THE EFFECT OF FACILITATOR TRAINING ON THE DEVELOPMENT AND PRACTICE OF PARTICIPANTS IN AN ONLINE INDUCTION PROGRAM FOR TEACHERS OF SCIENCE AND MATHEMATICS

by

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ABSTRACT

Learning in computer-mediated conferencing systems requires frequent and open interaction in environments that foster sharing and examination of group knowledge and experiences. Written dialogue is the means by which this interaction takes place. This study examined the effects of a training program designed for facilitators in the e-Mentoring for Student Success (eMSS) program, which provides online induction for beginning science and mathematics teachers. The training was designed to improve the quality of dialogue among participants in the program. The intervention consisted of three components: 1) an online training institute prior to beginning of the program year, 2) placement of facilitators in positions within the discussion areas of the program, and 3) ongoing online support for practicing facilitators.

Three examinations were conducted in this mixed-method study. First, pre-intervention program dialogue was quantitatively compared to post-intervention program dialogue through use of a program-specific rubric to code program discussions. Second, case studies were conducted to determine how the training affected the practices of seven program facilitators and which components of the training effected change or growth. Third, pre and post intervention surveys were administered to all participants of the training to obtain their perceptions of their development as a result of the intervention.

Comparison of dialogue before and after the intervention indicated a significant improvement in dialogue quality in the discussion areas of the program. Case studies of facilitators' practices revealed areas of the training that impacted the skills and strategies that facilitators used in efforts to foster increased and improved dialogue. Survey results indicated that participants gained a better understanding of what constituted quality dialogue in terms of the eMSS program and how better to foster quality dialogue in an online environment. Components of the training found to be effective in helping facilitators to foster dialogue improvement were: 1) focus on program goals and vision, 2) focus on the nature of online communication, 3) practice with the analysis of actual program dialogue, 4) practice in composing effective online messages.

Implications for online facilitators are discussed and recommendations are made for designing training for facilitators to work in computer-mediated conferences.

CHAPTER ONE

INTRODUCTION

Computer-mediated communication is significantly different from other forms of interaction. It is an asynchronous, primarily text-based dialogue. Somewhat different interaction strategies are required to create maximal educational benefits for participants. The need for facilitators has been identified in programs and courses that depend on text-based communication in a computer mediated environment to help participants construct teaching, learning, and support experiences in mutually beneficial ways. Online facilitators have been important in building a sense of community in these environments, in providing clear procedural and organizational expectations, and in promoting discussions among participants by acknowledging contributions to discussions and encouraging interaction among participants. However, a need has been identified to improve the quality of dialogue that takes place in online discussions. Studies of knowledge construction in distance learning suggest that knowledgeable facilitators may have the capacity to promote increased learning through focused and productive dialogue. This study examined how well-trained facilitators can promote the improvement of dialogue in distance learning environments, a key component in the construction of knowledge in such systems. Further, it examined how to train online facilitators to assess the learning taking place in online discussions, adapt the curriculum, and direct the discussions according to the progress of the participants.

Background

E-mentoring for Student Success (eMSS) is a distance mentoring program designed to provide professional development and mentoring support for beginning middle and high school science and mathematics teachers. This National Science Foundation (NSF) funded experimental program matches experienced science and mathematics teachers with beginning teachers, who may be physically separated by distance or by urban congestion. The structured, computer-mediated conferencing program is made up of many interactive components, including guided threaded discussions, private discussion areas for mentor-mentee pairs, modules for professional development, and content-specific discussion and information areas (Figure 1). Delivered using the WebCT platform, this program is unique among mentoring programs in that it is provided using a web-based model and offers content-specific structured mentoring and professional development.

The eMSS partnership was created in response to the need for retention of knowledgeable and competent science and mathematics teachers. The eMSS project was designed to improve novice teachers' content knowledge and pedagogical content knowledge, in addition to their survival skills and general pedagogical knowledge, the traditional focus of characteristic of mentoring programs. The partnership recognized the need for providing early career support closely connected to the science and mathematics subjects and grade levels taught by beginning teachers. Realizing that access to trained mentors of the same discipline and grade level is not available to beginning teachers in

many states, the partnership designed the distance mentoring program using a web-based model. In the vision of the eMSS partnership,

> If we can give new science teachers tools enabling them to experience promising levels of student achievement sooner, we believe that increases in new teacher satisfaction and desire to remain in education will occur, and that there will be less distance between the learning profiles of beginning teachers' students and those of more experienced instructors (Wheeler et al., 2002, p. 2).

