have you asked a tough question here! I wish I had an answer. I have one section of 8th grade where the boys in the class are continually putting one another down. I've tried reasoning with them, I've talked to them individually, both to no avail.

Lecture. The term lecture used for this type of message was modeled after the lecture message type in Hillman's (1999) study in which message authors provide expository statements that provide learning for others. Lecture messages in the present study (28% of the messages) provided instruction from the author for the benefit of other participants. Lecture messages were generally more directive than conversational and involved a description or rationalization of a classroom strategy, as seen in this posting by a mentor,

In an earlier e-mail, I mentioned the 10 by 2 or 2 by 10 strategy. Its goal is to make all kids feel like they belong/fit in. Kids that are identified in some way "at risk" or having the potential to become "at risk" need some sort of assistance. We at our school use 2 by 10 strategy: a faculty member volunteers to work with one of the at-risk students, and has meaningful conversation with that student 2 continuous minutes per day for 10 consecutive days. It is research-proven, as well as also works in our school.

Exploring. Exploring messages are those in which the author was looking for clarification or answers to questions or problems. There are two major types of exploring messages, those asking questions about topics in discussion, and those requesting input on classroom strategies. As an example of exploring questions about discussion topics, one participant asked about a classroom problem another participant was having, "Is there any chance of getting parental help with this problem? Or do the parents have the same feelings?" An example of request for ideas about classroom strategies is the message that initiated the discussion that included the above quote, "One type of student I found it particularly challenging to try to help

is the one who does not see a relationship between success in school and a better future. Any suggestions?” Nearly 40% of the messages were coded as exploring, indicating that participants may have valued the knowledge and experience of others.

One category not included in this framework was sharing resources and strategies. I found that sharing resources did not provide clear information on how participants were learning in discussion, as all resource sharing could be also be considered either supported statement or lecture. Rather than considering the content of the message in this examination of how participants are learning, I focused on the type of discussion. Fifteen percent of the messages contained resources or strategies, and all submessages that included sharing of resources were either supported statement or lecture.

Examining the Diversity Module Discourse for What Participants Are Learning

Participants in the Diversity Module discussion related their increasing understanding of multicultural education acquired through the module to their classroom practice.’ To help understand the meaning of messages, discourse was analyzed with messages in the topic-based context (thread) in which they were posted. One hundred and sixty messages were posted in nine threads. The number of messages per thread is shown in Table 13. I did not include eleven stand-alone messages that did not pertain to teaching discussion (i.e., eMSS staff logistical postings, announcements of upcoming evaluation requirements, etc.) in discourse

analysis. An examination of the discussions in each thread is presented in this section.

Threads are presented in order of their appearance in the discourse.

Table 13 Number of Messages in Each Thread Topic

Thread #	Topic	Activity #	# of Messages
1	Awareness of student culture, discrimination	1	20
2	Awareness of self and student culture, strategies to counter discrimination	1	52
3	Establishing classroom climate of respect	2	11
4	Awareness of self culture can foster better understanding of student culture	2	25
5	Sharing strategies for a classroom climate of respect	3	8
6	Sharing strategies for classroom respect, based on a classroom problem	3	5
7	Self awareness can foster awareness of student culture	2	5
8	Sharing detailed strategies for classroom use	3	18
9	Reflecting on strategies for diverse learners to increase content knowledge	4	5

At the beginning of each of the threaded discussion descriptions that follow, a table illustrating the competencies in evidence in that thread is provided. The competencies are those described in Table 10 (Competencies of a Multicultural Teacher) and Table 11 (Instructional Competencies for Teaching Diverse Science and Mathematics Students). Levels in each table correspond to the competencies of a multicultural teacher (knowledge, application, synthesis), the instructional

competencies are not arranged hierarchically, so no levels are provided. The Diversity Module activity that prompted discussion for each thread is also provided. An outline of the Diversity Module activities is in Appendix E.

Thread One. Activity #1: “Exploring your own influences,” Topic: Awareness of student culture, discrimination. Twenty messages were posted in this thread.

Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Aware of self culture Aware of student culture Application of strategies for respect	Knowledge Knowledge, application Knowledge
Instructional competencies: Pedagogical knowledge Pedagogical content knowledge	Instruction use and control None	

The prompt for this discussion was posted in the Diversity Module itself, asking participants to read an article, Deepening Our Dialogue About Equity (Weissglass, 1997) and respond to at least one of three possible prompts. The goals of this activity were to help teachers appreciate reasons for being aware of their own culture and then to develop this awareness.

The thread began with discussion about the importance of becoming aware of one’s own culture. Discussion quickly moved to participants expressing their ignorance of their own culture and the importance of becoming aware. Discussion remained at the knowledge and application levels of the self-awareness category.

Discussion was initiated by a facilitator citing an activity from the Diversity Module in which teachers examine their self-awareness of culture. One early message illustrates a participant's lack of awareness of self-culture,

I don't feel that diversity has really been a part of my past. I wonder what I am missing??? I always approach my classroom as everyone being an equal. I see each student as a student and ignore gender, race etc. I am wondering if by ignoring I am somehow discriminating??!!

As discussion progressed, message postings provided evidence of teachers approaching the knowledge level of awareness of what makes them culturally unique, as shown by this mentor's reflective message,

When you grow up white and middle class you can assume that things that happen are because of you, yourself, not because someone wants to marry me since I'm rich or they won't give me a job because they don't like African Americans...I always thought of that as having a chip on your shoulder or not being a trusting person, but it would be something to think about.

The higher level of awareness exhibited in the previous quote (compared to the first quote in this section) is not attributed to learning from discussion. This message was a stand-alone message, indicating the author may have possessed awareness at a higher level before the module discussion began. Much of the discussion throughout this thread (actually prevalent in the entire module discussion) concerned discrimination, either by teachers against students, or more often students discriminating against each other. As discussion progressed, the focus moved to teachers becoming aware of students. These discussion postings provided evidence of awareness of student culture, but at the knowledge level, as shown by this experienced mentor's posting,

I've always tried to treat my students with respect but have, from time to time, found myself making judgments based, not on them as individuals but, on their background or family or the like. I really want to correct this failing and hope this section will allow me to make a small start.

Teachers expressed increasing awareness of students as individuals. However, there was no evidence of teachers' knowledge of how to help students increase learning about their identity or apply their identity to learning. One of the mentees posted a reflective message on her awareness of student culture at the knowledge level, "Most teachers enter the classroom, and notice that there is diversity in their classrooms, in their schools, but they don't take the time to look at it, to deal with it. I know I was guilty of this."

As one might expect of teachers, they eventually offered resources for peers to develop an awareness of their students. It is important to note that the discussion that focused on understanding the culture of students was geared toward confronting discrimination, not toward enhancing education for diverse students. Generally, they appeared to believe that understanding of the culture of the teacher and the student was about respect. Several messages in this thread were under the category of application of strategies for respect. For instance, one mentee described a classroom strategy to promote caring and respectful interactions,

But what we did at my school this year, we have an advisory where we have a group of 25 kids, and one of the topics that we did as a school this year, was racism and discrimination. The kids and I had a really candid honest talk, I think they really learned from it.

Participants discussed strategies, with understanding of the use and applicability of strategies increasing in complexity.

The knowledge level of strategies for respect is illustrated in a discussion about a strategy in which teachers make a personal connection with individual at-risk students. Several participants discussed similar strategies and how they allowed them to, “make connections with students.” Some evidence of the knowledge level of application of strategies for respect was seen in this thread. One participant explained how application of strategies was useful,

What these techniques can do is to reduce the affective filter that many students have. If students are not feeling heard, connected to others, or have emotional issues getting in their way of learning, then these techniques can be helpful.

Discussion about respect for students was admirable, but this early discussion does not meet the goal of improving education for diverse learners. One participant’s message of reflection on a classroom intervention concerning awareness of student culture does begin to relate understanding diversity to teaching,

Acknowledging that there are differences among the students in your classroom lets you set up a situation where you can look at the differences, and even use those differences to reinforce your teaching.

This message illustrates the entry into the application level of strategies for respect in her awareness that students differ in their approaches to learning.

In thread one, several participants examined their own cultural awareness, and many participants discussed their awareness that their students are diverse, but not an awareness of the critical dimensions of their students’ cultures. However, the latter component was not a function of the module activity on which this discussion was based. Strategies to counter discrimination by students against each other or teachers against students were shared and discussed.

Thread Two. Activity #1: “Exploring your own influences,” Topic:

Awareness of self and student culture, strategies to counter discrimination. This discussion had the most involvement in terms of number of messages posted (52) and number of different participants posting. Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Aware of self culture	Knowledge, application
	Aware of student culture	Knowledge, application
	Aware of student learning characteristics	Knowledge, application
	Application of strategies for respect	Knowledge
Instructional competencies: Pedagogical knowledge	Comprehension of main ideas Representations of material Instruction use and control Adaptation for student needs Evaluation of student learning Reflection on teaching	
Pedagogical content knowledge	None	

The Weissglass reading also informed this discussion. The conversation began with one participant addressing the module prompt to discuss unproductive responses that people often use in superficial discussion about diversity in order to avoid uncomfortable dialogue. Participant ideas, rather than the formal module curriculum, drove much of the learning evident in this thread. The topic within thread two producing the greatest number of messages centered on discrimination for several reasons. The initial prompt came from the module curriculum, but tangent topics

introduced by participants produced important discussions in the two sub-threads (described below).

In thread two, participants discussed awareness of diversity in two major ways: teacher awareness of self and teacher awareness of students. While discussion concerning the *awareness of own culture* category remained at the knowledge and application levels, in the *awareness of student culture* category, discussion revealed awareness at the synthesis level (see Table 10 for description of categories and levels). This discussion illustrated the participants' understanding of the need for such awareness. A case study participant, in her second year of teaching, illustrated the application level as she expressed the need for self awareness as follows:

Our experiences throughout life and as teachers in the classroom set our "opinion" of people. When we take an isolated experience with someone and due to the perceived globalization to all who now fall into that category due to comments or the experiences of others we become bigoted.

Another beginning teacher expressed the need for awareness of self and student culture: "In my experience, people tend to deny their prejudice towards others. I feel that these prejudices and discriminatory actions are due to the segregation of communities and the lack of knowledge of others' culture and struggles."

Most of the discussion in thread two involved understanding students as individuals, primarily to avoid or counter discrimination by teachers against students and by students against each other. Participants discussed three categories for awareness of students as individuals: cultural diversity, socioeconomic status, and the development of student self identity. Illustrating the need for awareness of student culture, two participants provided reflective statements about teachers placing their

own values on students, as a case study participant wrote, “I then realized that I was trying to push my own values (which I think are beneficial to all students--another unproductive thought) rather than focus on the needs of the individual students.” This statement, part of thread two, illustrates participants are at the application level in the domain of student awareness.

The discussion within thread two that included the above posting began with a facilitator prompt to discuss treating students as individuals. Following a few stand alone messages, one participant posted a classroom scenario of an unfair situation, prompting participants to post resolutions. Through subsequent discussion, the level of awareness of student learning characteristics was seen approaching the application level, as illustrated by this participant’s statement about learning approaches, “I think it's great that we're finally making an effort to teach to all children where they are and not where we'd like them to be.”

One participant was very concerned about learning by students of poverty in her classroom, and initiated a discussion within thread two in that direction. Learning about the needs of low SES students was based on participant discussion and a book by Ruby Payne, A Framework for Understanding Poverty (1996), which several of the participants had read as part of a workshop, provided for Montana teachers, that was not affiliated with eMSS. This discussion actually initiated much of the subsequent discussion about discrimination, moving from discrimination regarding SES to ethnicity, culture and small town prejudices. Many participants shared

classroom and life experiences, but discussion showed competencies only at the knowledge level.

Two important short sub-threads appeared in thread two dealing with assessment and colorblindness (ignoring cultural differences). In the assessment sub-thread, ten messages were posted about assessment concerning awareness of student culture in relation to diverse groups. In this sub-thread, two national policy terms are used: the No Child Left Behind Act (NCLB), and a measurement used in this Act, Annual Yearly Progress (AYP). This sub-thread branched from the discussion about discrimination according to SES. It started with a mentor/facilitator posting a message about examining test scores by group, “When we look at test scores, even our administration separates them out so we can look at the different groups, and they do it by ‘zip code’ so that it's not as obvious, but we know what they are really doing.” The discussion moved to the damaging effect NCLB requirements may have on students, as a mentor posted:

I'm noticing that our school is not trying as hard to keep kids at our school anymore -- especially if they are free & reduced lunch. (We missed AYP by 3 kids in that sub-group). I had never (before) heard our Associate Principal say things like, "Well, maybe so and so would do better in a smaller setting, have you considered..."

The assessment sub-thread showed evidence of passion when discussing NCLB, “What an example to set for the rest of the nation! How long must we pay for bad management elsewhere? I'll get off my soap box now.” However, with teachers expressing opinions and relating experiences, awareness above the knowledge level was not evident.

In the assessment sub-thread teachers' discussed in a general sense how standardized assessments disadvantage certain students. However, they did not take the desirable next step of discussing how large scale assessments could be made more equitable for diverse students. This "soap box" discussion illustrates the need for facilitators to steer discussion to a discussion centered on student learning.

The second sub-thread in thread two concerned colorblindness in multicultural education. This sub-thread was short, but like the assessment sub-thread, illustrated the need for multicultural education. Proponents of colorblindness advocate ignoring cultural differences as a method of assuring respect for students as individuals. However, this behavior does not address the need for culturally relevant teaching (Howard, 2001; Bailey & Boykin, 2001; Darling-Hammond, 1995.) A recently retired mentor teacher in a predominately white, middle class area, responding to the NCLB discussion wrote:

I do agree that NCLB tends to make problems with diversity worse. With this in mind, I sometimes feel that I may discriminate more if I stop and figure out cultures, backgrounds etc. I do know that there are facts that need to be known and understood, but I feel like I am doing the best when I just treat each student as an individual and as an equal.

The colorblindness discussion illustrated that at least one participant was moving from the idea that awareness of student culture is primarily important as a means to avoid discrimination, to the idea that student learning can be enhanced through awareness of diverse student learning characteristics,

I sometimes, think the best way to handle diversity is to ignore it. By that, I don't mean to be insensitive to the differences among our students but to treat all students fairly. And treating all students fairly doesn't mean treating all the same. It would be grossly unfair to treat a resource student and a gifted

student the same. We must be fair to all and allow each to grow and move ahead as quickly as he/she can.

Citing special needs as an example of diversity is an indicator of the limited exposure this teacher has had to diverse students (confirmed in interview.) The aspect of cultural awareness influenced by personal experience is discussed later in this chapter in the distinctive findings section.

In thread two, participants explored the awareness of self more deeply, sharing personal reflections. Discussion of student culture involved learning about students as individuals and as members of a cultural group. In addition, discussion of student learning characteristics was evident in this thread. Evidence began to emerge that previous experiences with cultural diversity shape their awareness of their own and their students' cultures. Participants sharing previous cultural experiences (primarily discrimination) showed a higher level of awareness compared to those who did not report such experiences.

Thread Three. Activity #2: "Understanding our students," Topic: Establishing classroom climate of respect. Eleven messages were posted in this thread.

Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Aware of student culture Application of strategies for respect	Knowledge Knowledge, application, synthesis
Instructional competencies: Pedagogical knowledge	Comprehension of main ideas Representations of material Instruction use and control Adaptation for student needs	
Pedagogical content knowledge	None	

This short thread began with a prompt by one of the facilitators who asked for responses to the question, “How do we work toward making our students accept each other?” Responses centered around student behavior and cultivating students’ respect for one another. Most of the messages contained examples of activities teachers have used to initiate students’ knowing of each other, such as the “two truths and a lie” activity. (In this activity, a student tells two truths and a lie about him/her self and others guess which is the lie.) Discussion moved into reflection on student respect when a mentor submitted a caution to the series of simple activities, “Of course, if there are students not willing to accept others, they might need to be worked with individually with counselor(s), administration, a teacher the student trusts, and parents possibly as well, if necessary.”

It was a case study mentee who suggested there is more to respect than simply learning a bit about each other,

Often kids are given a quick tour and then that's it. Kids need to learn the "internal systems," in order to feel comfortable. Peers could be trained to really take on the new kids, check in with them regularly etc. and it could have quite a positive impact.

This thread did not provide evidence of learning by participants, yet it did provide a number of resources that non-posting participants could use. This thread did provide evidence that at least one participant is at the synthesis level of application of strategies for respect by not only promoting caring and respect (application level), but showing evidence of fostering a safe and equitable learning community (synthesis level),

I lay it out right at the beginning of the year that there is actually only one rule in my classroom, that we will treat each other with respect at all times. This year I had the kids generate the details of what that means, how it looks and sounds, and those classroom norms are posted visibly. When another student puts someone down, or worse, I refer to the agreed upon group norms as my first step. If there's hostility and name-calling involved, I speak privately to the perpetrator and try to get them to express whatever is bothering them about the other kid, if there is anything. We defuse, then I can remind them of norms and expectations. I model constantly.

Thread Four. Activity #2: "Understanding our Students," Topic: Awareness of self culture can foster better understanding of student culture. 25 messages were posted in this thread. Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Aware of self culture Aware of student culture Application of strategies for respect	Knowledge, application Knowledge, application Knowledge, application
Instructional competencies: Pedagogical knowledge	Comprehension of main ideas Instruction use and control Sequencing of learning events Adapting for student needs	
Pedagogical content knowledge	None	

The prompt for this discussion, provided by a mentor/facilitator, asks participants to post cultural make-up information about the school where they teach (a website providing school demographics was referenced in the module activity). They were further prompted to share the cultural makeup of a school they attended as students and how it may have influenced their current teaching practice.

There was not a great deal of interchange between participants (with one exception described later), but much reflection was seen. Participants truly examined what their formative years meant to their teaching. One mentee, who is White, wrote this clear example of the application level of self awareness,

An incident at a junior high dance I attended sort of sums up my family's response to minority students. During a mixer, boys lined up on one side of the gym, girls on the other. We were to dance with the person we ran into. I ran into one of the black kids. I had no problem dancing with him, and did so but when I got off the floor, my dad, who was one of the chaperones that night, told me I should have walked off the floor rather than dance with that

kid! It took me quite a while to forgive him for that comment! I always fear I might have prejudices I'm not aware of, just like I wasn't aware of my dad's.