The eMSS program utilizes the distance education experience of the Science/Math Resource Center and the Burns Telecommunication Center (BTC) of Montana State University (MSU) and the mentoring expertise of the New Teacher Center at the University of California at Santa Cruz (UCSC). The program, administered by the National Science Teachers Association (NSTA), seeks to foster the culture of a professional learning community for science and mathematics educators. The program began with 12 school districts or rural consortia in Montana and California, ranging in size from 315 to 34,436 students. The partnership designed, piloted, and expanded the induction program to eight states through the first four years of its existence. In year five, the program scaled up to include a total of 16 states. With a goal of expanding nationally, program designers seek to provide participants with the opportunity to become part of local and national professional communities dedicated to the improvement of student achievement in mathematics and/or science. Working with experienced mathematics and science instructors, research scientists and mathematicians, and other new teachers, novice teachers are provided with support that moves beyond the emotional support, familiarization with school culture and the profession, and general teaching

skills commonly seen in other induction programs. Science and mathematics teachers, through this program, receive support specific to science and mathematics content and how to teach that content in ways that are likely to improve students' learning of challenging science and mathematics topics.

Discussions

Click on a topic name to see its messages.

Topic	Unread	Total	Status
Pair Place	0	0	private, unlocked
Got Ideas	0	0	public, unlocked
Dilemma 1	0	0	public, locked
Dilemma 2	0	0	public, locked
Chemistry	0	0	public, unlocked
Earth Science	0	0	public, unlocked
Life Science	0	0	public, unlocked
Physics	0	0	public, unlocked
Math	0	0	public, unlocked
Getting Started	0	0	private, unlocked
Getting Started - Mentor Forum	0	0	private, unlocked
Coffee Break	0	0	public, unlocked
All	**0**	**0**	---

Figure 1. eMSS discussion board in WebCT showing private and public discussion forums.

Figure 1 provides a view of an eMSS WebCT discussion board. Within each of the discussion areas seen in Figure 1 will be many threads (or topics) of conversation. Figure 2 shows some of the threads or topics of discussion found in a single discussion area, physics. As can be seen in Figure 2 (under the "status" bar) there are multiple messages posted by various participants in each thread. The discussion on electricity in Appendix A (taken from the discussion board seen in Figure 2) provides the reader with an idea of the discussion format commonly found in eMSS.