In response to this message, a mentee illustrated the application level of awareness of student culture when she wrote about the importance of learning about diversity, “Your story probably rings true for many people. What is most striking to me is that question of hidden prejudices, it's so important for us to constantly examine those issues, and to make our kids aware that we ask those questions so they'll do the same.”

A mentee wrote about teaching in the same community in which she grew up. The community is close to a reservation and has a large percentage of Native American students. She became aware of prejudice when she went away to college, “When people would ask where I was from, their reaction to my answer was astounding. I couldn't believe the number of people with negative remarks or comments about how much they feared Native Americans.” Now when she faces discrimination or cultural disrespect in her students, she uses a phrase, “I challenge your bigotry!” which she based on her awareness of reactions by others. Other participants acknowledged the phrase, vowed to use it and described situations in which it would be appropriate. This phrase, and its importance in the classroom were mentioned by two other participants in interviews. These postings were part of an ongoing thread in which this participant exhibited the application level in integrating strategies for respect in her classroom.

Three separate multilevel categories were seen in this discussion, all providing evidence of the application level. It is important to note that in two of the three

responses cited here there was evidence of understanding that could be attributed to life experiences rather than learning from the Diversity Module curriculum or participation in the discussion. In this discussion, participants related their own culture to that of their students, indicating a developing understanding of the importance of culture in student learning.

Thread Five. Activity # 3: “Try an Intervention,” Topic: Sharing strategies for a classroom climate of respect. Eight messages were posted in this thread.

Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Application of strategies for respect	Knowledge, application, synthesis
Instructional competencies: Pedagogical knowledge	Representations of material Instruction use and control Adaptation for student needs	
Pedagogical content knowledge	None	

Thread five started with a prompt by a mentor/facilitator who asked participants to describe teaching practices they have seen that affect diverse students positively or negatively. She started with an example describing teachers who observed each other’s classrooms for evaluating the frequency of calling on Latino/a female students.

The remainder of the discussion was centered on participants describing enrichment programs for at-risk students, but did not address diverse students and their specific needs or learning characteristics. Opinions were shared about teachers who would rather not work with difficult to teach students. The general feeling of participants can be summed up in one mentor's comment,

It is very frustrating when you know students are dealing with a lot in their lives and they have to deal with a biased teacher on top of it. I've seen teachers do their best to get students kicked out of their class because it took a little extra effort to work with them. It is really a shame...it's kind of like throwing a life away like it was dispensable.

The discussion in this thread was centered on only one multicultural category: application of strategies for respect. All three levels of success within this category were visible in this discussion. One case study participant expressed her awareness of the need to foster a safe, inclusive and equitable learning community (synthesis level) in her comment about a program at her school,

Each group had a counselor and teacher leaders that would meet once a week to deal with issues that might distract them from their academics. This way students had an outlet that would then allow them to focus better in the classroom. We also found that these students attended school more often and were generally more successful when given an opportunity to deal with their nonacademic issues at school.

Thread Six. Activity #3: "Try an intervention," Topic: Sharing strategies for classroom respect, based on a classroom problem. Five messages were posted in this thread. Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Application of strategies for respect	Knowledge, application, synthesis
Instructional competencies: Pedagogical knowledge Pedagogical content knowledge	Instruction use and control None	

A mentee initiated the sixth thread by relating a classroom experience. In her classroom, students expressed bigotry toward one another using racial slurs. She related how she stopped teaching and lectured the class on respecting one another. In her message, she asked for input from other discussion participants. Four respondents agreed that she should have engaged students in conversation rather than lecturing them. A mentor wrote at length explaining possible activities to help students avoid racial conflict. She then reflected on a situation in which tolerance was necessary and helpful. This short thread contained no evidence of learning by participants, but did provide very good resources for classroom practice.

Like the fifth thread, discussion was limited to the category of application of strategies for respect. In this thread, teachers provided responses designed to help others learn from their experiences. One experienced teacher provided evidence of the synthesis level in her reply to the initiating mentee,

You may want to start by doing some team building. Generally, once we get to know the person that sits next to us, we can start to get along. Kids each come from their own ethnic culture as well as their own family cultural expectations. Tolerance is a learned skill.

This thread provided learning opportunity for others who may have read it without posting. One mentee provided a scenario from her classroom and participants discussed ways to handle the problem. The thread culminated with an experienced teacher providing a reflective description of a similar problem in her classroom and the solution she applied.

Thread Seven. Activity # 2: “Understanding our students,” Topic: Self awareness can foster awareness of student culture. Five messages were posted in this thread. Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Aware of self culture Aware of student culture	Knowledge, application Knowledge
Instructional competencies: Pedagogical knowledge	Comprehension of main ideas	
Pedagogical content knowledge	None	

Only five messages were in this thread, which started with a reflective posting by a mentee. She related her experience of attending a funeral in which the minister expressed intolerance for different religions. She related this experience to her classroom,

I thought about my classroom and how often as a student, and still as a teacher, the fact of my “otherness” is overlooked. We often forget those who are not present and make remarks that assume a homogeneity that is not reflective of our actual society.

Discussion ensued in which respondents acknowledged the importance of being open and honest with students about diversity. This discussion was not extensive, but there was evidence that the few participants learned about their own views of diverse students. The posting cited here provided evidence of the application level in awareness of self culture but messages in the discussion did not go beyond the knowledge level in the awareness of student culture. Like the discussion in thread six, this discussion was based on a participants' experience, but it did not relate closely to the classroom.

Thread eight. Activity # 3: "Try an Intervention," Topic: Sharing detailed strategies for classroom use. Eighteen messages were posted in this thread.

Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Application of strategies for respect Application of strategies for learning	Knowledge, application, synthesis Knowledge
Instructional competencies: Pedagogical knowledge	Comprehension of main ideas Representations of material Instruction use and control Adaptation for student needs	
Pedagogical content knowledge	None	

This thread started discussion on the third Diversity Module activity. The activity required participants to develop and try an intervention in their classrooms for

their diverse students. In this thread, a mentor/facilitator asked participants to discuss classroom strategies to meet the needs of diverse students. The discussion was beneficial to readers in one regard, as several participants described strategies they have tried in their classrooms and several subsequent clarifying questions were posted. However, most of the ideas posted were activities designed to get to know students, such as one mentor's idea to put a world map up and have students indicate their countries of ancestry. There were no ideas for incorporating cultural relevance in science or mathematics classrooms.

Two multicultural categories were seen in this discussion. Almost all messages were in the area of application of strategies for respect, with one message considered application of strategies for learning. Most of the messages were at the knowledge level, with some at the application level. A synthesis level message about strategies for respect was posted by one of the case study mentees, demonstrating her attempt to help students maintain a climate of equity, caring and respect,

I will remind students that it is how we use a word and not the word itself that makes it inappropriate. Then I ask if the word(s) were used appropriately or inappropriately as a put down. This is intended to give them ownership of their choices and the responsibility to make good choices for themselves and their classmates.

This thread contained a number of strategies for classroom use that could be read and learned from by all participants. The detailed descriptions of strategies and how to implement them falls under the instruction and control category of pedagogical knowledge.

Thread nine. Activity #4: “Reflecting on your intervention,” Topic: Reflecting on strategies for diverse learners to increase content knowledge. Five messages were posted in this thread. Competencies in evidence:

Competencies	Categories in evidence	Level(s)
Multicultural competencies	Application of strategies for learning	Application
Instructional competencies: Pedagogical knowledge	Representations of material Instruction use and control Adaptation for student needs	
Pedagogical content knowledge	Instruction use and control Selection of best methods Adaptation for student needs	

In this thread, prompted by the 4th module activity, participants reflected on classroom interventions they tried. Most of the interventions involved establishing student groups to counter stereotypical gender or culture based roles. Four mentees reflected on strategies they tried. All expressed learning from the activity, one even elaborated on why the intervention was not successful. As an example, a mentee discussed using gender grouping. He considered the intervention successful when, “...all of the students really got into the lab.” There was little discussion in this thread, messages were often of the stand alone type. All authors described and reflected on interventions for content learning they had designed and implemented in their classrooms, thus most messages were at the application level. Although the participants sometimes reflected briefly on the success of classroom activities as seen in the quote above, there was no evidence of in-depth evaluation of student learning.

This was the only thread that offered information in the pedagogical content knowledge area. The module activity that prompted this discussion is the first one to ask for reflection on classroom strategies. Although the level of multicultural knowledge was not high, strategies for applying cultural awareness to learning were offered and reflected upon.

Summary of Diversity Module Learning

Examination of Diversity Module discourse showed participants were building a cohesive group through the support, acknowledgement and reflection seen in discussion. There is evidence of learning shown by reflective statements regarding increased awareness of culture and testing new practices in the classroom. Most of the discussion provided evidence that participants attained the knowledge level in multicultural education, although there were several examples of application level or synthesis level attainment. Table 14 illustrates the levels attained for specific competencies within each thread. This table does not account for the number of messages that provide evidence of each competency, but illustrates the levels of competencies seen in individual threaded discussions.

Table 14 Multicultural Education Level Attained within Each Category by Thread

Category	Level Attained		
	Knowledge	Learning	Synthesis
Aware of own culture	1, 2, 4, 7	2, 4, 7	
Aware of student culture	1, 2, 3, 4, 7	1, 2, 4	
Aware of student learning characteristics	2	2	
Application of strategies for respect	1, 2, 3, 4, 5, 6, 8	3, 4, 5, 6, 8	3, 5, 6, 8
Application of strategies for learning	8	9	

Each number represents the discussion thread in which evidence of competency level is found.

Only one thread contained pedagogical content knowledge competencies of instructional strategies. Pedagogical competencies were evident in all threads, with four competencies represented in a number of threaded discussions. All but one of the threads contained knowledge of instructional use and control in the classroom, primarily centered around categories (classroom management, discipline, etc.) of creating a learning environment. Distribution of instructional strategies by thread is provided in Table 15.

Table 15 Instructional Competencies in Evidence by Thread

Category	Pedagogical knowledge competencies	Pedagogical content knowledge competencies
Comprehension of main ideas	2, 3, 4, 7, 8	
Representations of material for student learning	2, 3, 5, 8, 9	
Instruction use and control	1, 2, 3, 4, 5, 6, 8, 9	9
Sequencing of learning events	4	
Selection of best methods		9
Adaptation for student needs	2, 3, 4, 5, 8,9	9
Evaluation of student learning	2	
Reflection on teaching	2	
New Comprehensions of main ideas		

Each number represents the discussion thread in which evidence of instructional competency is found

Examination of the module discourse showed the important discussions that were taking place, providing opportunities for learning by a number of participants. As reported earlier, the case study participants were not very visible in posting their thoughts in the Diversity Module. A caution is in order because even though case study participants did not post many messages, this does not mean that learning did not occur. This caution is supported by eMSS website statistics and interviews which show that participants often read but do not post messages (statistics available from the Burns Telecommunication Center, Montana State University). This “lurking”

(reading but not posting) is an important aspect of the eMSS program. In interviews, every case study participant described reading about resources she could use, even printing and saving them, but not posting messages. Figure 8 illustrates the numbers of messages read and posted by all eMSS mentors and mentees throughout the academic year.

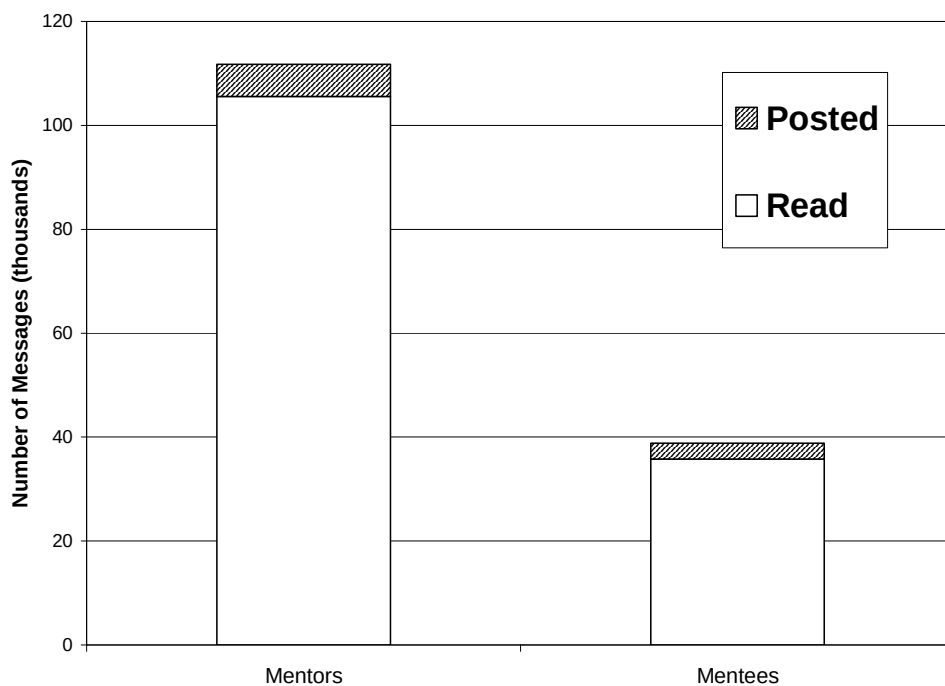


Figure 8. This chart illustrates a comparison of messages read and messages posted for mentors and mentees throughout the 2004-2005 academic year. Mentors accounted for 105,527 messages read, while mentees read 35,770, for a total of 141,297 messages read. Mentors posted 6,259 messages (5.93% of the number read) while mentees posted 3,048 messages (8.52% of messages read) for a total of 9,307 messages posted. These figures do not include messages posted by eMSS staff and facilitators.

Learning by Individuals

This section focuses on the learning of five individual teachers, referred to as case study participants. Messages posted by each of them in the diversity discussion and Pair Places, as well as dialogue from both interviews, were examined to determine both what they were learning about teaching diverse students and how this learning was taking place. I interviewed each case study participant twice, gaining much more information about their learning through interviews. Two key findings emerged from interviews. First, even though participants did not post messages in discussion, they learned from reading the postings of others. Second, as you will see in the following sections, they learned a lot about teaching diverse students from what they read online. Table 16 illustrates the number of messages posted by case study participants in several categories over two years of participation in eMSS. The overall number of messages posted and read is only available for year two of participation. Note that name were changed or removed for confidentiality.

Table 16 Number of Messages Posted in Key Categories

Participant	# posted in Pair Place (year 2) mentee/mentor	# posted in Pair Place (year 1) mentee/mentor	Pair Place msgs about diversity	msgs posted in diversity discussion	Total diversity messages posted	# read overall (year 2)	# posted overall (year 2)	Ratio of posted to read (year 2)
Mary	34/33	5/4*	5	3	8	1105	42	0.04
Martha	21/30	31/46	4	6	10	668	38	0.06
Teresa	12/12	25/24**	0	0	0	24	15	0.63
Katie	13/20 ***	21/14	4	1	5	677	22	0.03
Jennifer	58/68	Not in program	13	15	28	745	115	0.15
Total for case study participants	141	86	26	25	51	3219	232	0.07
Total for all module participants				160				

* This pair was initiated in March

** Different mentor in year one

*** This is a “quad place” (year two only) that consists of two mentors and two mentees, numbers are for messages posted by Katie and those posted by her mentor addressed to Katie

A graphic representation (Figure 9) of messages read and posted illustrates the large difference between the two categories. This information caused me to wonder why the case study mentees did not participate by posting messages. To answer this question I conducted a focused examination of their Pair Place interactions and their responses to the personal interview questions.

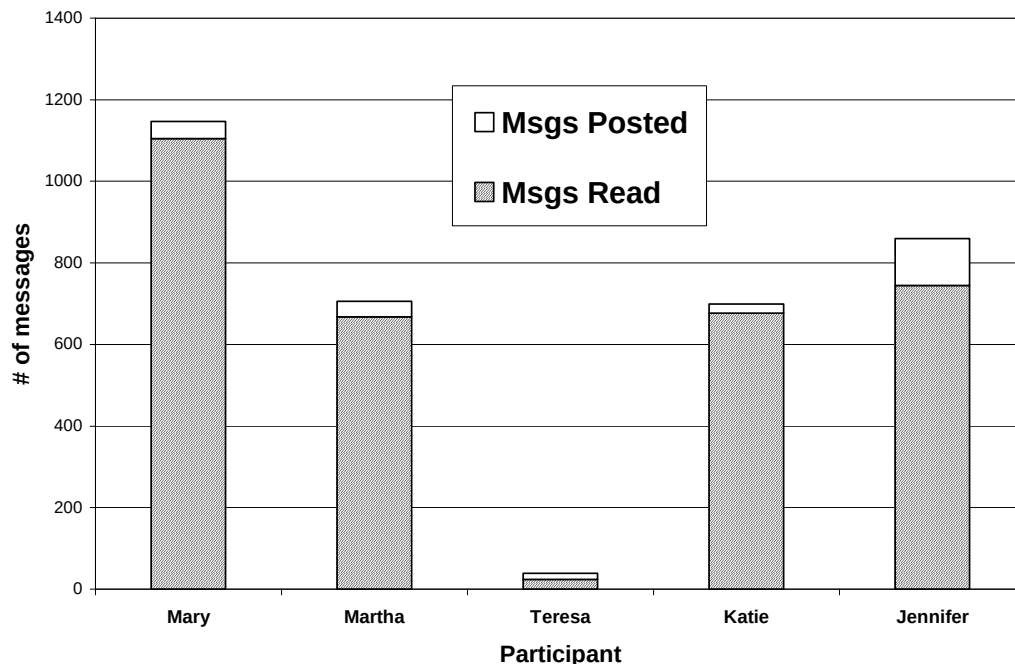


Figure 9. Illustrates the number of messages read by participants compared to the number of messages each posted in the second year of the eMSS program.

During interviews, several case study participants expressed their reluctance to post questions or prompts because of their fear of appearing uninformed about the topics being discussed. One participant, (Jennifer) however, posted often and

included several messages coded as prompts. For example, she posted the first message by a participant in the entire module. The four mentees expressing reluctance were all in their second year of teaching and even though Jennifer is only in her second year of teaching mathematics, this was her eighth year of teaching overall. In her personal interviews, Jennifer talked about how she was not afraid to post messages or even try new ideas in her classroom, because she is an individual who is basically unafraid in many areas of her life. Her use of continuing messages also illustrates her confidence. Jennifer was the only study participant who posted continuing messages to elicit responses. She posted three of these.

It should also be noted that Jennifer posted more messages than other case participants in the diversity discussion (15, compared to the next closest at six). One wonders if this was due to experience and confidence or the greater free time a teacher with more planning experience may have. This issue was addressed in interview discussions and all the mentees expressed having more time in their second year of teaching. In fact, one mentee was working as a substitute teacher and had a great deal of free time. However, all interviewees except Jennifer expressed their unwillingness to post messages even though they now had more time.

Case Study Participant Descriptions

Information about a participating instructor's teaching assignment and the student population she serves is important in understanding the findings in this study. A description of case study participants, including their teaching assignments and the

students they work with, is presented in Chapter 3. As an aid to the reader, a summary of the description is provided here.

All case study participants are white, female teachers of either science or mathematics. All have taught or are currently teaching diverse students, with student populations above the state average of Native American students, and/or above the average percentage of students of low socio-economic status. Four began eMSS participation in the program's first year, which was also their first year of teaching. One began participation in the second year of eMSS, corresponding to her eighth year of teaching, but her second year teaching mathematics. One of the participants is currently substitute teaching after teaching in a reservation school in her first year. Four of the participants are native Montanans, and three live in the community in which they teach.

Learning by Individual Case Study Participants

Mary. Mary expressed the greatest growth in awareness of student culture, citing participation in the Diversity Module,

It [Diversity Module] opened my eyes and broadened my mind a little bit. Working in the environment I did last year, my thoughts about diversity were a little bit different than the other perspectives that were posed in the Diversity Module ... So, it does broaden my perspective somewhat to realize that even if I am thinking diversity, there is always a little wider that I can go with that.

She expressed her growth in cultural awareness through Diversity Module participation, even though she did not post many messages. Unfortunately, she did not have a regular classroom in the second year of program participation, so she was

unable to apply learning about teaching diverse students to her classroom practice. It is interesting to note that she increased her awareness of student culture by reading messages posted by other participants about their students. As a substitute teacher in the second year of eMSS participation, she did not teach the same students for more than two consecutive days, negating her ability to become more aware of individual students. She did relate her new understanding to situations with her students from her first year of teaching (also her first year of eMSS participation) commenting on her new awareness of these students as shown in the following interview quote,

After the module, it would have been nice to be able to try some different approaches with them that were brought up during the module and seeing how they responded. [Now] I totally understand where they were coming from.

In the conversation, the preceding quote reflected on a situation during the previous year, in which her students disagreed with her classroom practice. She expressed that she would respond to students differently with her new understanding.

She did display an increase in the competency of awareness of strategies for respect at the application level. In early first year Pair Place postings, she expressed her lack of understanding of her student's culture, which resulted in a lack of respect from students, "My comments to them were about their total bigotry to me." In the follow up interview at the end of the second year, she attributed her increased awareness to Diversity Module discourse, "It made me more aware, to be more cautious with my words and how I approach students."

Perhaps due to her proclaimed reluctance to post messages online, Mary expressed little awareness of her own culture. In interviews, she spoke of "opening

her eyes,” but did not provide evidence of self awareness beyond the knowledge level. Her comments about awareness were almost all centered on understanding her students, rather than herself, making assessment of her self awareness difficult. Mary attributed her strong gains in awareness of student culture and in strategies to foster respect to participation in the eMSS program, more so than did the other participants. Several times in interviews, she reported learning from reading messages posted by others. She reported reading the entire Diversity Module curriculum and all messages posted in the module closely. In fact, she read over 1100 messages on the eMSS site in the course of the second academic year.

Mary gained pedagogical knowledge, particularly in the categories of instruction and comprehension, (see Table 11 for categories) from reading the thoughts of other teachers in situations that paralleled her own,

Knowing where other people are coming from and that in the classroom I was in last year, the trials and tribulations I was going through were not unique to me. Seeing how other people had worked through that or were working through that.

She also increased her knowledge of the comprehension of the main ideas of teaching, as well as instruction from interaction with her mentor. In a first year Pair Place posting, she wrote of her lack of knowledge in the area of instruction, “I was so busy dealing with behavior issues my students were unable to progress as far as they could have.” In the second year, she showed more understanding of instruction, “I recognize the importance of control in the class, there is a major difference in having control and being controlling.”

She also attributed her growth in some areas to group interaction online,

As I read through the postings in this section there were many "yeah, that's so right" and some "do we teachers expect ourselves to be super human and know, as well as, fill the needs of all our students" thoughts that came to my mind. This is some wonderful dialog.

While much of her pedagogical knowledge growth was attributed to and seen in online interactions, she attributed her growth in pedagogical content knowledge (especially in comprehension of main ideas and instruction and representation categories, see Table 11) almost exclusively to her mentor. She and her mentor had extensive online dialogue in Pair Place about specific lessons and how to structure them. In a series of messages, her mentor quizzed her on how she would sequence a particular lesson with questions like, "How will you assess learning?" and "What will you do next?", followed by specific advice. Mary acknowledged both the advice and the difficulty of developing and presenting quality learning throughout the thread.

Martha. Martha focused much of her early eMSS learning opportunities on categories of pedagogical knowledge such as instruction use and control, and selection of learning events. In early Pair Place discussions, she asked questions pertaining to these pedagogical categories, illustrated by this posting in a Pair Place dialogue with her mentor in September of the first year of eMSS participation, "I haven't quite figured out if these types of students would rather do nothing than do something incorrectly. Can you help?" Her questions about pedagogical content knowledge show a change in her knowledge level over time, as well as her increasing concern about developing a culturally relevant curriculum. In an early September Pair Place posting in year one, she expressed the concern, "I don't know how to make the

content relevant or exciting to them to try and reach them on any level.” Her growth is seen in a Pair Place posting in September of the second year, “I would really like to pick your brain about the pacing of objectives for your students. I will email you my curriculum map...let me know when you can read it.” These messages indicate her gains in knowledge of instruction and in ability in selection of learning events, but she continued to struggle with sequencing the events she understood.

In response to my first research question, “Are beginning teachers on or near Native American reservations who participate in a distance mentoring program increasing understanding of their student’s culture and subsequently adjusting their classroom practice?”, Martha provides direct evidence to answer yes. She is in a unique situation of teaching in the town (adjacent to a reservation) where she grew up. She expressed an ignorance of the culture of her fellow students growing up, “When I was growing up, I lived in a bubble.... I know there must be a way for me to change my thinking,” and only began to realize she had little specific knowledge of Native American culture when she went away to college and witnessed discriminating remarks that made her reflect on her awareness. This experience may have helped move her to increase awareness (at the application level in Table 11) of her own culture. Her learning about teaching diverse students came in four ways. First, as she left her hometown, she became aware of the cultural differences between herself and the Native American students she grew up with, as illustrated in this Diversity Module posting,

After I graduated from high school, I attended [a university]. When people would ask where I was from, their reaction to my answer was astounding. I

couldn't believe the number of people with negative remarks or comments about how much they feared Native Americans. I at the time could not relate since I had grown up with the culture and felt pretty secure.

Second, she read postings from others throughout the eMSS discussion areas and applied what she learned in her classroom. The benefit to her teaching from ideas shared in group discussion is seen in postings and illustrated in the following interview remark,

I think that my classroom would be very much boring and stagnant without the program. Because not only does it give me the resources, it also encourages me to change and to be more exciting and to do things for students, to make learning easier and more successful for my student population.

This posting, and the discussion it came from, illustrate her understanding of student culture and strategies for learning at the application level. She entered the synthesis level of application of strategies when she continually tried strategies she developed to help her Native students learn content. She considered the culminating activity successful for two reasons. First, students seemed to learn the content (evidence of evaluation of student learning). Second, she gained knowledge of effective evaluation strategies.

The third source to which Martha attributed her learning was local administrators and professional development opportunities. “Last year we had an all-district training about poverty and how it affects our students. (Diversity Module posting).” She also gave credit to her mentor, himself an experienced teacher on a Native American reservation, as illustrated in this interview response:

I really value the opinions that are out there, specifically Charlie, because I deal with him on a more regular basis, to say, 'Hey, this is what I want to try out, or these are my frustrations and I am not sure how to deal with it,' and to have somebody validate what I am feeling and to also help me work through those challenges.

During the first interview, when the Diversity Module was just beginning, she described a need to develop her cultural awareness, "I feel like it's (Diversity Module) very relevant to my life I really feel like ...it's important to me in what I'm doing," although her postings provided evidence she was already at the application stage. In the Diversity Module discussion, she wrote about developing self awareness of culture, how that awareness showed her the need for culturally relevant practice, and her perceived lack of skill in providing such instruction, "I would really like to be able to relate more to the culture here, but I'm drawing at straws." As her learning progressed, she tried culturally relevant classroom activities, stating in interview that she learned from reflection on the effectiveness of activities for her students. Following an unsuccessful strategy, she developed another strategy with assistance from her mentor. In an interview, she proclaimed the second strategy successful in helping individual students learn.

Martha moved from the application level to the synthesis level in several of the multicultural competencies. Her pedagogical knowledge became more complex as she showed an increase in several categories of pedagogical content knowledge. For example, her mentor described their first year conversations as involving the mentor providing advice. Whereas, during the second year the mentee often wrote about

things she tried and asked for suggestions to make them better. He cited her “evolution of confidence” in her ability to teach math. This illustrates her increased knowledge of content, as well as her increased knowledge of representations, instruction and selection of best methods.

Teresa. Teresa also provided affirmative evidence for the first research question, although her increase is less pronounced. She exhibited gains in categories of pedagogical and pedagogical content knowledge, especially comprehension of main ideas and representations, but struggled with other aspects. No evidence was seen of progression beyond the knowledge level in multicultural education categories.

In a Pair Place posting early in her first year of eMSS participation, she expressed a lack of pedagogical knowledge in instruction (management), “They (students) told me daily how bad a teacher I am, for the first couple of weeks, just to get under my skin. It worked. I went to their class in fear.” There is evidence that this lack of knowledge of instruction is partially based on her lack of cultural awareness of her students. In a Pair Place posting reflecting on the first few weeks of school, she wrote that she did not look forward to setting up classroom rules at the beginning of the year, and she expressed her need to learn about the students’ culture.

A progression of her dialogue over time shows her growth in both pedagogical and pedagogical content knowledge. In response to an interview question about her teaching ability, her mentor said that she is a “pretty talented teacher.” Teresa attributed this growth to discussion with her mentor and participation in online discussion based on the eMSS module curriculum, specifically the classroom

management module (in the fall of her first year of participation). One activity in this module asked teachers to evaluate their management style (using an evaluation tool), and to reflect on how their style affects their teaching. She wrote to her mentor that she fit the authoritarian management style, and reflected on the pros and cons of an authoritarian approach. She later reported an incident in which she wrote referrals regarding misbehaving students, a relatively authoritarian response. Yet after reflecting, she chose an alternative approach, “I talked to the students, they understand.”

Teresa’s understanding of instruction grew further, as seen in this Pair Place posting in year two, “One of my biggest strengths this year is my learned knowledge of how hard I can push them (students) without creating too much dissonance.” She also showed growth in pedagogical content knowledge main ideas, in the second year, along with her continued struggle in sequencing and selection of methods, indicated by this second year Pair Place posting, “I know the material, but not necessarily the text and flow.”

Her adaptations of classroom practice for diverse students were not based on a heightened awareness of student culture, rather, she was using activities suggested by her administrators, as seen in these two quotes from interviews, which illustrate a lack of knowledge of understanding of student culture and applications of strategies,

For instance, we were learning the measure pi, and I went outside so we could measure trees and anything we could find round in nature, and we found this bird nest, well I had no idea until the next week that it’s against their culture to touch such things.

I had them write a Native American word sentence, and the way they rebelled was talking about, instead of Indian Tacos and Native American stuff, they talked about Gatorade and things of teenagers.

Teresa began to apply strategies for student learning toward the end of the last semester of this study, although there was not evidence of her growth in awareness of culture,

I had an elder come in and talk about the medicine wheel and then put a picture on the board and then we did the different chords inside the circle, and did lengths and angles and areas and all of that stuff. They were listening and polite and they felt more open and welcoming towards me because I understood a piece of them ...they could see math in their world.

In various postings and interview responses, Teresa illustrated the knowledge level of awareness of student culture, learning characteristics and application strategies (described below). There is no evidence she progressed beyond the application level in any of these categories. In the follow up interview, she explained that the community member led lesson about the medicine wheel was successful while the lesson she developed for measuring pi was not. She became aware that the first lesson was not successful because it violated student's cultural rules, but she was unable to articulate the relevance for student learning of one lesson over the other. She knew the medicine wheel lesson was relevant to students, but attributed success of the medicine wheel lesson to the knowledge possessed by the community member, rather than her own awareness of the importance of a medicine wheel in students' culture.

Most of Teresa's cultural knowledge came from local sources, in which administrators and community members helped her understand the cultural needs of her students,

There are definitely cultural difference that mostly the office helps me with, for instance, they won't have, you can't talk to brother in laws, so, and certain other members of your family, or certain, you know, and so they know all of that cultural stuff.

There may be two explanations for her not increasing her awareness about multicultural education through eMSS. First, her mentors were not experienced in teaching culturally diverse students, although school and community members provided classroom strategies. Second, she chose not to participate in the Diversity Module, and there was no evidence of her self awareness of culture beyond the application level. She reported her gain in understanding of best practices for the instruction and representation categories of pedagogical knowledge through eMSS participation, primarily from her mentors. Although she did not actively participate in large group online discussions, she did communicate extensively with her mentors, often over the phone. She reported that during the first year of eMSS participation, she talked with her mentor on the phone regularly. She continued telephone discussion with her mentor during her second year in the classroom and with eMSS. (I did not have access to the phone calls, but she reported on conversations in interviews.)

In addition to growing through interaction with her mentor, she did learn from the larger community as well. During the interview, she expressed the benefit of participation in the online community in relieving isolation and helping her build confidence,

Yes, it [communication online] helped a lot in just giving me more backbone to stand up and say yes, I guess I really do know what I am doing. And, I know I am not alone. Because when you are in a classroom, you pretty much are the only adult doing a job that you don't know if anyone else is doing the same way.

Teresa gained in pedagogical and pedagogical content knowledge (especially in the instruction and representation categories, see Table 11) through participation in the eMSS program. She did not participate in the Diversity Module, even by reading, and expressed little knowledge of the reasons for culturally relevant instruction. She did gain application level knowledge of multicultural education strategies, through eMSS participation and learning from local administrators and community members.

Katie. Katie expressed awareness of self and student culture through involvement in eMSS. In the Diversity Module discussion, she posted a message reflecting the complexity of student diversity,

I think that as a teacher we can and should strive to understand where our students are coming from, but also I think its might be important to accept that we may never quite be able to comprehend or totally relate to what any student is going through in life.

Even though she expressed awareness of culture, she did not show evidence of high competency levels in awareness. For example, in the Diversity Module discussion on awareness of self, her posting was primarily about methods of communication briefly discussed in the assigned module reading.

She began her current teaching position at the same time that she moved into the community, which is adjacent to a Native American reservation. When describing

her learning during the second interview, she provided the following reflection regarding her own awareness of culture,

I just remember a couple of people saying they really don't see any diversity, they treat everybody exactly equal and never even think about it and I wonder how that is really possible. It's like when I applied for the teaching job at (current school); the first think I did was look on the map and said, wow, its right next to an Indian reservation. How can you filter that out of your mind so that it doesn't have any influence? It seems so unrealistic that we could have no influences about how different cultures are.

As she increased her awareness of the cultural needs of her students, she began to realize what she did not know about culturally relevant teaching. She related her growing understanding of the importance of student culture, and the beginnings of an understanding of the implications of student culture for classroom practice,

I guess it has made me think more about ALL of the kids in my class and what kind of home life they have, what their background is, how do they feel about their future. I guess I realize that you don't necessarily know what life is like for each of these kids whether they are Native American or not.

All of the above postings illustrate her awareness of culture in her students, but not beyond the knowledge level.

There is little evidence of her applying this understanding in classroom practice or progressing very far as a multicultural educator. Instead, she focused in other directions. For example, she discussed the danger of offending someone, "It made me realize that you can't talk about diversity without having a fear of saying something offensive to someone." In one interview, she spoke of the importance of getting to know all students on a personal basis and cited her "good rapport" with Native American students (the knowledge level in application of strategies for respect, see Table 11). When asked in interviews about her classroom strategies for

diverse students, Katie mentioned respect issues: “It (Diversity Module) has made me think more about all of the kids in my class and what kind of home life they have.” She provided no information about adaptations for individual student learning. I do not contend that she does not practice culturally relevant strategies, but she did not articulate her knowledge of the use of strategies when asked.

Katie attributed her learning about multicultural education to the Diversity Module curriculum (assigned reading) and reading discussion postings. She did not complete the activities in the Diversity Module in which participants practice and evaluate culturally relevant classroom strategies. Her mentor is not experienced in teaching diverse students, however, she considered him a considerable helping influence in improving her pedagogical content knowledge (particularly in the areas of representation, selection of best methods and instruction, see Table 11). She credited his impact on these categories of her pedagogical content knowledge in this interview statement,

Ray is such an interactive teacher, he always into inquiry based activities. So, he has given me opportunities to be that kind of teacher. Even though I think that makes the whole classroom management issue more of a challenge. He has really helped me be a better teacher. I like the way he does so many really neat activities.

Like many other eMSS participants, Katie experienced growth in the comprehension and instruction categories of pedagogical knowledge. In an early first year Pair Place posting, she asked very basic questions of her mentor, “How many points do you usually have in a quarter? How do you weigh tests, quizzes, homework, labs, etc? Do you have a participation grade?” After this one discussion about

pedagogical knowledge, every other Pair Place discussion was about teaching specific science concepts, that is, pedagogical content knowledge.

Katie did not limit herself to learning about multicultural education or pedagogical knowledge. In an interview, she related her lack of content knowledge when she first came into her teaching position. While teaching and participating in eMSS, she was also taking science courses. She concentrated her eMSS learning on increasing her pedagogical content knowledge, citing collaboration with her mentor and the larger group for providing strategies and activities she could apply in her classroom, “I like the content area, where you can go in and learn some new activity about microorganisms or something with physics. I think these are my favorite parts.”