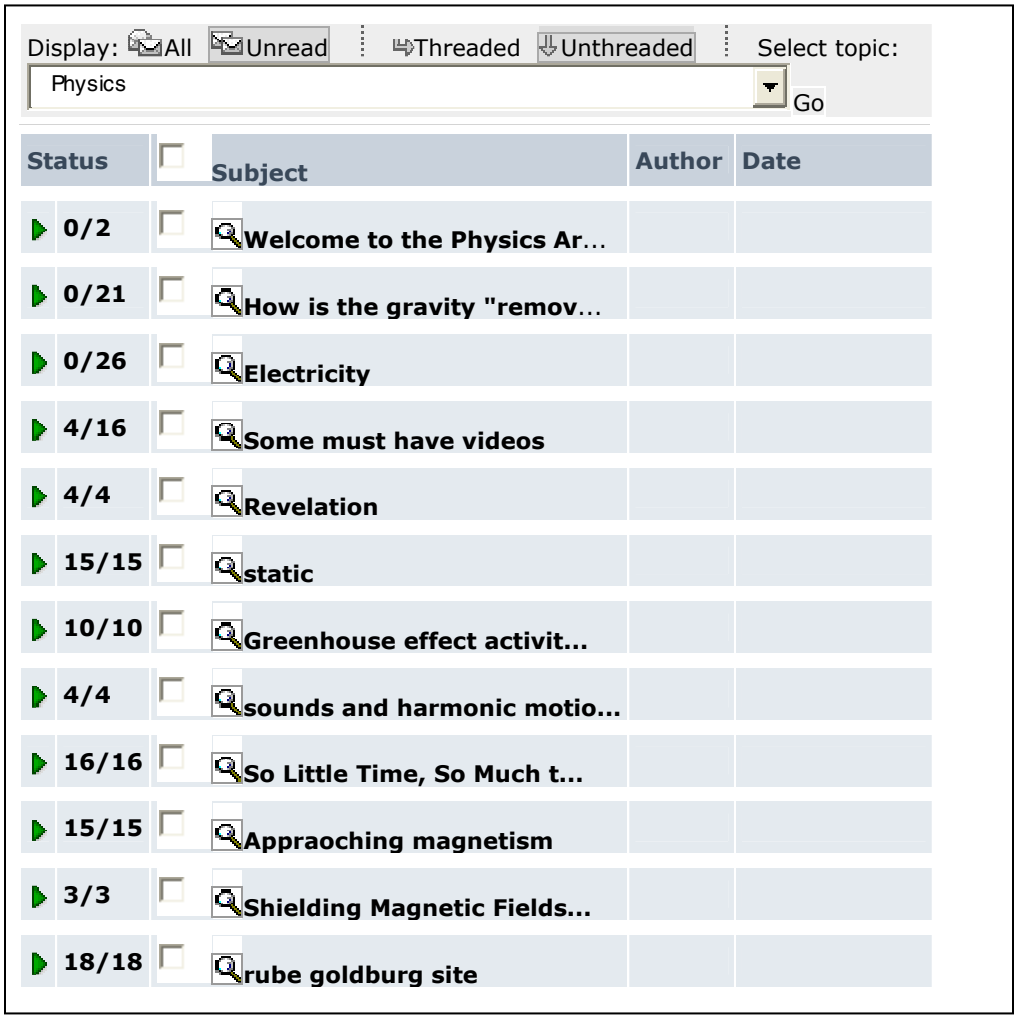


Figure 2. Multiple threads of discussion found in the physics discussion area on the eMSS discussion board in WebCT.

The electricity discussion is a thread that contains 26 postings from among seven or so different participants. In the electricity discussion in Appendix A, one can view the attempts of program participants to answer a mentee's request for help and to further understand the concept at a personal level. The discussion is typical of the types of messages and discussion environments provided in the program. Through facilitated dialogue in structured discussion areas, the program staff seeks to foster the level of

communication and reflection necessary to enhance new teacher practice and to promote the professional development of experienced teachers. The eMSS Design Principles, which have been a guide in the development of the program and are seen in Appendix B, specifically address the importance of dialogue to the programs goals:

> A central goal of eMSS is to promote reflection, conceptual growth and change, and improvements in professional practice through rich online dialogue. We believe that online learning environments, when carefully designed and moderated by trained facilitators, can be singularly effective places for meaningful dialogue leading to teacher growth, accompanied by changes in classroom practice and student learning gains (eMSS Design Principles, Table 4).

Problem of Study

A second-year evaluation report of the eMSS program submitted in June 2004 by Brent Ford of the Horizon Research, Inc. (HRI) examined the frequency of high quality dialogue among participants in various areas of the online program. Only five percent of postings were coded as "high quality" according to criteria developed by HRI (Ford, 2004). In order to foster a level of communication and reflection with potential to enhance teacher practice, HRI recommended that the program develop specific strategies "which are likely to result in a higher proportion of future postings being 'high quality'" (p. 23). Ford further states:

> The analysis of on-line dialogue suggests that there is room for improvement with regard to deepening the conversations and the project should consider ways in which this can be accomplished. One way is to provide additional training for mentors, facilitators, and content experts. Since interactions and conversations among project participants are

> preserved, the project has a wealth of on-line dialogue that can be used in such training … (p. 30).

During the summer of 2004, in response to the formative evaluation concerns expressed by HRI (Ford, 2004), a pilot intervention was implemented which involved training program facilitators to promote higher levels of online discourse. The pilot consisted of an online facilitator development seminar as well as face-to-face sessions on improving dialogue for all mentor and mentee participants in the eMSS summer and fall workshops. A preliminary analysis of program dialogue during the spring of 2005 (Taylor, 2005) indicated certain areas of improvement in dialogue quality among participants. However, in most cases, the improvement was not statistically significant. A formative program evaluation report by Brent Ford of HRI, released in the spring of 2005, stated that in order to effect the desired levels of growth in beginning teachers' practices, work still needed to be done to enhance discussion quality and increase participation.

To that end, and in response to the need to begin national scale-up of this distance program, two online facilitator and advanced mentor training sessions were designed and implemented during the summer of 2005 that included segments on dialogue quality and leading online discussions. In addition, an ongoing facilitator forum in the program's discussion area provided additional training and support for practicing facilitators throughout the program year.