It is in Pair Place that we see evidence of her growth in pedagogical content knowledge. In an early series of first year Pair Place messages, she attached several pictures of lab equipment asking her mentor to identify the equipment and provide guidance on their use. She completed science courses over the summer between the first and second years of eMSS. She came into the second year of eMSS with requests for equipment and resources, expressing her greater knowledge in selection of methods. She knew what to use and how to use it in her classroom, she just did not have the classroom resources in her school. Evidence of growth in various pedagogical areas is seen in the beginning teachers’ progression from questions such as, “How do I...” to questions such as “I did this, what do you think...”

Katie illustrated this growth in comprehension, representation, instruction and selection of methods. In September of her second year, she posted this message, “I do

a warm up with the smart board at the beginning of the period. So far we have been warming up with astronomy information.” In November, she posted, “Here’s my lab (attached). Please let me know what you think. The students haven’t learned about cations or anions yet so I had to adjust the lab quite a bit.” Her ability to adjust the lab for her students illustrates her knowledge of adapting for student needs, a category of pedagogical content knowledge.

By January, she was providing resources to her mentor, “Check out this website on antibubbles, it’s interesting if you like to quaff a beer once in a while, or even if you don’t – real physics at work.” Providing verification of her pedagogical content knowledge growth, her mentor spoke of her progress in an interview,

I think that the year, now almost two years under her belt that she is much better. She has a grasp of how to make things work and put things across and plan things so that they do work well. All of our communications last year, the meetings that we had, the mentoring program, all of that together has given her a broader perspective, a broader view of the world, she didn’t get locked into any one thing, it kept on giving her new ideas to think about and try.

Although there is little evidence of Katie’s growth beyond the knowledge level in multicultural education, she exhibited strong growth in many categories of knowledge of teaching science.

Jennifer. Jennifer expressed knowledge of awareness of cultural needs of her students,

What is most striking to me is that question of hidden prejudices, it's so important for us to constantly examine those issues, and to make our kids aware that we ask those questions so they'll do the same. I can't stop thinking about what was presented at Leadership and in the (poverty) Framework book, how much of school is biased already against students who live in poverty.

Citing learning from activities in the Diversity Module and a professional development workshop outside of eMSS, she reported an increase in understanding of awareness of student learning characteristics and adapting instruction for student needs. In particular, she illustrated the synthesis level of awareness of student learning characteristics (helping students maintain a climate of equity, caring and respect) in this stand alone posting about her classroom rules in the Diversity Module discussion,

I lay it out right at the beginning of the year that there is actually only one rule in my classroom, that we will treat each other with respect at all times. This year I had the kids generate the details of what that means, how it looks and sounds, and those classroom norms are posted visibly. When another student puts someone down, or worse, I refer to the agreed upon group norms as my first step. If there's hostility and name-calling involved, I speak privately to the perpetrator and try to get them to express whatever is bothering them about the other kid, if there is anything. We defuse, then I can remind them of norms and expectations. I model constantly.

There was an extended discussion in the Diversity Module on classroom strategies for respect. In addition to the strategy described in the quote above, she described several more strategies she has developed. She continued to be very active in the Diversity Module discussion, but strategies centered on respect rather than student learning. She also illustrated the application level of self awareness and awareness of student culture in a reflective posting about experiences that may have helped her form her awareness of culture,

There is no question that my experience had a huge influence on my attitude toward diversity. We were all active in the civil rights movement, and other social action activities of the time. I am concerned that my students here might grow up believing they live in a mono-culture because differences are often hidden. I know that I am more sensitive to the subtleties of discrimination

because of my own experience and work overtime to broaden my students' view of those around them.

Jennifer was particularly excited about increasing her understanding of teaching low SES students, since a large percentage of her student population lived in poverty. She also reflected on her own culture and how it relates to her classroom practice, “I know that I am more sensitive to the subtleties of discrimination because of my own experience and work overtime to broaden my students' view of those around them.”

Although she was very active in online discussion of application of multicultural education practice, her learning did not come entirely from participation in eMSS. A face to face professional development experience, partially supported by eMSS was a significant experience in her cultural awareness. This PD experience was a workshop designed to increase awareness of student poverty related to learning. Since many of her students are from low SES backgrounds, she embraced this increased awareness and expressed her desire to help her students understand diversity as well,

Does this influence my teaching? I hope so. I hope that I bring all that knowledge to my classroom, that my students see a slightly broader world because of the view I bring, and that they see at least the possibility of tolerance, even embracement of diversity.

During participation in the Diversity Module, she was very active in sharing application strategies and discussing her culturally relevant classroom practice with her mentor and the larger group. Her messages were often reflective and included personal information about her own culture and heritage. In Diversity Module

discussion, Jennifer posted 15 messages, in six of them, she described experience-based strategies for the group's benefit. There was no evidence of application of strategies for learning in her diversity discussion postings. She did express awareness of student learning characteristics at the application level in interview,

It's (Diversity Module) made me more accepting of where they (students) are, and looking at that whole framework of kids who come from poverty, so I've tried to be more explicit in teaching that and more aware of the kids that you end up having to say, Joey won't be doing homework, I just have to accept that, Joey won't be doing homework.

Jennifer described bringing existing cultural awareness to the Diversity Module discourse, which allowed her to share her knowledge and experiences. In two separate messages, she describes classroom strategies, one she adapted and one developed by school administrators. In the first activity, students bring objects from home that "share a bit of themselves." Students then describe the object and discuss learning about each other. She wrote that kids bring personal items and are open in their discussions. This activity provides clear evidence of her synthesis level of application of strategies for respect by helping students maintain a caring climate. The second activity she described is an after school program in which students can receive tailored academic support according to their needs, illustrating the synthesis level of awareness of student learning characteristics.

As one might expect of a teacher with eight years of experience, Jennifer did not express a need for basic pedagogical knowledge as was seen in other case study participants. During interview, she expressed her comfort with many categories of pedagogical knowledge, and her tendency to reflect on teaching, "I am also at a point

in my own professional development where I am looking at my classroom curriculum and questioning what, not every single step, but the big concepts.” However, she did express her continual learning about instruction by reading messages posted by others,

I am still new to math, and I read through different peoples approaches to handling for classroom management, I pick and chose some things that might work for me, I wouldn't say that those were the greatest benefits I see, but I have used them. It has helped me in developing my classroom.

Like Katie, Jennifer's greatest need expressed in eMSS was in the area of pedagogical content knowledge, (especially comprehension of main ideas, representations, and selecting the best methods for teaching content, see Table 11). Jennifer expressed her need in this area in various forums online, as can be seen by this example, posted early in the academic year in Pair Place,

I want to try and present a more cohesive set of math concepts. In order to do that I need to continue to deepen my core content knowledge. I'm hopeful that the resources in this program can help me. I also want to fill my "bag of tricks," develop those nice fat files of activities and methods of presentation that reach students on different levels and with different learning styles.

During interviews, she expressed how beneficial the knowledge of mathematics was that she gained by collaborating online within the eMSS community. She was very active in the mathematics discussion area and often asked questions of her mentor and others about mathematics and how to teach it. Perhaps because of her experience or self-confidence, she did not ask to be given lessons and other resources like the other case study participants did initially.

Her early requests for help involved asking for advice on strategies she currently used, “I am using some very basic, though obviously needed warm up

sheets this year. I have at least one or two students for whom this work is too easy. Source ideas?” She quickly advanced from asking for advice to sharing resources with her mentor, “Yes, your procedure makes a lot of sense, sounds very efficient. Here’s how I do it....” In addition to discussion of pedagogical content knowledge, Jennifer expressed the benefit of adding to her teaching repertoire with instruction strategies and resources she gained through her own searches and collaboration in eMSS,

One of the things that I have used quite a bit is the resources online. So it helped me to focus some searching for resources, I have several sites set up in my bookmarks, math sites that I got from that material, which I would not have had time to seek out and evaluate and do all that myself.

A Summary of Themes Evident in the Data

Usefulness of the Diversity Module

Curriculum. Induction can range in complexity from simply showing a new teacher how to use the copier to involving new teachers in developing classroom strategies. Curriculum for induction has been shown to be beneficial in a number of studies (Feiman-Nemser, 2001; Kohler, et al., 1997; Luft and associates, 2002, 2003). The curriculum of the Diversity Module served to help participants increase awareness of self and students, but application of awareness in teaching practice was not accomplished. The Diversity Module curriculum was intended to help teachers increase awareness of self and student culture and apply this awareness in classroom

settings to enhance learning of diverse science and mathematics students.

Examination of learning in these areas can inform the effectiveness of the curriculum.

Case study participants expressed awareness of self and student culture, even when they did not complete the module activity in which they apply and assess their awareness in the classroom. Passion about teaching was expressed in various discussion forums throughout eMSS. Diversity Module driven discussions illustrate this passion. As Jennifer became aware of her own culture and that of her students, she also became aware of the level of awareness in fellow teachers,

The issue that concerns me most at my school is the huge bias many of my colleagues demonstrate toward students from lower socio-economic groups. If I hear one more teacher complain about "these kids," and "these parents," when referring to our huge number of "family-impooverished" students I'm afraid I'll lose it, professionally that is.

The change in awareness is illustrated by a retired teacher-mentor who participated in Diversity Module discussion. In a posting early in the module, she explained her philosophy of multicultural education. An excerpt from this explanation illustrates her colorblind view, "I see each student as a student and ignore gender, race etc." Throughout the discussion in the Diversity Module, this mentor asked a number of exploring questions about student culture, such as this posting, "With this is mind, I sometimes feel that I may discriminate more if I stop and figure our cultures, backgrounds etc. Does anyone else agree?" There is no evidence that she now thinks her teaching strategies should recognize student differences, but evidence shows she is thinking about her impact as a teacher on diverse students. Late in the

discussion, she revisited her earlier colorblind statement with a reflective question, “However, I am wondering if by ignoring I am somehow discriminating??!!”

The component of the Diversity Module in which participants try culturally relevant strategies in the classroom was in later module activities, which only a few participants completed. For the case study participants, group discussion of application of cultural awareness seemed to center on respect in the classroom rather than learning. This observation of mine was confirmed by Martha in the follow up interview, “I honestly feel that most of the diversity discussion has been about how to help kids gain tolerance, and not so much about how do you relate the culture of your students in your classroom.”

All competency levels were seen in application of strategies for respect, including the synthesis level shown by the author of this message whose activity helps students maintain a climate of equity and respect, “The activity brings up a lot of questions from the students and a lot of discussion. Plus students get to know one another. And we know when students get to know one another, they are more accepting of each others differences.” The knowledge level in strategies for respect was prevalent in the Diversity Module discourse, such as this activity designed to establish rapport with students, “At our school, we have a principal-directed strategy called “2 by 10” or “10 by 2.” A staff member takes an at-risk student voluntarily, and spends 2 minutes a day dialoguing, for 10 consecutive days.”

Discussion in the Diversity Module on classroom applications of module material to improve instruction only involved a few participants, and did not include

case study participants. However, in Pair Place dialogue and interviews, some case study participants revealed application and assessment of culturally relevant classroom practices. For instance, Teresa displayed awareness of, and interest in, culturally relevant strategies for learning by bringing in a community member to lead a lesson using a medicine wheel to help students learn geometry concepts. When measuring angles found in a familiar cultural object (the medicine wheel), students were more attentive. She acknowledged the limits of her cultural knowledge when she described a lesson she developed to measure objects in nature. She had students manipulate an object that was considered sacred and untouchable in the culture of her students.

One of the other case study participants developed a lesson in which she designed culturally relevant strategies for learning (synthesis level, see Table 11), having students manipulate numbers using names and populations of clans in students' community. This activity also engaged the students in applying their knowledge of their culture in mathematics lessons.

The successful application of a culturally relevant curriculum requires cultural awareness and knowledge of strategies. Case study participants who participated in the Diversity Module expressed increased awareness of self and student culture. All Diversity Module participants gained strategies for adapting for student needs in the area of creating a classroom climate of respect. In addition, all case study participants expressed gaining strategies from local administrators, community members and/or mentors. One participant gained resources from her mentor, who had taught in a

reservation school (same tribal affiliation). Strategies and resources often came from sources within or close to the students' community, as seen in one participant's acknowledgement of school administrators, "There are definitely cultural difference that mostly the office helps me with."

Reflection is seen as a critical tool for high level learning online (Garrison, Anderson & Archer, 2001). The Diversity Module curriculum fostered reflection in teachers. Over 30% of message subtypes were coded as reflective. In interview, several of the case study participants spoke of reflection as a part of the learning process. One case study participant's response to an interview question illustrates this reflection, "Sometimes it's really obvious what worked or didn't work. The other times where it's not so obvious, I spend a lot of time reflecting on my actual practices." All case study participants provided evidence of reflection as a method of learning about their teaching. Some, like the participant quoted above, described reflection directly. During interviews, others gave indirect evidence of reflection on practice. An example follows.

If I didn't have that exposure [eMSS participation] at all, then I'd probably just flail along and not really make those adjustments and think about issues. Even if I don't necessarily change anything specific, I'm at least aware of something so if the situation arises then I've already thought about it and I know how I'm going to handle it.

Participation in Professional Development. Professional development in multicultural education can be effective in helping teachers improve teaching practice for diverse students (Howard, 2001; Solano-Flores & Nelson-Barber, 2000). A knowledge level of multicultural education competencies can be enhanced through

participation in Diversity Module professional development. While a certain level of knowledge can be achieved outside of the Diversity Module, the evidence suggests that the module curriculum improved the knowledge of those who participated.

To investigate this idea more fully, I examined a case in which one participant did not participate in the Diversity Module, so she had not been asked to reflect upon her own and her students' culture. Instead, in her classroom she tried a community member led activity without cultural awareness to help provide meaning to the activity. In the follow up interview conducted in May of her second year, she expressed a lack of cultural awareness when commenting on a failed culturally relevant activity. Her seemingly stereotypical viewpoint was evident in her surprise regarding her students' response to the lesson: "I had them write a Native American word sentence, and the way they rebelled was talking about, instead of Indian Tacos and Native American stuff, they talked about Gatorade and things of teenagers."

She did not understand the difference between traditional and contemporary cultures. As Pewewardy (1998) warns, there is no such thing as a "real Indian", but the stylized Hollywood created images of past tense Indians. Pewewardy further cautions that teachers should not assume that any Native American student believes in or follows the values of what may be considered a traditional Native culture.

This participant witnessed the use of culturally relevant resources in the classroom when a community member assisted her in teaching a lesson by adapting her instruction with a culturally relevant strategy, "I had an elder come in and talk about the medicine wheel and then put a picture on the board and then we did the

different chords inside the circle, and did lengths and angles and areas and all of that stuff,” but she was unable to express why the students learned better with the use of the medicine wheel. All of those who participated in the Diversity Module expressed either enhancing an existing awareness of developing awareness and a more thorough understanding of cultural issues for working effectively with students.

For instance, one participant who expressed developing her cultural awareness though previous life experiences developed a culturally relevant classroom learning activity at the synthesis level of application of learning strategies. She developed her strategy as an activity in the Diversity Module with help from her mentor and guidance from the Diversity Module curriculum. Another participant, who brought little or no multicultural teaching competence prior to Diversity Module participation, developed an application level of awareness of her own and her student’s culture. She reported her growth in an interview, “It (module participation) has made me think more about ALL the kids in my class and what kind of home life they have, what their background is, how do they feel about their future.” Another participant reported developing awareness of student cultures, “It does broaden my perspective somewhat to realize that even if I am thinking diversity, there is always a little wider I can go with that.”

Needs of Mentees Change Over Time

The induction needs of teachers change over time. This may be an obvious statement, and it is well supported in literature (Feiman-Nemser, 2001; Stansbury & Zimmerman, 2002). Examination of the messages posted by case study participants

over the course of their participation in eMSS illustrates the change in teacher needs. Mentee needs changed in two ways: their confidence in their understanding of basic categories of pedagogical knowledge (comprehension of the main ideas and instruction, see Table 11) increased, and the nature of their perceived needs regarding their teaching practice also changed. These two aspects often changed together.

One of the case study participants began participation in the eMSS program with eight years of teaching experience, but she participated because she was new to teaching mathematics and needed help in teaching content. Although she participated in eMSS pedagogy activities, she expressed a lack of need for the information, “I read through different peoples’ approaches to handling classroom management, I pick and choose some things that might work for me, I wouldn’t say that those were the greatest benefits I see.” She continued to participate, however, for two reasons. First, she cited her ability to help others benefit from her teaching experiences. Second, she expressed a need to increase her knowledge in several categories of teaching mathematics content. During an interview, her mentor described this participant’s activity in Pair Place, “...she's shared a lot of ways that she teaches, and I shared the way I teach, and I'll hear something and go, ‘oh yeah that's better than what I'm doing,’ and change.” The participant felt that her true need, which was mathematics pedagogical content knowledge, could potentially be met through eMSS participation,

Now that I have a better sense of the curriculum, where my students need to be at the end of the year, where they've been, I want to try and present a more cohesive set of math concepts. In order to do that I need to continue to deepen my core content knowledge. I'm hopeful that the resources in this program can help me.

Using this participant's information as a basis for comparison, I examined the change in needs of other, less experienced case study participants. In year one of eMSS participation, participating mentees posted a great deal of exploring messages. Many of the messages began with the words, "What do I do...?" and, "How can I ...?". Example messages from two of the mentees to their mentors in the first year of eMSS participation are, "I am looking for ways to incorporate the items you've shared into my classroom," and,

My frustration with my general math classes is largely because I don't really know what to do with them. I try to have an activity every day to get them moving, but if you have any suggestions for different ways to 'practice' that would be great!
If they can't multiply now, I'm not sure how I'm going to get them to apply those skills later. Help!