Purpose of Study

This purpose of this study is to examine the degree to which learning can be facilitated in a distance environment through initial and ongoing professional development for online discussion facilitators. An intervention, designed and implemented by the eMSS program in response to the recommendations of the HRI evaluation report, involved three parts: a) the development and implementation of an online facilitator seminar and advanced mentor training, b) the provision of actual facilitation experience in various areas of the program for advanced mentors and future facilitators, and c) continuing online training and support for facilitators throughout the program year. The intervention specifically targeted increasing the level of online participation in the program, increasing the quality of dialogue in the program's various discussion areas, and building a professional community of learners capable of supporting improvement in professional practice in the participants' classrooms. Through analysis of electronic dialogue, participant surveys, and case interviews, this study sought to answer the following research questions:

1. *How does the facilitation training affect the practice of program facilitators?*
2. *How does the facilitation training affect the practice of program mentors?*
3. *What components of the training are facilitating change in practice?*
4. *What changes are seen in the overall quality of dialogue in the program?*

5. *What components of the training are facilitating change in dialogue quality?*

6. *What preliminary evidence is there, if any, that change in program participants' online practice is effecting change in the classroom practice of beginning teachers?*

After the intervention, the facilitator/advanced mentor training, program dialogue was analyzed using a rubric modified from an HRI document designed to assess the level of dialogue according to program goals. This dialogue was compared to preliminary analyses of dialogue during previous years. In addition, case studies of facilitator practices and dispositions were completed which gave a more in-depth insight into changes in the dialogue, and in participants themselves that may be attributed to the intervention. And last, through a pre and post survey, designed to assess the skills and attitudes of participants, including advanced mentors and facilitators, evidence of growth in dispositions and practice of participants was gained.

Significance and Benefits of Study

The Mentoring Community

The school reform movement of the 1980's (Little, 1990) brought about awareness of the necessity of knowledgeable, well-trained, and competent teachers. This need was enhanced further by an increasing national teacher shortage. Since this movement, an abundance of research conducted on resulting mentoring and induction programs for beginning teachers has provided evidence that mentoring programs are successful both in retaining new teachers and in improving their professional practice

(Britton, et al., 2003; Darling-Hammond, 2000; Feiman-Nemser, et al., 1999a; Stansbury and Zimmerman, 2002). As a result of well-designed mentoring programs, there is evidence that beginning teachers tend to move through the stages of development faster as they gain confidence and increase their teaching skills. Mentoring relationships can more quickly move teachers beyond the survival stages of an early teaching career into a critical self-reflective practice (Schon, 1987) that "can lead directly to improved teaching and learning in the beginning teacher's classroom" (Stansbury and Zimmerman, 2002).

However, distance and time limitations have made it difficult to provide adequate induction programs for certain populations, especially in isolated rural areas such as the widely spaced and numerous small school districts in Montana where the nearest experienced teacher, much less one who teachers the same content area, may be 30 or more miles away. Surprisingly, isolation also exists in congested urban areas, such as the crowded districts of California, as busy schedules, demanding responsibilities, and congested roads make it difficult, if not impossible, for mentoring pairs to meet face-to-face. Advances in technology and the realization that electronic networking can be a powerful learning force have increased the possibility of supporting teachers who face these limitations. The eMSS program was developed with a vision of using electronic networking to support new teachers of science and mathematics. Study of this structured mentoring program offered through asynchronous computer-mediated communication provides insight into the effectiveness and best practices of distance mentoring, an approach still in its infancy. This study was designed to shed light on the impact of computer-mediated communication on the depth and breadth of mentoring relationships.

The Distance Learning Community

Research focused on online learning environments suggests that instructors can facilitate the development of a sense of community in which online participants feel genuinely connected to each other and are able to comfortably share thoughts, opinions, and ideas. If practitioners are to grow and develop, especially novices, they must have contact and quality interaction with others, skilled and trained in practice, to facilitate the availability of experiences and exposure to grow from their existing state of knowledge into that of a more skilled practitioner. High-level, reflective communication in which participants communicate their understanding, listen to views of others, explore alternative perspectives, and are challenged in their beliefs must take place (Britton, 2003; Miller & Miller, 1999; Stansbury & Zimmerman, 2002). This "shaping process", as Vygotsky calls it, is facilitated by the "interpsychological" work with co-members of learning communities (Cole, 1996; Moll, 1990). Vygotsky's sociocultural and social learning theories hold that social interaction plays a major role in the development of cognition (Driscoll, 2000). Thus social dialogic processes in which communities of practitioners socially negotiate meaning are essential (Jonassen, et al., 1995; Wegner & Snyder, 1999). This study contributes to the limited research, in this dawn of electronic learning, regarding how the social nature of learning can be facilitated in a distance environment by the intentional design and development of online program facilitators.

The Science/Mathematics Community

And finally, new science and mathematics teachers face challenges unique to their disciplines (Adams & Krockover, 1997; Emmer, 1986; Garet, et al, 2001; Luft, 2001;

Salish I Research Project, 1997; Simmons et al., 1999; Trumbull, 1999). These challenges range from identifying and addressing student misconceptions in mathematics and science to connecting abstract science concepts, making science and mathematical concepts relevant to students' lives, identifying inquiry and problem-based learning experiences that enhance student achievement in science and mathematics, and knowing techniques for maintaining a safe and complete science laboratory environment. Often lacking from mentoring programs is the support related to these subject matter issues. Therefore, extending new teachers' understandings of mathematics and/or science content and discipline-specific pedagogy (pedagogical content knowledge, PCK) is important in the overall development of the beginning science and mathematics teacher (Garet et al, 2001; Luft et al, 2003; Luft and Patterson, 2002; Loucks-Horsley et al, 2003; NRC, 1996, Salish I Research Project, 1997; Shulman, 1987). In line with the situated cognition theory of learning (Lave & Wenger, 1991), providing content-based mentoring to beginning science and mathematics teachers allows them to construct their learning in the context of their own science and mathematics classrooms, keeping in mind their own needs and those of their students. This study of the eMSS program contributes to what is now a small body of knowledge on the importance and advantage of content-specific mentoring and how this can be facilitated through dialogue in an online environment.

Definitions

A number of terms are used throughout this paper that require description and/or definition. These terms include mentoring and induction, distance mentoring and

induction, computer-mediated conferencing, reflection, facilitation, pedagogical content knowledge, and learning communities. While a brief description and explanation will be provided in this section, more extensive information regarding these terms will be provided in other sections, especially the literature review in Chapter 2.

Mentoring can be defined as the process of providing counseling or guidance by a tutor or coach. This description is adapted from Webster's (1993) definition of a mentor as "a trusted counselor or guide, tutor, coach".

New Teacher Mentoring. Odell and Huling (2000) are more specific to the mentoring process of a beginning teacher. They view mentoring as a professional practice that occurs in the context of teaching whenever an experienced teacher (mentor) supports, challenges, and guides novice teachers (mentees) in their teaching practice.

Induction is generally seen as a larger process of systematically training and supporting new teachers which includes mentoring as only a component of the process. Definitions and understandings of induction vary widely from a single orientation at the beginning of the school year to a well-developed, responsive curriculum involving multiple components such as mentoring, observations, professional development opportunities, etc. and covering an extended period of time. Wong (2001) describes induction as beginning before the first day of school and continuing through the first two or three years of teaching. He identifies the purposes of induction to be easing the transition into teaching; improving teacher effectiveness through training in classroom management and effective teaching techniques; promoting the district's culture – its

philosophies, missions, policies, procedures, and goals; and increasing the retention rate for highly qualified teachers.

Distance mentoring or e-mentoring is defined by Single and Muller (1999, 2001) as a relationship established primarily using electronic communication between a "more senior individual" and a "lesser skilled or experienced individual" that is intended to "develop and grow the skills, knowledge, confidence, and cultural understanding of the lesser skilled individual to help him or her succeed, while also assisting in the development of the mentor". They further define "structured" e-mentoring as a" formalized program environment which provides training and coaching to increase the likelihood of engagement in the e-mentoring process". Electronic communication is seen by Steinberg (1992) as an ideal mentoring environment as its flexibility allows for asynchronous communication independent of time and space.

Distance induction can be seen a the use of electronic communication to ease the transition into teaching for beginning teachers; to improve teacher effectiveness through support and training in classroom management and effective teaching techniques; and to promote the culture and integrity of the profession. The goals of distance induction include providing beginning teachers with improved access to support and training systems in an effort to promote higher levels of teacher effectiveness and student achievement while increasing the retention rate for highly qualified teachers.

Computer-mediated conferencing (CMC), according to Gunawardena, Lowe, and Anderson (1997), refers to the "exchange of messages among a group of participants by means of networked computers for the purpose of discussing a topic of mutual interest"

(p. 139). Online or electronic communication can be in many forms: e-mail, instant messaging, chat rooms (of a synchronous nature in which participants are online interacting at the same time), or online discussion boards and audio and videoconferencing (Guy, 2002). For the purpose of this study, electronic learning is considered web-based communication, primarily using an asynchronous format in which participants are online at different times.

Reflection is a concept on which researchers have not yet reached a consensus on any single definition. However, Buysse et al. (2003) concludes from Hatton & Smith (1995), among others, that there is general agreement that "reflection refers to the ongoing process of critically examining current and past professional practices against an overarching philosophy as a method of improving future practices and increasing knowledge". Hatton & Smith (1995) describe four distinct forms of reflection based on a comprehensive review of the literature: technical, descriptive, dialogic, and critical. Further, reflective practice, a concept introduced by Donald Schon (1987) and influenced by Dewey (1933), involves thoughtfully considering one's own experiences in applying knowledge to practice while being coached by professionals in a discipline.