Year two messages were much more collaborative and showed evidence of experience. The mentees posted experience-based information and asked for feedback on classroom activities they had developed or attempted. In the second year of participation, messages to mentors began with phrases such as, "I tried this..." and, "What do you think of..." One of the case study participants illustrated this change well. In one of her earliest, first-year Pair Place postings, Katie asked her mentor for help in a basic area of pedagogical knowledge: "Do you have a participation grade or a good behavior grade?" Late in the second year, she asked her mentor to review a lab activity she developed and adapted for the learning needs of her students, "Here's my lab (see attached). Please let me know what you think." Each mentor described the change in teaching confidence they saw in their mentee, illustrated by one mentor's comment, "I have seen an evolution of confidence [in teaching math], just knowing

the more she tries and fails, just like any other teacher.” Another mentor spoke of his mentee, “She has a grasp of how to make things work and put things across and plan things so that they do work well.”

The pedagogical needs of each of these more confident mentees also changed over time. Early in their eMSS experience, they requested information on basic pedagogical needs, such as classroom management. As they matured as teachers, their needs were more content related, even incorporating cultural relevance into practice,

I had a couple of ideas about how to incorporate the actual culture around this area into my classroom, so right now we are studying pre-algebra concepts, adding like terms, that kind of thing, Charlie suggested that I use instead of adding like terms, have the different clans.

The case study participant who did not participate in the Diversity Module also chose not to participate in the eMSS program at all during the last semester of her second year. She cited her mentor and group collaboration for helping her achieve such a level of professional maturity that she felt she no longer needed induction, “This semester, because I was so nurtured and carried for a year and a half there, felt like I was ready to spread my wings and go by myself. So, it [eMSS] helped me get there.” Even though evidence of growth in cultural awareness was not seen in this participant in interviews (she illustrated the knowledge level of awareness of student culture and student learning characteristics), she did express growth in confidence and in some areas of pedagogical content knowledge. She perceived an increase in pedagogical knowledge, specifically in adapting classroom strategies, but evidence does not support her perception. She related the story of an adaptation in her classroom for her Native American students, in response to an interview question

asking about any adaptations she may have made for culturally diverse students. A community member, however, developed the adaptation and led the lesson. When asked if it was successful, she provided evidence of students on task “They were listening and polite...” but did not provide evidence that she evaluated learning or reflected on her teaching. Her pedagogical content knowledge seemed limited to the categories of comprehension and representation. Other categories were either lacking or not reported.

Collaboration Online

Beginning teachers may internalize the experiences of their mentors (Paine, Fang & Wilson, 2003) and in so doing, increase their learning about teaching. Collaboration in the eMSS online community allows beginning teachers to learn from a variety of “teachers”, including peers. Case study participants commonly described the positive benefits of learning from members of the community. One mentor reported that his assigned mentee, a case study participant, learned from him, as well as from others in the program, “I think the collegiality of just being around fellow mentees and hanging around some of us mentors really helped her convince herself that she was on the right track of doing things.”

Induction research describes the importance of collaboration in development of a classroom learning community to provide support and serve as a means to explore and reflect on classroom practice. In Odell & Ferraro’s (1992) study, mentored teachers rated support they received through collaboration with peers and mentors as very important in their mentoring program. In the present study, all

participants reported that the thoughts and advice of others, whether from their mentor or the group, helped to relieve the feeling of geographic isolation and was beneficial to their confidence as a teacher. As one mentee reported, “it helped a lot in just giving me more backbone to stand up and say yes, I guess I really do know what I am doing. And, I know I am not alone.” It is important to note that isolated teachers might not have gained knowledge from others if a collaborative online group was not available to them. One case study participant compared the help (particularly in aspects of mathematics instruction) she received from the online group to that she gets from local school peers, “To put out a question and to get, oh my goodness, a massive amount of response is invaluable, because in the building I am at, I can do that, and I may get one or two responses.”

Examining the Need for Collaboration. Collaboration in online learning is valuable for more than support. Distance education research also illustrates the importance of collaboration in the social construction of knowledge. Studies by Gunawardena, Lowe & Anderson, (1997); Kanuka & Anderson (1998) and Garrison, Anderson & Archer (2001) illustrate the importance of socially constructing knowledge online. However, in a study by Gunawardena, Plass & Salisbury (2001) the authors questioned whether collaboration is needed for learning online. In the present study, learning appears to have resulted from both visible discussion with others in the group (messages posted by participants for all to read) and non-visible participation in the online group by reading messages without posting. The various discussion groups in the eMSS program provided opportunities to learn by causing

participants to interact with each other. Speaking in an interview about learning in eMSS group discussions, Mary responded,

And it's also really nice that if I was in a situation where I had questions or a predicament in the classroom concerning either a student that wasn't sure how to make a connection with the subject matter or, needed some ideas on the material to be covered that I could post the question and get information an assortment of people from different perspectives.

Kanuka & Anderson (1998) noted that participants in an online program gained knowledge even though their participation was limited. In the present study, beginning teachers expressed gaining knowledge from the reading and reflecting on thoughts of others without posting. One case study participant read over 1100 messages in the course of the second academic year of the program. Non-visible learning can be illustrated by this participant's assessment of her situation without a regular classroom (while substitute teaching) in a Pair Place posting, "Considering my situation I will not be able to contribute in any positive way to the discussions or even ask probing questions. What I can do is to gain from the postings of others so when my situation changes I will be better prepared to teach." In online discourse and interviews, evidence of her gain in awareness of self, student culture and learning characteristics, as well as knowledge of application of strategies for respect was clearly seen.

While learning by the participant above was not visible to her online peers, other case study participants were more visible online. Many online messages contained acknowledging remarks, such as one case study participant's remark about an activity for classroom respect, "Thanks for a great idea, my kids love to use "big"

words and that'd be a great one to teach them.” Much of the visible participation happened when participants engaged in extended discussion threads, as several participants did regularly. All participants posted dialogic messages with mentors in Pair Place, seeking input on classroom strategies they tried and discussing ways to improve. Jennifer described her Pair Place relationship in this interview remark,

I guess the true description is that it's collegial. She and I have said to each other that we share ideas as much as I get material from her. There are some specific things that I've asked her about and she's always been great to give them to me, and I feel no reluctance to say I have no idea, I'm totally stuck about this, or do you have a website where I could look for that.

Reading or posting in a group discussion does not necessarily lead to learning. Stacey's (1999) research provides evidence that collaboration is important, especially for strategies and ideas, but participant learning can be independent of the group, regardless of the level of visible participation. Evidence of this type of learning was seen in a participant's remarks: When talking about the Diversity Module discussion during an interview, she said, "...the Diversity Module, they're helping, they're good thinking, but I think I'm often doing it on my own.”

Collaboration Helps Build Confidence. As they gain experience, beginning teachers are more comfortable participating as a peer in the online community (Hara, Bonk & Angeli, 2000). This can be seen in comparing beginning teachers. The two case study participants who expressed increased confidence most often posted resources for the learning of others. For example, one posted the following strategy for increasing awareness of student culture, “I do an activity with my 6th graders that comes from the TRIBES book called sharing from a sack....” In the Diversity

Module, six of one case study participant's fifteen messages were coded as lecture (a statement from knowledge or experience providing information as a resource to others). Five of another participant's six Diversity Module messages were also coded as lecture. However, the participant with the third highest number of posted messages posted only one lecture message, and no other case study participants posted any lecture messages. Thus, participants who expressed increased confidence in their ability to work with other teachers as peers, but not as often as the two cited above, posted fewer messages that provide learning resources for others.

Evidence of a change in confidence as induction progressed is provided by several beginning teachers whose messages express more confidence and also provide help for others. An example of this change is seen by comparing one of Katie's early messages in the Pair Place discussion in year one, "I'm hanging in there... Any chance of a demo of the turkey gun in Bozeman? I haven't a clue what you do with it and my physics students are curious too," to one from late in year two, in which she confidently expresses her knowledge of awareness of student culture in the Diversity Module discussion, "I think that as a teacher we can and should strive to understand where our students are coming from, but also I think its might be important to accept that we may never quite be able to comprehend or totally relate to what any student is going through in life."

Strategies

Strategies help a teacher enact a beginning repertoire by providing information for representation of material for student learning, and by providing a

base for selection of methods. In multicultural education research, Mariage & Garmon (2003) cite the benefit of providing pedagogical resources for improving teacher practice. In Valencia & Killion's (1988) study, they found content-based resources helped teachers improve minority student achievement. All of the case study participants discussed classroom strategies at some point.

Whether or not the resources came from the eMSS program, all participants cited resources and strategies as helpful. As Martha reported on the value of online resources in an interview, "One of the things that I have used quite a bit are the resources online...I have several sites set up in my bookmarks, math sites that I got from that material, which I would not have had time to seek out and evaluate and do all that myself." She also reported on the values of local sources of strategies, "I have tracked down our Native American studies teacher and asked her for a list of clans. I'm excited to try it!" Interviews with participants and their mentors provided evidence that classroom strategies were very important for representation and selection of methods.

One participant spoke of her growth in understanding of these categories of pedagogical content knowledge through strategies provided by her mentor and others,

He (mentor) has really helped me to be a better teacher. I like the way he does so many neat activities. Last year I thought, man, I could never be that kind of teacher, but this year I am starting to think, yeah, it's a possibility. Some of the activities he has done I have done in the classroom. And not just him, some of the other mentors have had good activities as well.

Several participants credited their mentors and others for helping them develop the knowledge of adapting strategies for student learning, whether to meet the cultural

needs of students or student knowledge level. One participant, who was new to teaching mathematics content, reported increasing her knowledge of adapting content teaching, “These management tips that are different for a math class... I just felt like things tightened up because of some of the tips I got from people in the program.”

Pedagogical content knowledge strategies were a major component of the eMSS program. Case study participants cited the benefit of these strategies to their ability to represent material and adapt methods in addition to providing a larger pool from which to select methods.

By the end of the second year of eMSS participation, beginning teachers were expressing their ability to adapt instruction because of an increase in knowledge of the main ideas and representation of teaching and of teaching specific content. As one participant wrote in a second year Pair Place posting, “The lab I would like to do is a modified lab from a... lab manual. I am going to be working on this today and I hope to do the lab on Thursday.” We can draw a parallel to Luft, et al’s (2001, 2002) research here. In Luft et al.’s study of the ASIST induction program for science teachers, she contends that increasing use of inquiry activities such as adapted labs indicates an improved science teacher. This participant posted often about using and adapting labs in her second year of eMSS participation.

Examining the discussion about adapting strategies shows a link between the pedagogical content knowledge category of adapting strategies and multicultural education. All participants expressed a need for culturally relevant classroom strategies. The participants who expressed the greatest cultural awareness also

showed the greatest level of understanding of strategies for diverse students and how to apply them. The increase in categories of pedagogical and pedagogical content knowledge, coupled with a high level awareness of student culture and learning characteristics is linked to the adaptation of teaching strategies for diverse students.

Martha exhibited a synthesis level of awareness of student culture when she wrote of her mentor-assisted adaptation of classroom strategies for her students,

Right now we are studying pre-algebra concepts, adding like terms, that kind of thing, Charlie suggested that I use instead of adding like terms, have the different clans, and then have the students that are all from one clan go together and say, OK, how many people are in this clan, and then try to relate it to the culture that way.

One participant described the way program participation benefited her repertoire of strategies, “And just the ideas, the ideas are fabulous, I have a nice little file of ideas to use... in the classroom.” Like this participant, all of the case study participants reported that strategies and resources provided in eMSS curriculum activities or discussion helped them improve their teaching.

Distinctive Findings

Mentoring by Pair, but Within a Larger Group is Effective

Mentoring is cited as an avenue to allow beginning teachers to make the experiences of their mentor their own. Feiman-Nemser, Parker & Zeichner (1993), caution that this may not always be preferred; they found that mentors promote their own practices, possibly limiting reform and growth by the novice teacher. The structure of the eMSS program reduces this problem. Each mentee is assigned a

mentor, which could lead to the limits described by Feiman-Nemser, Parker & Zeichner. However, the collaborative network of mentors and mentees working together in learning groups provides different points of view for the beginning teacher. One mentor specifically addressed the concern of his potential to limit the growth of his mentee. He actively encouraged her to collaborate with others in order to explore teaching strategies different than his own. He reported that the collaboration was successful,

All of our communications last year, the meetings that we had, working with peers in the mentoring program, all of that together has given her a broader perspective, a broader view of the world, she didn't get locked into any one thing, it kept on giving her new ideas to think about and try.

In a sense, eMSS beginning teachers have the best of both worlds: A mentor who teaches a similar subject and grade level, and a community of mentors and mentees offering differing views, resources and sources of support.

Several case study participants reported that a valuable component of the online eMSS program is the variety of ideas and experiences available from a number of mentors and fellow mentees. One wrote about obtaining ideas from others,

With the mentoring program, every time that there's something else posed, it makes me reflect on what I do and what I think about a certain issue, versus if I didn't have that exposure at all, then I'd probably just flail along and not really make those adjustments and think about issues.

Her mentor also reported that she gained ideas from others,

I think just having somewhere to go to get questions answered whether it be me or someone else, I think she just gets in there a lot and, like a lot of the mentees, get in there and read a lot of stuff and then if you can use it great, and if you can't you can't, and if you have time to email or call somebody, she does.

Another mentor provided his mentee with help in her classroom practice, particularly in the area of representations of material by helping her with science teaching strategies. The case study participant remarked on the great benefit her mentor was to her development as a teacher, “I think he has had a really big influence on how I teach. Ray is such an interactive teacher, he was always into inquiry-based activities. So, he has given me opportunities to be that kind of teacher.” Conversely, when asked about influences on her teaching, the mentor mentioned collaboration with the larger eMSS group. In addition to gaining ideas and help from him, he reported that she obtained different viewpoints from the larger eMSS group,

...new ideas, different views, I know a number of times when we have had our dinners, she would be in a group of people talking, discussing different strategies and ways of doing different things.

Mentors and mentees may view their contributions in different ways, but all case study participants cited the positive benefits of an individual mentor in addition to the collaborative group.

Online Mentoring Helps Alleviate Teacher Isolation

Many teachers in Montana are isolated because they are the only teacher in their subject area in their school. Even teachers in larger schools are sometimes isolated with non-collaborative fellow teachers. In a Pair Place discussion with her mentor, one case study participant lamented about the lack of help and cooperation she was receiving from fellow math teachers in her school. All four of the case study participants with less than three years of teaching expressed their feeling of geographic isolation and that it was relieved through participation in eMSS. Teresa

reported in an interview that collaboration with peers relieved her geographic isolation, “you know so I’m not by myself, you know, in this strange and new situation.” Another reported how her mentor helped with her feeling of isolation,

I’d have to say that my relationship with (mentor) has had a profound effect on how I teach because I feel really isolated, where I’m teaching as far as having contact with other science teachers, people interested in science. So the contact I get through this program is probably what’s sustained me so far on teaching. Honestly, I don’t know that I would have stuck with it.

Personal Experience May Be Hard To Overcome

Constructivist learning theory describes learning scaffolded on existing knowledge. eMSS participants draw on their own experiences when learning about diversity in education. When they learn about their own culture and reflect on experiences, existing knowledge can be very powerful in helping them grow in multicultural education practice (Larke, Wiseman & Bradley, 1990; Salzman, 2000). Multicultural education research also examines teachers’ resistance to changing teaching practice for diverse learners (Lukyx, Cuevas, Lambert & Lee, 2005; Stodolsky & Grossman, 2000). In Stodolsky & Grossman’s study, resistant teachers explained that teaching diverse students was not their job. A similar situation was seen in the present study, in the Diversity Module discussion in which two experienced teachers agreed that all students should be taught in the same way. Conversely, success in multicultural professional development has been shown in studies by Stodolsky & Grossman (2000) and Agbo (2001), when teachers become aware of cultural differences and training helps them develop strategies to meet diverse student needs.

What is not clearly examined in research is the existing knowledge, sometimes misconceptions, about multicultural teaching that teachers can bring to professional development. Case study participants described having witnessed discrimination based on ethnicity or culture. This experience seemed to cause them to focus on avoiding discrimination in their classrooms rather than culturally responsive strategies to promote student learning. The problem in the eMSS online professional development was that many participants were so focused on discrimination and fairness that they had trouble relating to the need for change in application of strategies for diverse student learning. Evidence supports that some of the case study participants were able to understand the need for culturally relevant curriculum and to make changes in their classroom practice. An example is the case study participant already discussed who designed a lesson on number manipulation around students' clans.

Two experienced teachers in particular had difficulty embracing the idea of the need to provide culturally relevant instruction. Based on a self reported lack of cultural awareness, they perceived culturally relevant instruction as unfair to some students. Even though these two mentors were not part of the case study, because of their comments in discussion, I interviewed them after the Diversity Module concluded to learn their thoughts on culturally relevant teaching. In these interviews, one of them did relate an increased awareness of student culture and learning characteristics, "I guess reading about all of the different classrooms and the things they face and the solutions to those concerns was very, very enlightening." She

expressed difficulty in changing her long held perception, but was more understanding of student needs for respect and learning, “My thought always has been, I don’t even know who they are, everybody’s a student, everybody’s equal, and that’s the way I progressed. And maybe (now) I would be a little more aware and might do something different with some of those kids.”

Statements by the same mentor indicated that she believed adapting instruction had to do with reacting to learning problems rather than proactively attempting to enhance learning, “I guess if there were problems, I would maybe consider this (diversity) a reason, or something to deal with, more than I have in the past, to help solve a problem.” The students in this teachers’ community are all white and of similar socio-economic status. I wonder if her awareness and subsequent strategies for adapting for students would change with exposure to diverse students.

Online Learning May Happen Without Being Observed by Others

Kanuka & Anderson (1998) reported gains in knowledge by participants in online learning environment even when learners did not show cognitive change. The instrument Kanuka & Anderson used for analyzing online discourse, developed by Gunawardena, Lowe & Anderson (1997), originally indicated optimal learning when participants replaced existing knowledge with new ideas (cognitive change).

Gunawardena, Plass & Salisbury (2001) reported a lack of online learning without active participation. In the present study, most case study participants did not participate as actively as they reported they would have liked. With the exception of

one, each case study participant related (in interview) regret for not participating more visibly, for example, by posting messages. However, all of these participants reported significant learning about teaching practice. They attributed learning to reading, practicing strategies and reflecting on experiences and thoughts posted by others on the eMSS site.

Invisible learning, or reading and not posting, is an important issue in education, it is seen in face-to-face as well as online instruction. This concern should be studied in both types of instruction. In this study, learning by non-posting participants was informed through interviews. An online instructor may not have the opportunity to interview students, thus may have no way of conducting formative assessments of learning. Other types of evidence of online learning may be provided (journal, summaries, etc.), but without any proof of reflection, assessing learning may prove troublesome.