A *facilitator* is defined by Edward Ruete (2004) as "someone who uses some level of intuitive or explicit knowledge of group process to formulate and deliver some form of formal or informal process interventions at a shallow or deep level to help a group achieve what they want or need to do or get where they want or need to go". In the context of this paper, facilitators work in program discussion areas to initiate, direct, and deepen online participant dialog in ways that create teacher growth, and ideally lead to

changes in classroom practice and student learning gains. In the context of the eMSS program, staff facilitators, content experts, and discussion leaders are formally trained to fulfill this role. However, mentors and even mentees can informally fulfill the role by promoting high quality dialogue through example and practice in the program discussion areas.

Pedagogical content knowledge (PCK) was first proposed by Shulman (1986, 1987) as a union of content and pedagogy. A synthesis of three knowledge bases: subject matter knowledge, pedagogical knowledge, and knowledge of context, PCK includes the "most useful forms of representation of these ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the ways of representing and formulating the subject that make it comprehensible to others" (Shulman, 1987, p.9). PCK goes beyond being a content specialist. Cochran, King, and DeRuiter (1991) differentiate between a teacher and a content specialist in that:

> Teachers differ from biologists, historians, writers, or educational researchers, not necessarily in the quality or quantity of their subject matter knowledge, but in how that knowledge is organized and used. For example, experienced science teachers' knowledge of science is structured from a teaching perspective and is used as a basis for helping students to understand specific concepts. A scientist's knowledge, on the other hand, is structured from a research perspective and is used as a basis for the construction of new knowledge in the field (p.5).

Communities of practice are defined by Wenger & Snyder (1999) as "groups of people informally bound together by shared expertise and passion for a joint enterprise". They go on to explain that members in these communities share their experience and knowledge, a community's primary output – necessarily diverse, in creative ways that

foster new approaches to solving problems. The eMSS program seeks to foster this type of environment for its participants.

Potential Limitations of this Study

Sampling the Population

During the fall semester (2005) of this study, over 8,000 messages were posted to the program's discussion areas. It would follow that over 16,000 messages could be expected to be posted during one academic year. The time needed to study the entire population of messages limits this study to a sample of messages. Dialogue for this study was taken from the structured public discussion areas where program facilitators monitored and guided the discussions during the months of November and March. The private discussion areas (pair places) were not used in this study for two reasons. First, these areas are not facilitated, and thus the work of the facilitator cannot be observed in these areas. Second, the vast numbers of messages in the pair places would require that sampling procedures be used anyway. Limiting the study to a sample of messages (though collected across a wide area of the program and at representative times in the program year) potentially limits the understanding provided by all available discourse in the program.

Outside Communication

This study is limited to communication within the eMSS online program. Other modes of communication between facilitators, mentors, and/or mentees such as telephone conversations, communication by private e-mail or regular mail, as well as face-to-face

meetings and classroom observations are possible and occur on occasion. These additional modes of communication were not monitored directly in the study. This potentially limits our understanding of growth that resulted from these additional types of interaction between program participants. However, these other types of communication were sometimes referred to or otherwise reflected in the online conversations analyzed in this study, and in the facilitator and mentor responses during case study interviews and on pre and post surveys.

The Nature of Online Dialogue

Though it is known through studies of distance learning that distance programs can be quite effective in facilitating learning and growth, online dialogue is different in nature than face-to-face communication. In distance communication, the enhancement that hand gestures, body language, voice intonation, and facial expressions provide to understanding, continuing, and deepening the conversation is not present. Therefore, analysis of written online discourse may miss cues (especially underlying meanings observable in various modes of expression) otherwise picked up during face-to-face conversations.

Silent Participants

Bice (2005) found strong evidence in his dissertation, which was based on learning and growth in the eMSS program, that silent online participants learn and grow in practice. Called “lurkers”, these silent participants read messages but tend not to post

to the discussion areas. Thus, the growth, learning, and interactions of these participants will not be evident from the analyses in this study.