In discussion, many resources are provided which induced thinking about classroom practice applications. One mentor, in the Diversity Module discussion illustrated this in her posted request, “PLEASE post your ideas for student activities here as well as in the Pair Place. I learn so much from all of you--I'd love to be able to hear from ALL of you.” This participant’s mentor reported on one way in which she learned online, “She learns a lot from just going online and reading what everybody else writes.” When a teacher reads a book, he or she may learn, but evidence of learning is not apparent until assessed. We see the same situation in online learning by reading resources in discussion areas. Learning about aspects of

teaching may have been taking place, but was not visible in discussion. In interviews, case study participants reported on their learning, even though they did not share their learning through postings. As one participant, who posted infrequently said, “Not only does it [eMSS] give me the resources, it also encourages me to change and to be more exciting and to do things for students, to make learning easier and more successful for my student population.”

Summary

My research questions ask if beginning teachers who participate in an online mentoring program can increase their cultural awareness and subsequently adjust their practice. Evidence supports teachers’ increased cultural teaching competencies through various means including curriculum based online professional development, collaborative discussion, and learning from sources outside of eMSS. The case study data suggests that beginning teachers learned about cultural awareness and practice in different ways. Regarding cultural awareness, four of the five case study subjects attributed their increased cultural awareness to participation in eMSS Diversity Module activities. They cited the module curriculum as successful in three areas. First, they increased awareness of their own culture and student culture. They increased awareness of student learning characteristics and how to adapt for them. Finally, they cited the benefit of their reflection about teaching practice. They cited the collaboration with mentors and peers in the module with helping them develop

their understanding of the importance of awareness of their own and their students' culture.

All case study participants described learning about classroom practice regardless of the level of their participation in eMSS. However, not all participants learned about culturally relevant classroom practice to the same degree. Those who expressed high level (synthesis) awareness of self and student culture progressed to developing strategies for respect and learning for their students. Developing strategies for respect and student learning was attributed to a number of sources, both within and outside of eMSS. Although case study participants did not discuss culturally responsive classroom practice experiences online in great depth, some of them, along with other eMSS participants were describing and reflecting on strategies by the end of the module activities.

In general, the case study beginning teachers learned about improving their teaching practice in ways that suited their individual needs. At first, they expressed the need for general pedagogical knowledge. Subsequently, they described gaining knowledge in this area. In the second year of the program, case study participants evolved from asking for classroom activities to add to their available repertoire to asking for review and guidance on activities they developed and adapted to help their particular students learn science and mathematics.

Although they did not express their need for personal support early in the program, case study participants expressed increased teaching confidence in instruction and representation of material because of the support they received from

their mentors and peers. The method of learning varied with the person, including reflection, dialogue, reading and absorbing and, of course, trial and error. Most participants expressed learning through a combination of these methods.

CHAPTER 5

CONCLUSIONS

The following quote has been on my wall for the past two years. I found it in a newspaper article, which quoted Darrel Kipp, a Native American educator on the Blackfeet reservation in Northwest Montana, “Standardized tests are great for standardized kids, but our kids aren’t standard kids.” Dr. Kipp’s quote sums up the essence of multicultural education: teaching, testing and classroom practice should take into account the culture of the student to help that student learn to the best of his/her potential.

Almost three fourths of the teachers in Montana are in isolated communities. Many of the schools in these communities have only one teacher for all secondary students in science and mathematics. For this reason, many of these districts do not have a locally available mentor prepared to help beginning teachers develop their understanding of teaching science and mathematics content to their students. The daunting task of being a beginning teacher in an isolated community is compounded by the large number of diverse students these new teachers may have in their classrooms. Teachers may experience difficulty understanding and meeting the unique educational needs of students from cultures different from their own. The online format of the eMSS induction program at the center of this study provided isolated beginning teachers with a knowledgeable mentor and curriculum based learning opportunities to help them meet the needs of their diverse students.

A module of the eMSS program, designed to help teachers improve their classroom practice for diverse students was available during March and April of 2005. The study examined learning of teachers who participated in that module from two perspectives. First, I analyzed the discourse of all messages posted by participants in the Diversity Module. Second, I conducted a comprehensive case study of five Montana beginning science and mathematics teachers with diverse student populations. The case study consisted of an analysis of the online discourse spanning 1-2 school years, and personal interviews of the five teachers and their mentors. The case study was designed to examine participants' teaching competencies in two areas: The ability to teach diverse students, and, their understanding of pedagogical and pedagogical content categories of teaching.

A key component of educational equity is the teachers' cultural awareness with respect to their own experiences and those of their students (Black & William, 1998; Brickhouse, Lowery, & Shultz, 2000; Koba, 1996; Malloy & Jones, 1998; Solana-Flores & Nelson-Barber, 2000). Facilitating awareness in teachers and providing appropriate instructional resources may increase academic achievement for diverse students (Rothstein, 2004). This study examined the beginning teachers' awareness of their own culture and student culture, and their interest in and ability to adapt instruction for diverse students. I also examined their change in understanding of categories of pedagogy and pedagogical content knowledge.

Discussion of Teacher Growth

As delineated in the induction section of chapter two, categorizing teacher growth accurately requires standards for comparison. Several standards were developed and/or applied in this study. To understand change in *knowledge* of teaching diverse students, I synthesized a graduated framework of competencies gleaned from previous research findings. This framework served as a standard to categorize the learning by participants in key areas of multicultural education. I also developed a series of standards to observe change in *teaching competencies*. I developed a framework of competencies for pedagogical and pedagogical content knowledge based on Shulman's (1987) components of pedagogical knowledge. I applied both of these frameworks during analysis of dialogue among participants to identify the types of learning taking place or absent, providing a reliable interpretation of the findings.

I examined discourse from the two years of program involvement by the case study participants (one year for Jennifer). There was ample evidence of participants' growth in categories of teaching practice over the course of their participation. In interviews, participants attributed their learning to the eMSS program, personal experiences, and local learning opportunities that were integrated with the eMSS learning process.

The Diversity Module served as one learning tool for study participants. Examining dialogue among participants provided information about the effectiveness of the Diversity Module curriculum and facilitation, as well as about the online

learning from the module. This analysis provided evidence that the module curriculum helped teachers set in motion the process of becoming better multicultural teachers. Because participants did not complete module activities, progression to the synthesis level in all multicultural teaching competencies was not seen.

The Diversity Module

The evidence indicates that participants in the Diversity Module gained increased awareness of their own culture and the culture of their students. Some participants entered the module experience with a moderate level of cultural awareness, and some with very modest awareness. For most, their level of awareness was increased. In this regard, the module was successful. However, there was little evidence that participants made the connection between cultural awareness and culturally relevant classroom practices for student learning. Participants developed and discussed activities for nurturing respect for all students, but provided little evidence of developing strategies for enhancing learning by diverse students.

Participating mentees who showed the highest levels of multicultural competencies in the Diversity Module had additional avenues for learning about related issues. Some also had significant first hand experiences with diversity issues (primarily related to discrimination) before teaching. Several participants worked in schools in which the population of diverse students was large, and local administrators and community members helped them in their culturally relevant classroom practice. One case study participant benefited primarily from her match

with a mentor with eight years of experience in a reservation school with students whose culture was similar to her students' culture.

The findings suggest that the online Diversity Module in its present form does not maximize teacher growth in meeting the learning needs of diverse students. One reason for this is that participants did not complete the module activities. In the eMSS program, participants are allowed to migrate to different modules or discussion areas as their needs and time constraints change. Thus, some participants whose needs, interests or time availability changed did not complete all module activities. And since the eMSS induction program serves a wide range of needs for beginning teachers, devoting more than the eight weeks of program time to a module on diversity may not be feasible. Later in this chapter, I provide recommendations to address the concerns raised here concerning the Diversity Module.

Participants' New Understandings

Seven focus questions guided examination of the data for understanding case study participants' growth. These focus questions were grouped together to identify the content of the participants' learning, the process by which they learned this content, and ways in which the participants' new understandings were integrated into their classroom practice with diverse students. The next sections summarize conclusions about learning by case study participants.

What Are They Learning?

Beginning teachers in this study increased their understanding of virtually all aspects of pedagogical knowledge, as delineated earlier in this study (p. 168) based upon Shulman (1987). Through online collaboration, they increased their understanding of the use of strategies to help their students learn science and mathematics concepts in a more meaningful way. By increasing their cultural awareness, teachers began to adapt their classroom practice to meet the unique needs of diverse students.

Pedagogical Knowledge. Case study participants increased their understanding and representation of the main ideas of teaching. Participants new to teaching when starting eMSS expressed the need to increase this knowledge with questions beginning with, “How do I...?” Evidence shows they received and began to process and apply the requested knowledge. As a sign of their increased understanding of the complex nature of teaching, participants showed increased abilities in virtually all aspects of pedagogical knowledge. My findings indicated the beginning teachers’ knowledge of classroom management issues improved. Most of the cases showed improvement in adapting instruction for student differences and needs, and, to a lesser degree, reflecting on teaching and evaluating instruction. Participants did not master all categories of pedagogical knowledge, but increased sophistication in their knowledge was evident.

Participants did not all exhibit the same level of mastery of pedagogical knowledge. The main area of differentiation was in adapting instruction for student

differences and needs. All participants demonstrated improvement in adapting overall instruction as their increased knowledge in teaching comprehension and representation allowed them to recognize and correct inadequacies in their teaching practice. Adapting instruction is a more complex pedagogical knowledge aspect. To adapt instruction for student learning characteristics requires knowledge of instructional methods and how to use them, in addition to understanding student learning characteristics and how to meet them. Few participants demonstrated the ability to adapt instruction for diverse student learning characteristics. Some teachers were unable to master this aspect of teaching, while others demonstrated progress. Participants' level of understanding of student learning characteristics can account for the difference. Those with a greater awareness of student culture and learning characteristics demonstrated a greater ability to adapt instruction according to student characteristics and learning needs.

Pedagogical Content Knowledge. Early in their eMSS participation, beginning teachers expressed little need for pedagogical content knowledge assistance. Once they began showing evidence of more understanding and confidence in their general pedagogical knowledge, they shifted their focus to improving their practice in teaching science and mathematics. Jennifer is a good example of this because even though she was an experienced teacher, she was new to teaching mathematics and entered eMSS expressing a need for pedagogical content knowledge.

Similar to their expressed needs for assistance with very basic categories of pedagogical knowledge, such as establishing an initial classroom management system, participants at first expressed needs in very basic categories of pedagogical content knowledge, such as help in their own comprehension of main ideas and strategies for representing the material. Most gained this knowledge from collaborative online discussion with their mentor, other mentors and fellow mentees. Growth in pedagogical content knowledge was evident in all participants as they went from initially asking for ready-made resources and strategies to asking for review and input on teaching strategies they had developed and/or adapted for their classrooms.

The findings demonstrated a link between participant growth in adapting instruction according to student characteristics and needs, and competencies of multicultural teaching. Case study participants learned to adapt science and mathematics instruction in relation to their increasing awareness of the learning needs of the students in their classrooms. Participants became increasingly aware of the cultural basis of those learning needs.

Multicultural Teaching. Participants initiated or increased their understanding of multicultural teaching through participation in the Diversity Module. Learning was enhanced when participants were able to relate it to previous experiences and outside (of eMSS) opportunities. The one case study participant who did not participate in the Diversity Module learned multicultural teaching strategies from local community members, but illustrated little awareness of student culture and learning needs. Those that showed the greatest levels of multicultural teaching competencies participated in

the Diversity Module and had personal experiences that shaped their awareness before they started teaching. However, personal experiences were not a prerequisite to growth in multicultural competencies.

Awareness of self, and more prominently, awareness of student culture were the keys to achieving the highest success levels in categories of multicultural teaching. Examination of Diversity Module discourse and interviews confirmed increased awareness of student culture. Those participants who expressed the greatest level of understanding of self and student culture also showed the highest levels in other categories of multicultural teaching.

Participants who did not report previous cultural awareness did exhibit increase in their level of success in several categories of multicultural teaching, primarily in awareness of student learning characteristics and application of strategies for classroom instruction. Most teachers participating in the Diversity Module discussion expressed an awareness of applications of strategies for respect in the classroom. This awareness may be based, in part, on a number of previous discriminatory experiences they introduced in discussion.

In addition to Diversity Module participation, several of the teachers showing growth in applications of teaching strategies to promote diverse students' learning had outside (of eMSS) opportunities for growth in these specific applications. Guidance and strategies from knowledgeable local peers, administrators and community members were available to several teachers. Participants that illustrated the highest competency levels in multiple categories of multicultural teaching learned

from a combination of Diversity Module participation, local resources and first-hand experiences.

How Are They Learning Online?

Previous research suggests that online learning happens through active collaboration in online dialogue (Gunawardena, Lowe & Anderson, 1997; Henri, 1992; Kanuka & Anderson, 1998). In this study, there were three avenues of online collaboration in which participants learned: with their mentor, within a learning group, and with fellow beginning teachers. Participants were involved in these areas, but their engagement may not have been visible to others. In interviews, participants reported reading ideas in discussion areas and either not posting a response or posting a message about the topic in another discussion area (such as Pair Place). Often, collaborative discussion was initiated by a prompt taken from eMSS curriculum, or from a resources or strategy posted by another eMSS participant.

In the Diversity Module, the curriculum provided a resource for learning through journal article reading and information provided by module developers. The reading in the Diversity Module served as a starting point for discussion by the learning group. In subsequent discussion, message authors shared resources related to the concerns presented in the reading. Fifteen percent of the messages posted in the Diversity Module discussion described resources for classroom use. Case study participants cited the sharing of resources as beneficial to their teaching practice, although few of these beginning teachers posted responses or participated in discussion. The teaching competencies affected by sharing resources and strategies

were representation and selection of methods. In the area of multicultural education, the sharing of resources and subsequent discussion was significant in adding to the teaching repertoire of strategies for creating respect. Examination of participants' discussion of these strategies revealed evidence of learning about diverse student culture and learning characteristics.

Group Collaboration. Researchers (Hara Bonk & Angeli, 2000; Henri, 1992) cite the development of a collaborative group as beneficial to online learning. Hara, Bonk & Angeli contend that a collaborative group is developing when participants respond to the thoughts of peers rather than just responding to a facilitator. In the Diversity Module discourse, over 60% of the 160 messages contained acknowledgement of the thoughts of others. Only 12 messages were coded as initiating dialogue (facilitators posted nine of these). The large percentage of acknowledging messages, coupled with the small number of facilitators' initiating messages, indicates participants were responding to the thoughts of peers in the group, illustrating a collaborative environment.

Several participants cited the benefit of reading the thoughts of others. One participant, Mary, read a large number of messages over the course of the academic year (over 1100) while posting relatively few. While not participating by posting messages, Mary benefited from the development of strategies and ideas through the collaborative discussion of others. In interviews, she attributed reading the messages as part of her growth in several aspects of teaching, particularly in awareness of student culture and application of strategies for respect in the classroom. Her

responses to interview questions confirmed her knowledge of these categories of multicultural teaching.

Non-visible learning, in which participants read messages but do not post is an important issue to online learning. Studies are warranted concerning non-visible learning in online as well as face-to face instruction. Non-visible learning is also important in face-to-face instruction, being analogous to students who learn but do not participate in classroom discourse. Choosing not to participate in online discourse by not posting messages may not be fair to other participants who are posting their thoughts for the group. In addition, facilitators may not be able to accurately assess learning by non-posting participants. For those participants unwilling to post messages, an instructor may require a journal or summaries that provide evidence of learning.

Collaboration With Mentors. Mentors played a significant role in the growth of participants, particularly in categories of pedagogical and pedagogical content knowledge such as comprehension, representations and creating a functional learning environment. Mentors related experiences, and contributed knowledge and guidance in response to needs presented by mentees. Mentors provided pedagogical knowledge strategies for instruction for their mentees early in the program. Mentor-mentee collaboration evolved to mentors providing feedback on strategies developed by mentees by the end of the second year of participation.

Throughout the program, mentors provided personal and emotional support as needed by mentees. As one would expect given the large body of participants in

discussion areas in eMSS, mentees shared personal problems online in the Pair Place they shared with their mentor. Mentors often acted as counselors, offering support for personal problems and difficulties encountered in the mentees' school. Case study participants all proclaimed their relationship with their mentor as one expected to last after eMSS participation.

Collaboration With Peers. Case study participants expressed their learning from peers (other mentees) primarily through sharing of resources for classroom strategies and adaptations, such as the sharing and discussion of strategies for fostering a classroom climate of respect for others in Diversity Module discussion threads two, five and six. Another benefit of collaboration with peers is the mentees' membership in a professional community of educators. Given that one of the criteria for selecting teachers as cases was the isolated nature of their teaching environment, it is significant that camaraderie among the mentees was a common theme expressed by these teachers. Simply sharing stories and concerns provided isolated teachers with the knowledge that someone shares similar concerns, experiences and challenges. Each of the case study participants cited sharing with peers as an important factor in relieving their feeling of geographic isolation.

How Does New Knowledge Relate To Classroom Practice?

All participants perceived respect for diversity as important and worth the effort to achieve. Diversity Module participants benefited from sharing resources and strategies for classroom practice in online discussion. At least 25 messages posted in

the Diversity Module described strategies, most for developing rapport with students and establishing a respectful classroom. In general, strategies did not address any specific cultural group of students.

Several experienced teachers entered the Diversity Module with knowledge of strategies for allowing teachers and their students to get to know one another better as individuals. These activities did not focus directly on the students' or teachers' cultures, yet represent a first step in relationship development. One type of strategy involved activities designed to allow teachers and students to gain familiarity with each other, such as the "two truths and a lie" activity. The other type was designed to build rapport with individual students and especially at risk students. An example was the "2 x 10" strategy, in which a teacher spends two minutes talking with one student each day for 10 consecutive days.