Coding Process

Judgments are required in order to analyze the meanings and quality ratings of written messages. Coders in this study were familiar with the goals and visions of the eMSS program. Measures of inter-rater reliability were used to assure consistency in rating messages and determining meanings. Still, personal judgment may limit the extent to which meanings of messages are understood.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

This literature review is organized into four sections:

1. Mentoring and Induction of Beginning Teachers
2. Learning through Computer-Mediated Communication
3. Distance Mentoring
4. Facilitating Distance Learning Systems

The first section looks at new teacher induction in general and its recent progress and direction to put in context the creation and implementation of the eMSS program, the distance induction program for science and mathematics teachers on which this study focuses. This section includes what is known about content specific mentoring, the benefits and characteristics. The second section examines what is known about learning through dialogue, especially in an online environment. The third section examines the evolving body of literature on distance mentoring (or e-mentoring, telementoring, etc.). And, for guidance in the design of the training for the facilitators in the eMSS program, the fourth section looks at what is known about facilitating learning in distance environments, specifically in distance mentoring systems.

Mentoring and Induction of Beginning Teachers

It is not the intention of this section to re-create work accomplished by others in their attempts to compile, compare, and make sense of the mentoring and induction literature. It is rather to benefit from this by identifying linkages to the present study.

Since education reform movements of the 1980's (Little, 1990) brought about concerns for high quality teachers and their retention, efforts to support new teachers in practice have spread widely. Research conducted on resulting mentoring and induction programs for beginning teachers has provided evidence that mentoring and induction programs can be successful both in retaining new teachers and in improving their professional practice (Britton, et al., 2003; Darling-Hammond, 2000; Feiman-Nemser, et al., 1999; Stansbury and Zimmerman, 2002). However, practitioners and researchers report that these programs vary widely in their approaches to supporting new teachers and that the varied strategies directly affect the successes of the programs (Fideler & Haselkorn, 1999).

What follows in this section is a summary of the results of three recent comprehensive literature reviews on new teacher mentoring and induction practices, findings from a comprehensive study on international induction programs, and descriptions of successful induction program models within the United States. It is the intent of these summaries to give the reader a general overview of how mentoring and induction efforts have evolved and practices of programs that lend themselves to success in retaining teachers, improving their practice, and the resulting improvement in student achievement.

Induction Literature: A Curriculum Approach

An extensive review of the beginning teacher mentoring and induction literature was conducted by Bice (2005) in his doctoral dissertation study which looked at the construction of knowledge about teaching and educating students of diverse cultures in the eMSS induction program. Bice (2005) points out that new teacher induction programs can vary from a single informational meeting at the beginning of the school year to a well-planned and sustained process which includes an adaptive curriculum that covers a period of several years. In addition to identifying the benefits of well-designed and implemented induction programs, Bice's review (2005) focuses on the need for a well-organized curriculum for induction programs and the characteristics and themes of programs described in induction research studies.

Using evidence provided from a variety of sources (Feiman-Nemser et al., 1999; Gless & Moir, 2000; Strong & St. John, 2001; Stansbury & Zimmerman, 2000; Ralph, 2002; Koestier & Wubbels, 1995; Bullough, 1987; Paine, Fang & Wilson, 2003), Bice (2005) identified the retention of teachers and the improvement of teacher practice as benefits of new teacher induction programs. Stemming teacher attrition can save districts the costs (both in time and work) of replacing lost teachers and can provide continuity for students in the classroom. Improvements in teacher practice and confidence may also contribute to retaining new teachers as well as result in an increase in the academic achievement of students.

Bice (2005) used the induction curriculum as an anchor around which to organize his review. To summarize his findings here is appropriate since both this study and his

were based on the eMSS induction program which utilizes an organized induction curriculum for supporting beginning teachers and guide mentors and program facilitators. The curriculum themes and sources identified by Bice (2005) are summarized below.

1. The changing areas of support needed by a beginning teacher at varying times during the induction process may be thought of as a curriculum framework that evolves with the development of the new teacher. (Feiman-Nemser et al., 1993, 2001; Gratch, 1998; Pleeger & Mertz, 1995; Ralph, 2002; Stansbury & Zimmerman, 2000)
2. Traditionally induction programs have focused on aspects of general pedagogical knowledge such as classroom management, understanding student needs, and comprehending the main ideas of teaching practice. These areas were observed and reported to be primary needs of beginning teachers. (Eisenman & Thorton, 1999; Odell, 1986, Ralph, 2002; Upson & Koballa, 2004)
3. Support is needed to help beginning teachers' transition to a focus on more advanced pedagogy such as learning to teach subject matter content more effectively. (Luft & Patterson, 2002; Luft, Roehrig & Patterson, 2003)
4. Beginning teachers grow professionally when provided with support to adapt and use instructional strategies and resources in the classroom. (Odell, 1986; Mariage & Garmon, 2003; Valencia & Killion, 1988)
5. Interaction among participants in an induction program can enhance teacher practice. This can include beginning and experienced teachers, administrators, and/or others providing professional development. Interaction beyond the mentor

relationship, then, is seen as beneficial in the growth of the beginning teacher. (Abell, 1995; Britton et al., 2003; Burton, 2003; Feiman-Nemser, 1998; Gersten & Dimino, 2001; Gratch, 1998; Odell & Ferraro, 1992; Sillman, 2003; Stansbury & Zimmerman, 2000; Van Hanegan, Pruet & Bamberger, 2004)