The findings provided little evidence of strategies for adapting classroom learning for diverse students. Part of the reason for the visible discrepancy between the amount of dialogue about strategies for creating positive and respectful relationships in the classroom and strategies for enhancing the learning of a diverse student population is due to the nature of the Diversity Module curriculum. The curriculum prompted participants to share their current strategies for building respect, without further piloting or refinement, but to first develop and test strategies for supporting learning before reporting on them. The development of strategies for student learning activity was in the later part of the module schedule and many participants did not complete this activity. Several beginning teachers participated in

this activity and described strategies designed to increase learning by female students in science classrooms by altering traditional gender roles in group work. Evaluation of these adaptations centered on the process of learning, indicating that students were more on task and involved in classroom activity. There were no reports of evaluation of student learning outcomes.

Beginning teachers who coupled a high level of awareness of self and student culture with strategies for adapting instruction shared or guided by knowledgeable mentors exhibited the most comprehensive gain in knowledge of application of strategies for diverse students' learning. Teresa applied strategies to make learning of math concepts culturally relevant for her students. Her first reported attempt was not successful, but her second effort did succeed. Awareness of student culture was the key difference in the success of the activities. The first attempt was unsuccessful because she asked students to manipulate objects in nature and she was unaware that the objects were considered sacred in the students' culture. A local community member with awareness of student culture led the second, more successful activity. In the community member led activity, Teresa learned through observation some initial lessons on adapting instruction for her students' culture. Increasing her awareness through this experience may allow her to adapt instruction on her own, thus increasing her effectiveness in the classroom.

Martha expressed a relatively high level of awareness of the culture of her students. She adapted a mathematics lesson to make learning more relevant to them, and her mentor gave her advice to make the adapted lesson more meaningful. She

expressed her understanding of the benefit to her students by the change suggested by her mentor. Like Teresa, she reported that the classroom activity was successful due to the increase of student interest and time on task.

All case study participants reported improving several aspects of their knowledge of helping their students learn science or mathematics. Each of them provided evidence of an increased knowledge of representing the main ideas in their subject areas in ways that communicated to their students. Several participants grew in their understanding of how to adapt lessons and materials for their students, and in their ability to reflect on teaching. This growth was most evident in the increased ability of beginning teachers to adapt instructional strategies to fit the existing knowledge and learning characteristics of their students.

Recommendations for Educators

The recommendations for educators that follow focus specifically on developing or facilitating online induction for beginning teachers of diverse students, and also touch more broadly upon distance education, induction and the preparation of teachers of multicultural students.

Sharing Strategies

Beginning teachers perceived resources and strategies for teaching core science and mathematics concepts as highly useful. This perception included both pedagogical and pedagogical knowledge classroom applications. Thus, educators would do well to provide classroom strategies for specific classroom needs such as

adapting science lessons for specific students' cultural understanding. However, a word of caution needs to accompany this recommendation. A mentor teacher's classroom experience does not guarantee that he/she understands the best ways to apply strategies in the beginning teacher's classroom. Teachers may learn to adapt classroom strategies through trial and error. To make beneficial changes to tested strategies requires the teacher to evaluate his/her instruction using a complex knowledge of teaching competencies such as comprehension of main ideas and adapting for learner needs. Findings in this study provide evidence that many beginning teachers do not possess this complex understanding of teaching to evaluate strategies. Discussion with mentors and peers provided beginning teachers information about classroom strategies using the complex knowledge others possess. Online discussion of how to adapt and apply specific instructional strategies was reported to be successful in helping beginning teachers adapt strategies independently.

A previous study of culturally relevant teaching cited the development of strategies by teachers as increasing the likelihood that they will apply culturally relevant practices in the future (Lukyx, Cuevas, Lambert & Lee, 2005). The findings from my study support the findings from this earlier study. Mentors and mentees alike stated that the discussion in the Diversity Module of "lessons learned" as group members piloted original classroom activities deepened all participants' understanding of when and how to apply new strategies in their own classrooms. In addition, these discussions were beneficial to the growth of participants' teaching

repertoire. These findings indicate that there is value in providing strategies online because it is one way to increase the repertoire and knowledge of beginning teachers whether they are simply reading and reflecting or also posting messages. eMSS participants indicated that they learn by reading online. Thus providing more strategies and ideas for them to read may increase their learning.

The potential for adding to the repertoire of a number of teachers is great. eMSS participants posted 9307 messages, but read 141,297 over the course of the academic year. One way to interpret these numbers is that each message posted was read by over 15 participants (141,297 read / 9307 posted). A more accurate interpretation keeps the uniqueness of Pair Place postings in mind. Approximately 3900 of the messages were posted in Pair Place, and would be read by only one person (eMSS staff messages read and posted are not included in this account). Assuming each Pair Place message was read by only one person, the mentor or mentee's partner, the 5400 messages that were posted outside of Pair Places correspond to the 137,000 messages read outside of Pair Places. This implies that messages posted outside of Pair Place were read, on the average, by 25 participants. Thus messages containing classroom strategies were potentially read by a large group. Mentees may benefit from reading about, or actively discussing, strategies shared by their mentor or by other members of the online community.

Mentor-Mentee Relationships

Current mentor-mentee pairs were matched according to their subject areas and grade level(s) taught. An additional pairing criterion, perhaps second to subject

area, could be the types of student diversity in the mentees' and mentors' classrooms. An induction program can easily find the ethnic and cultural makeup of any school online, or request this information from program participants. Using this information during the matching process may result in beginning teachers being paired with a mentor with pertinent experience.

A mentor-mentee pair relationship provides support and guidance for a beginning teacher, but adding access to a larger group increases the opportunity to examine new and varied ideas. Feiman-Nemser (2001) cautions that taking in the experiences of one mentor by a beginning teacher can limit the beginning teacher's professional growth. Having a diverse group of teachers available to provide different experiences and perspectives in discussion in the eMSS program served to address this concern.

The "hybrid" nature of the eMSS mentoring program is an important aspect to take into consideration by those planning induction programs. Mentors provided a number of different types of support to mentees (personal support, pedagogical knowledge, and pedagogical content knowledge). Mentees cited this support as very useful in contributing to their confidence in their teaching practice. Beginning teachers cited mentors as important in helping them develop classroom strategies and the confidence to try something new in the classroom. Each of the case study mentees also cited collaboration with peers as a way to relieve the feeling of isolation and increase their confidence as a teacher. Combining a one on one mentoring

relationship with a collaborative group provides increased opportunities for beginning teachers.

Helping Teachers Develop as Multicultural Educators

This study showed that teachers exhibit the highest level of competency in adapting learning opportunities for their diverse students when they also exhibit a high level of awareness of student culture. Online learning as it was presented and facilitated in the Diversity Module was not enough to develop the full potential of beginning teachers to support the learning of diverse students. Formative experiences (either as adolescents, before teaching, or early career) were a major contributing factor for those who moved along the continuum from preliminary knowledge to readiness to apply principles of multicultural education in the classroom. Martha and Jennifer reported experiences with diverse cultures as adolescents, and they cited this as initiating their awareness of self and setting the stage for awareness of student culture. Teresa's and Martha's teaching experiences illustrated that local educators and/or community members can help increase teachers' cultural awareness for those with or without previous experiences.

Multicultural education requires awareness. Discourse analysis of the Diversity Module revealed that teachers are more cognizant of the needs of their students when they increase their awareness of their own culture and that of their students. Comparison of the case study participants suggested that they learned to different degrees how to use culturally relevant strategies in the classroom. Those

with a higher level of cultural awareness exhibited a higher level of competence in adapting strategies for student learning.

The Diversity Module

The findings from this study concerning the importance of new teachers' awareness of their own and their student's cultures, and the considerable time and range of experiences required to create this awareness, provide insight for further online Diversity Module modifications. Presenting the Diversity Module curriculum in two separate, in-depth stages is a possible approach. The initial stage would include the first three competencies (see Table 10) of awareness of culture of self, awareness of student culture and awareness of student learning characteristics. The second component of the Diversity Module would focus on the application in the new teachers' classrooms of strategies to create a climate of respect and also to promote student learning.

The Diversity Module is only one of several important and useful modules in the eMSS program. Offering this module in two separate and in-depth segments, as in the above recommendation, may not be possible or in the best interest of beginning teachers facing many pressing demands. One alternative would be to embed the knowledge and skills needed to teach diverse students throughout the eMSS curriculum.

A more feasible recommendation may be to form a partnership between the local school and the eMSS program to benefit all stakeholders in diverse students' education. Supporting the development of a teacher that exhibits awareness and

understanding of student culture may justify the investment in professional development led by a school administrator, other teachers, and/or community members.

Local school personnel, with assistance from community members, can provide professional development for teachers in awareness of the culture of the local students. Administrators and community members taught teachers about local culture in a professional development program in Mohawk reservation schools (see Agbo, 2001). Agbo's study showed that simply learning proper pronunciation of student names and important Mohawk words helped teachers enhance relationships with students. A similar program is currently available in Montana through the Salish-Kootenai culture camps. These Salish and Kootenai tribes are co-located on the Flathead reservation in northwest Montana. They offer an annual one-week camp in which community members help participants understand aspects of Salish and Kootenai tribal culture. In addition, Salish-Kootenai community members help teachers understand students' culture throughout the school year (Confederated Salish & Kootenai Tribes, 2004). Similarly, in Browning, Montana, on the Blackfeet reservation, new teachers have been required for more than a decade to take classes on local culture at Blackfeet Community College (L. Gervias, personal communication, June 17, 2005).

Once teachers develop awareness of local student culture, they will become ready to participate in the second segment of the Diversity Module, which will concentrate on the application of strategies in the classroom.

Suggestions for Further Research

Factors Influencing Beginning Teachers’ Online Participation

A recurring issue surfaced during eMSS meetings on planning, research and online facilitation: How do we get mentees to be more active online? This was a problem in the Diversity Module piloted in the present study as well. Four of the five case study participants posted a combined 10 messages in Diversity Module discussion, and one of those four posted six of the 10 messages. This limited the insight about participants’ learning that could be gleaned from the Diversity Module discourse. A research question could ask what factors affect optimal online participation.

This concern begs the question: What is optimal online participation? Optimal participation can be defined in terms of both quantity and quality. With regard to quantity and frequency, eMSS beginning teachers were expected to participate online for an average of one hour per week, although many reported considerably more involvement. Several Montana State University faculty experienced in teaching online courses require students to post messages a certain number of days per week (generally three), and to respond to a certain number of other participants each week. The number of messages required can be changed according to the number of participants and/or the length of the course, but a minimum requirement for quantity or frequency of posts may improve less than optimal participation. As discussed earlier, some online participants report considerable learning through reading without

posting. However, when one participant does not post regularly, his or her peers are deprived of learning from that person's insights.

Just posting a certain number of messages does not assure optimal participation. Low quality messages may not add to the learning of the group. For instance, "Your last message was very well written" is not indicative of optimal quality participation. A conversation analysis tool in development by Horizon Research, Inc. (2005) provides measures of quality in online discourse. Examples of the topics addressed by these indicators include:

- Participants address the specific question or discussion item.
- Participants are willing to share; there is evidence of trust and collegiality.
- There is evidence participants reflect on their practice.
- Topics discussed are perceived as relevant by participants.
- There is sense making in the discussion.
- The conversation is taken to a higher level.

As a start to examining this question, several types of less than optimal participation by mentees in this study can be defined: seldom logging on, reading but seldom posting, and posting but seldom reading. Some mentees fail to log onto the website very much. This could be due to a lack of time, or they may feel they now have the experience and confidence they need for teaching and no longer have a use for induction, as Teresa attested.

The second type of marginal participation is reading, but seldom posting, as illustrated by Mary's experience. She provided evidence of learning, and communicated regularly with her mentor in Pair Place, yet she posted relatively few messages in larger groups compared to the number she read. A possible explanation

for not posting is participants' perceived lack of confidence in their knowledge of teaching, which would prevent them from feeling they are posting "intelligent" questions or responses.

The third type of marginal participation, posting but seldom reading, is more difficult to detect, yet like the first two types, may have a negative effect on mentee's learning. It appeared at time that certain mentees, whose districts allowed them to substitute eMSS participation for district induction activities, posted module assignments without reading and responding to others' messages. All three types of less than optimal participation by mentees and their impact on mentee learning, warrant further study.

There is ample evidence that mentors post more online messages than mentees. In Pair Place discussions, mentors and mentees post virtually equal numbers of messages. This is logical given the prompt-response nature of paired discussion. In large group discussions, however, most mentees post very little compared to mentors. In the course of the academic year, 96 mentees posted 3048 messages compared to 6259 messages posted by 84 mentors. Yet many mentors and mentees are reading messages. Participants accounted for 9307 messages posted, yet the same participants read 141,297 messages. Considering messages posted outside of Pair Places, messages were read by approximately 25 participants, on average.

The missing component in this low participation scenario is messages posted by beginning teachers. Several explanations could account for this lack of online activity. A possible explanation could be teaching experience. Jennifer, a mentee with

eight years of experience teaching, but only one year teaching mathematics, posted 115 messages over the year, which accounts for half of the total messages posted by the five case study participants. The average messages posted per person in the Diversity Module was eight. Jennifer posted nearly twice this average with 15 messages. Jennifer expressed her confidence and lack of fear when discussing several aspects of her life. A study of confidence as an aspect of online learning could start with Jennifer to examine whether she is more willing to post messages online because she is confident in her knowledge of teaching, or because of personality factors.

Expand Discourse Analysis

Discourse in the Diversity Module discussion provided a rich learning opportunity for new teachers. Not only were there sufficient messages to study, but they were all arranged within threads focusing on specific topics. The threads provided evidence of the initial thinking of the authors, as well as how the discourse led to the evolution of these thoughts. Staff and participants wrote over 10,000 messages during the course of the 2004-2005 academic year. Each module had a dedicated discussion area. In addition, there were discussion areas for content related topics and for dialogue about facilitating discussion and mentoring online. Each mentor-mentee pair also had Pair Place, their own private discussion area.

The framework for analyzing discourse in this study was developed through an iterative process that involved several cycles of reading discussions in the Diversity Module, constructing a framework to aid in analysis, then piloting and modifying the framework. This framework could be adapted for discourse analysis in

other contexts. Application of the framework across contexts can inform understanding of online learning and can improve the framework as well. The framework designed by Gunawardena, Lowe & Anderson (1997) was applied in other studies (Bice, 2004; Jarvela & Hakkinen, 2002; Kanuka & Anderson, 1997; Kosiak, 2004). In each of these applications, more information about online learning was discovered. The framework developed for this study provided understanding of learning about teaching diverse students through online discourse. Using the framework provided evidence that participants acknowledged the ideas of others and posted reflective thoughts online. Applying this tool to other discussion areas within eMSS, or an entirely different setting, may provide information on participants' understanding of topics discussed.

In addition, analysis of eMSS discourse with this framework can inform facilitation of online discussion. For instance, in the present study, 60% of messages posted in the Diversity Module were stand-alone postings, in which a response was not solicited. Use of this framework may help facilitators recognize the predominance of stand-alone messages, and adjust their facilitation to increase collaborative discussion. This, in turn, could increase the level of participant learning.

The discourse in eMSS contains a number of requirements for learning (reflection, cognitive presence, and cognitive dissonance) as shown in research literature. A thorough examination of various discussions may yield relevant information to the field of distance induction, and distance education as well.

Strategies in Online Induction

Some participants did not engage in Diversity Module discussion because they perceived it did not serve their needs. They felt they already had sufficient awareness of students' culture even though existing awareness was at very different levels across participants. They expressed the need for specific classroom strategies they could use immediately in their classrooms. Jennifer and Martha expressed this need for culturally responsive classroom strategies they could use directly or adapt for use with their students. The Diversity Module did not offer the needed classroom strategies and resources as perceived by the participants. Other participants expressed a need for resources and strategies for teaching their science or mathematics content. An interesting research study would examine how to provide new teachers with model strategies for classroom use in a way that promotes their growth as reflective practitioners rather than impede growth by providing them with "carry out" curriculum.

Assess Teacher Practice Directly

A major goal of the eMSS program, or any professional development program, is to increase the quality of teaching by participants. This study examined participants' growth in certain aspects of knowledge of teaching. The ultimate way to gauge the improvement in teachers' practice is to monitor the resulting changes in their students' learning. Clare & Aschbacher (2001) demonstrated a positive correlation between student work and observed teacher practice. Classroom observations of eMSS teachers could be conducted and their students' work examined

to gauge changes in the teachers' effectiveness. This study did not include a short or long-term examination of student achievement to gauge any improvement in beginning teachers' practice.

The study also did not include observation of the beginning teachers' classroom practice. Since Montana, like other states, is now piloting and refining statewide science and mathematics assessments, comparison of the performance of students in the classrooms of eMSS and non-eMSS teachers will soon be feasible. In addition, as interactive video capability becomes more common in remote, rural classrooms, it will become easier to carry out regular observation of new teachers participating in programs like eMSS.

Summary

This study confirmed previous research that showed a continuum of changing beginning teachers' needs over the course of the induction period. Results of this study showed beginning teachers increased their knowledge of teaching through participation in online induction.

Evidence illustrated that mentors were very important in supporting beginning teachers emotionally, helping them develop a greater understanding of teaching, and helping them to grow as professional educators. Findings showed that a collaborative group developed online, as shown by the great number of messages in which authors acknowledged the thoughts of others, and as expressed in interviews. Findings from

this study also supported that learning online can take place through reading and reflection without visible evidence in discourse.

Beginning teachers increased their understanding of the culture of their students, as well as their own culture. Many teachers adjusted their classroom practice to help students develop and participate in a climate of understanding and respect. Those teachers who developed a strong awareness of culture adjusted their practice to apply appropriate strategies for learning science and mathematics that reflected the cultures of their diverse students.

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APPENDICES

APPENDIX A

NATIONAL BOARD FOR PROFESSIONAL TEACHING STANDARDS

The NBPT Standards were developed from a National Board (1989) policy statement, *What Teachers Should Know And Be Able To Do*. Since that time, the standards have undergone revision every five years. The standards consist of five Core Propositions with sub-standards as shown below.

Proposition 1. Teachers are committed to students and their learning.

- a. Teachers recognize individual differences in their students and adjust their practice accordingly.
- b. Teachers have an understanding of how students develop and learn
- c. Teachers treat students equitably
- d. Teachers' mission extends beyond developing the cognitive capacity of their students

Proposition 2. Teachers know the subjects they teach and how to teach those subjects to students

- a. Teachers appreciate how knowledge in their subjects is created, organized and linked to other disciplines
- b. Teachers command specialized knowledge of how to convey a subject to students
- c. Teachers generate multiple paths to knowledge

Proposition 3. Teachers are responsible for managing and monitoring student learning

- a. Teachers call on multiple methods to meet their goals
- b. Teachers orchestrate learning in group settings
- c. Teachers place a premium on student engagement
- d. Teachers regularly assess student progress
- e. Teachers are mindful of their principal objectives

Proposition 4. Teachers think systematically about their practice and learn from experience

- a. Teachers are continually making difficult choices that test their judgment
- b. Teachers seek the advice of others and draw on education research and scholarship to improve their practice

Proposition 5. Teachers are members of learning communities

- a. Teachers contribute to school effectiveness by collaborating with other professionals
- b. Teachers work collaboratively with parents
- c. Teachers take advantage of community resources

APPENDIX B

NATIONAL COUNCIL FOR ACCREDITATION OF TEACHER EDUCATION
STANDARDS FOR PROFESSIONAL DEVELOPMENT SCHOOLS

The NCATE PDS standards were developed as guidance for learning environments that support candidate and faculty development within the context of meeting all children's needs (Standards for PDS, p. 1).

NCATE provides five standards with defining elements for each.

Standard 1. Learning Community

- a. Support multiple learners
- b. Work and practice are inquiry based and focused on learning
- c. Develop a common shared professional vision of teaching & learning grounded in research and practitioner knowledge
- d. Serve as instrument of change
- e. Extended learning community

Standard 2. Accountability & Quality Assurance

- a. Develop professional accountability
- b. Assure public accountability
- c. Set PDS participation criteria
- d. Develop assessments, collect information, and use results
- e. Engage with PDS context

Standard 3. Collaboration

- a. Engage in joint work
- b. Design roles and structures to enhance collaboration and develop parity
- c. Systematically recognize and celebrate joint work and contributions of each partner

Standard 4. Diversity & Equity

- a. Ensure equitable opportunities to learn
- b. Evaluate policies and practices to support equitable learning outcomes
- c. Recruit and support diverse participants

Standard 5. Structures, Resources and Roles

- a. Establish governance and support structures
- b. Ensure progress towards goals
- c. Create PDS roles
- d. Resources
- e. Use effective communication

APPENDIX C

THE INTERSTATE NEW TEACHER ASSESSMENT AND SUPPORT
CONSORTIUM (INTASC) STANDARDS

1. Content Pedagogy The teacher understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

2. Student Development The teacher understands how children learn and develop, and can provide learning opportunities that support a child's intellectual, social, and personal development.

3. Diverse Learners The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.

4. Multiple Instructional Strategies The teacher understands and uses a variety of instructional strategies to encourage student development of critical thinking, problem-solving, and performance skills.

5. Motivation and Management The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.

6. Communication and Technology The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

7. Planning The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

8. Assessment The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the learner.

9. Reflective Practice: Professional Growth The teacher is a reflective practitioner who continually evaluates the effects of his or her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.

10. School and Community Involvement The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support students' learning and well-being.

APPENDIX D

CONSENT FORM

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT
MONTANA STATE UNIVERSITY

Project: An examination of learning in an online mentoring program for teachers of science and mathematics.

You are being asked to participate in a research study of the effectiveness of online professional development for teachers of science and mathematics in isolated, rural settings of Montana. This study will help understand the needs and methods to affect the needs of beginning teachers who may not have an experienced, content knowledgeable teacher immediately available. The focus of this study is to examine beginning teachers' learning about teaching students from diverse backgrounds. You have been chosen because you are a teacher within the first three years of teaching science or mathematics and you teach in a rural or isolated community.

If you agree to participate, we will read and examine your written and spoken messages in the eMSS mentoring program in two ways:

1. Online messages you write will be examined for understanding of learning. We will look at messages to see what learning about teaching you have obtained, and in what aspects of teacher knowledge this learning takes place, such as knowledge of teaching practice, knowledge of subject matter, knowledge of understanding students needs, etc.

2. Two interviews will be conducted by this researcher with you. These interviews will be conducted in early March and late April of 2005, at times and location of your choosing. Each interview will last between 15 and 20 minutes, and will be conducted by telephone or in person, whichever is more convenient for you. In-person interviews will be conducted at the location of your choice. The interview will be designed to provide more detailed information about your online learning.

We want you to know that:

1. Your participation is confidential and voluntary.
2. You may choose not to participate or to withdraw your consent at any time without penalty.
3. There is no compensation for your participation. Participating in this study may have some general benefits in that you will be contributing to the improvement of teacher education. Participating in this study may also provide you with new teaching ideas through participating in reflective thinking in response to the questions and dialogue with the researchers.
4. The risks for participating in this study are minimal. This may include risks such as feeling uncomfortable talking about your teaching experiences.
5. Your decision to participate/not to participate in this study will have no effect on your participation in the eMSS program.

6. Your thoughts and messages and personal information will be kept confidential and secured in locked offices or in password protected computers. No one outside the principal investigator and approved research staff will have access to your information. Your privacy will be protected to the maximum extent allowable by law.
7. In research papers or other public presentations resulting from this study, your name will not be used and any identifying characteristics or personal information that could be used to identify you will be deleted or masked. It is highly unlikely that anyone would be able to identify you from any published report, although it is slightly possible that another eMSS participant might read a report based on this study and recognize your remarks. Your privacy will be protected to the maximum extent allowable by law.
8. If you have any questions or concerns regarding your participation in this study you can contact me at:

Lawrence R Bice, 401 Linfield Hall, MSU-Bozeman, Bozeman, MT 59717; 406-994-7536

9. If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Chair Institutional Review Board Office, 308 Leon Johnson Hall, Montana State University, Bozeman, Montana, 59717. For information and assistance, call 406-994-5721.

Your signature below indicates your voluntary agreement to participate in this study.

=====

Participant's Signature _____ Date _____

APPENDIX E

OUTLINE OF DIVERSITY MODULE AND ACTIVITIES

In the hands of a competent and caring teacher,
students' culture can be turned into academic gold.

—Enid Lee
Author and Diversity Consultant

Diversity Module

Overview

While standards now guide much of the curriculum in schools, how the material gets presented still very much depends on our teaching techniques. As teachers, our beliefs and values around language, racial identity, culture, and equity all influence our classroom practice. When students see little or no connection between themselves and the subject matter, they find it hard to learn.

Our goal in this module is to help you become a multicultural teacher who:

- Maintains high expectations for all students.
- Builds cultural knowledge of self and students.
- Practices culturally responsive teaching.

In this Diversity Module, you will work with your mentor in the Pair Place as well as the Diversity Discussion Group to examine the challenges of relating to the diverse students in your classroom. By consciously looking at diversity, we develop our effectiveness as educators of every student.

We'll begin by examining how our own backgrounds and cultures influence us. By first understanding this, we can begin to connect to our students. Next, we'll take a look at the various student groups at your school. We'll also do an activity to deepen your understanding of your community of learners. Based on what you learn, you'll try adapting a lesson to connect with the diverse students in one of your classes and reflect on the result.

To get started, click on Activity 1 below.

Activities

[Activity 1: Exploring your own Influences](#)

[Activity 2: Understanding our Students](#)

[Activity 3: Try an Intervention](#)

[Activity 4: Reflecting on your Intervention](#)

[Activity 5: Module Reflection](#)

Activity 1: Exploring your own Influences

Many studies show that teacher quality is central to student progress. It's the student-teacher interaction that sets the stage for classroom learning. But how do we connect with students who have backgrounds different than our own? We can better reach these students if we first understand our own cultural beliefs and behaviors. This self awareness provides teachers with a framework for being conscious of the diverse needs of their students.

Step 1: As an introduction to this interesting and complex topic, go to "[Deepening Our Dialogue About Equity](#)" by Julian Weissglass. He writes about the importance of self awareness in teaching diverse students. You'll need to set aside 10 to 15 minutes to read the article. Once you've completed the reading, go the left of your screen, click on Discussion Areas, and post a reflection to the Diversity Discussion Group. Choose from one or more of the prompts below:

- Discuss one of what Weissglass calls "unproductive responses" about equity on page 1.
- Discuss one or more of the three structures Weissglass presents for increasing communication: dyads, support groups, and personal experience panels.
- Discuss anything else about the article you would like to reflect on.

Step 2: Julian Weissglass is one of the diversity experts who contends that for teachers to make a difference in the lives of their diverse students, they must begin at the personal level. You'll be working on Step 2 in the Pair Place with your mentor. Take a look at the questions below and select the ones you feel comfortable answering. Your answers will only go to your mentor.

- Describe your cultural background.
- Where is your family from and how has this shaped who you are?
- When you were in school, how did your background and culture connect—or not connect—with your educational experiences?
- Is there anything else about your background or cultural identity that influences your teaching?

Follow-up to Activity 1

Your mentor will be sending you his or her answers to the above questions. In the Pair Place, respond to your mentor's post with a comment or reflection.

Mentor Tips

Working With Your Mentee On Activity 1

Step 1:

Both you and your mentee will be reflecting on the article "Deepening Our Dialogue About Equity" by Julian Weissglass. Use the prompts suggested in Step 1. Respond to at least one other post by a mentee.

Suggestion: Continue to label your threads in the Pair Place to make it easy for you and your mentee to follow the discussion.

Example: Diversity Act. 1

Step 2:

In Step 2 you'll also be responding to the prompts along with your mentee. Choose the ones you'd like to answer and send them to your mentee in the Pair Place.

Take into consideration that some of your mentee's answer may be fairly personal and respond with sensitivity to your mentee's answers. Paraphrasing the mentee's responses may be helpful here.

Examples of paraphrasing stems:

"What I hear you saying is . . ."

"In other words . . ."

"So, if I understand you correctly . . ."

- The Diversity Mentor Forum offers a place for you to communicate with other mentors working on this module. Go to your Diversity Mentor Forum in the Discussion Area to see what other mentors are doing with this module and to get answers to any questions you may have.

Activity 2: Understanding our Students

An awareness of our students—their background, their culture, and what they bring with them when they pass through our classroom door—helps us to think about shaping our curriculum to meet their diverse needs.

Step 1: Research information on the makeup of the students in your school. Your district may have this information, but an easy way to access it is to go to the website listed below. Follow these steps to gather this information:

1. Go to the website: <http://www.greatschools.net/>
2. Choose a state from the orange "Select State" bar in the middle of the page.

3. Type in your district or city and click "go."
4. Click on your school grade level.
5. Click on your school.
6. Beneath your school name, click on the blue box "teachers/students." This will give you information on the ethnic and socio-economic makeup of your school.

Once you have gathered this information, make a post to your mentor in the Pair Place with the following information:

- Briefly summarize the report on your school.
- Compare the information on your school to the makeup of the classes you teach. Is it similar or different?
- Include a reflection on the general makeup of the students you teach.

Step 2: Choose one of the following activities that will deepen your understanding of the cultures in your school. Focus your activity on a culture different than your own. Once you have completed one of these activities, you'll post what you learned to the Diversity Discussion Group.

1. Interview the parents of one or two of your students from cultures other than your own. Use the following prompts:

- Engage them in a discussion on how they view education in relation to their families.
- What was their own educational background?
- How did they feel about their experiences in school?
- How did those school experiences shape their expectations for their children as well as their attitudes toward their children's teachers and the school as a whole?

2. Interview community leaders. You can use many of the questions and prompts listed for parents. Try to find out how education fits in with the values of the community.

3. Attend a community gathering of a cultural group other than your own. Examples include a sporting event, a concert, or an open-air market. Observe what happens with an eye toward finding connections to your classroom teaching.

4. Interview an experienced teacher at your school with a reputation for success with diverse students. Often, veteran teachers come to understand the nuances of a local community and may have interesting insights.

Once you have completed one of these activities, post a brief summary of what you did and what you learned to the Diversity Discussion Group. Consider using one or more of the following prompts to guide your posting:

- What did you do?
- What did you learn?
- What makes the members of the community unique?

- Does your new knowledge help you understand your students better?
- From your own cultural perspective, what similarities or differences do you see between you and your students?

Respond to at least one other post in the Discussion Group.

Mentor Tips

Working With Your Mentee on Activity 2

Step 1:

Although your mentee will send you a summary of the information on his or her school, it's a good idea to go the website beforehand. You can check that there are no glitches in getting to the information, and it will help you respond to the information the mentee sends you. If the mentee's school does not come up using "Search for school or district," try again by searching under "city."

Step 2:

Although mentees will be posting their responses to the discussion group, you can help make this happen by checking in to see they have been able to select an activity. Knowing their teaching situation, you may be able to make a suggestion. This step may take some time. While your mentee works on this, you might wish to continue on with Activity 3 to keep things moving. You'll also want to respond to one or more of the posts in the discussion group.

- Check in with the Diversity Mentor Forum to connect with other mentors working on this module.

Activity 3: Try an Intervention

Now that you've looked at your own cultural background and that of your students, the next step is thinking about strategies for meeting the diverse needs of your students. In Activity 3, you'll develop and try a diversity strategy in your classroom that connects your curriculum to the lives of your students.

Students bring their own special circumstances to class; this is no stereotypical student and no standard way to meet their needs. That's why moving beyond generalities about groups and getting to know your students as individuals is so important.

Step 1: Read the strategies listed below and work with your mentor in the Pair Place to decide on an approach that might help engage one group of the students in one of your classes. You do not need to make a huge change or rework an entire lesson; the goal is to try something that will make a difference for at least one group of students.

Examples of Intervention Strategies:

Demonstrating machines:

Purpose: Using common objects allows low socio-economic students who may not be familiar with lab equipment to concentrate on science.

Example: A teacher wanted to help low socio-economic status students understand simple machines. Rather than construct a complex pulley mechanism or measured levers, he brought in materials students might recognize such as bicycle parts and a washing machine motor for the demonstration.

Graphical math:

Purpose: Urban students having difficulty with graphing may understand the concepts better by studying a map grid of the local area.

Example: To help urban students understand graphs, spatial information, and measurements, the teacher brought in street maps of the local area. Students measured and graphed distances to and from familiar landmarks such as home, school, store, and relative's homes.

Local biology with community member:

Purpose: For teachers not familiar with local biology and its cultural relevance, a community member speaking to the class can enhance understanding.

Example: A teacher invited a respected community member to speak to the class on local plants and animals and their importance to the community.

Students' language use:

Purpose: Helping students understand the need for standard English without disrespecting the students' home language enhances student-teacher respect.

Example: A teacher did not immediately try to change the way students talk when speaking in Black English Vernacular (Ebonics). Understanding that the students are comfortable with BEV, she tried to help students understand how and why to use Standard English in the larger community.

Health class and families:

Purpose: Students participation may increase when they work in groups. This research project also draws on the extended family support network.

Example: A life science teacher with a number of Latino students asked them to investigate health issues in their families. Many of the students were able to work in groups to easily do this research with extended family members and present an oral report to the class.

Gender grouping:

Purpose: Rotation of group responsibilities ensures that stereotypical gender roles are not reinforced.

Example: To gauge and help control for gender differences in math and science classes, a teacher placed students in groups that contained equal numbers of male and female students. He also ensured that each member of the group rotated through the various tasks and responsibilities.

You or your mentor may have developed other strategies on your own. In the Pair Place, post to your mentor either an intervention strategy you believe will be effective or a question on how to include an intervention in an upcoming lesson.

Step 2: Once you decide on an intervention to try, use it in your classroom.

Follow-up to Activity 3

In Activity 4, you'll be checking in with your mentor on how the intervention went and possible next steps. You may wish to jot down some notes as soon as the lesson concludes to help capture the experience for your discussion with your mentor.

Mentor Tips

Step 1:

You'll be working in the Pair Place to help your mentee select an intervention strategy. Seven examples are presented to give you and your mentee ideas that he or she might try in class. This step, which forms the foundation for this activity and the next, lends itself to a phone conversation or exchange in the chatroom.

Suggested coaching stems are listed below for possible use in settling on an intervention strategy:

"What would that look like. . ."

"Let me see if I understand . . ."

"How would it work if . . ."

"I'd be interested in hearing more about . . ."

"Tell me what you mean when you . . ."

"To what extent . . ."

Step 2:

Set up a time to check in with your mentee to follow-up on how the intervention went. Here again, a phone conversation or chatroom session is helpful.

- Check in with the Diversity Mentor Forum to connect with other mentors working on this module.

Activity 4: Reflecting on Your Intervention

Step 1: In the Pair Place, post the results of your intervention to your mentor. You may wish to use the following prompts:

- How did students react to the intervention?
- How would you describe the level of success with this intervention?
- What did you learn from applying this intervention?

Step 2: Also in the Pair Place, post a follow-up intervention strategy you might use to continue to help meet the needs of the diverse students in your classroom. Work with your mentor to continue the momentum you established in Activity 3.

Step 3: In the Diversity Discussion Group, post a brief summary of the intervention strategy you used in Activity 3 and what you discovered. Consider the following prompts:

- Describe your grade level, content area, and student diversity.
- In a sentence or two, describe the intervention you conducted.
- Discuss your results. Were they what you expected?
- How might you change the intervention next time?

Respond to at least two other posts in the discussion group to provide input for other teachers' intervention results.

Mentor Tips

Step 1 and Step 2:

Once your mentee has taught the lesson, check back in the Pair Place, the eMSS chatroom, or on the phone to reflect on how it went. Use the prompts for the mentee in Step 1 as a conversation guide.

Step 3:

Respond to at least one of the postings from mentees on their thoughts on the module.

- Check in with the Diversity Mentor Forum to connect with other mentors working on this module.
- Suggestion: You can use Activity 4 to organize your thoughts for the Module Reflection that is in Activity 5. Sending your mentee the Activity 5 Module Reflection immediately will provide effective closure to the module.

Activity 5: Module Reflection

Now's the time to reflect back on the work you did in this module. In this concluding activity, you'll review your progress in the Diversity Module and plan next steps.

In the Pair Place your mentor will send you a Module Reflection that discusses what worked for you, your areas of focus and challenge, and next steps for you and your mentor. You are encouraged to add thoughts or make changes.

Your only task for Activity 5 is to do the following:

Respond to your mentor in the Pair Place that you've read the Module Reflection and have made any additions or changes that you'd like to add.

And, congratulations on your work in the Diversity Module.