6. Critical self-reflection helps beginning teachers grow and mature in practice. Thus, opportunities to learn to develop critical self-reflective processes can lead to the growth of the beginning teacher. (Britton, et al., 2003; Flecknoe, 2000)

Bice's dissertation study (2005) further supports the use of a curriculum in induction programs. His work showed how the use of an intentional and customized curriculum within the eMSS induction program helped teachers to reflect on and examine their own beliefs and to develop an awareness and understanding of student backgrounds and needs. This ultimately led to positive changes in the practice of new teachers.

Induction Literature: An Empirical Approach

In order to assess the need for additional research evidence on the impact of beginning teacher induction on teacher quality and retention, a thorough literature review was conducted by Lopez et al. (2004) of SRI International for the National Center for Education Evaluation within the Institute of Education Sciences. The goals of the review were to determine what existing empirical literature says about the impact of new teacher induction programs on teacher retention and teacher quality (especially as quality influences student achievement), and which components of programs contribute to any observed benefits. The review focused on experimental and quasi-experimental research

written since 1980 (considering older work to be less likely to represent practices and programs of today) which examined induction programs for beginning teachers (defined by the authors as instructors in their first or second year of teaching though, problematically, some of the studies used broader definitions). Of the 387 articles on new teacher induction examined, only 12 met selection criteria for the study. The criteria demanded that the study:

- examine the retention of beginning teachers (though most relied upon teachers' self-reports about their plans to remain in teaching); and/or
- examine improvements in teacher quality (only one considered student achievement as a measure of teacher quality – others relied on classroom observations of teacher practices); and
- be an experimental design that utilized random methods for assigning participants to treatment and comparison groups; or
- be a quasi-experimental design that included a planned comparison between groups of people (such as treatment and control), between occasions of measurement (such as pretest and posttest), or both.

The majority of research studies included in Lopez's review were evaluations of specific induction programs. Several studies consisted of research that examined different approaches to mentoring, a common component of induction programs (Klug & Salzman, 1991; Stallion, 1988).

Though Lopez et al. (2004) found mixed results in the empirical research studies regarding teacher retention and teacher quality, there were several findings relevant to the

present study. First, their efforts revealed few examples of rigorous research to demonstrate the impact of beginning teacher induction. This finding reinforces repeated calls for studies that rigorously examine the connection between new teacher induction and its reported benefits.

Second, mentoring was found to be a defining feature in most of the programs studied. It was, however, used in conjunction with other activities like classroom observations, various workshops and trainings, portfolio development, and release time for professional development. Though induction programs typically include the assignment of a mentor, they continue to vary widely in design and practice – ranging from single events to regular and highly structured support – as reported in comprehensive reports of current induction practices (Fideler & Haselkorn, 1999). This may be one factor contributing to the difficulty of conducting experimental approaches to research on the effects of induction programs.

Third, the authors report that in the Texas study (Dana Center, 2002), the new teacher retention rates were not only higher overall for participants in the induction program, but that this was especially true for minority groups and teachers at the high school level. The study reported 91 percent of Hispanic teachers returned for a second year of teaching compared with 73 percent of those who did not participate in the program. This is encouraging considering the disproportionately low number of teachers representing minority groups (Ingersoll, 2001) in the nation's public school system. Likewise, it is encouraging to see increased retention of high school teachers who

participated in the induction program, especially in the context of this study which focuses on mathematics and science teachers at the secondary level.

Fourth, and especially relative to this study, is that the authors of the review report that in the evaluation of the New York program (NYC Board of Education, 1993), self-reports of retention were even higher if the assigned mentor was in the same subject and/or grade level as the new teacher. This finding provides support to the decision of the eMSS program to provide content specific mentoring and the program's efforts to match mentoring pairs within specific subjects and grade levels. Another finding of this study was that retention rates were higher for participants who were assigned mentors at the beginning of the school year rather than mid-year. And mentoring for extended periods was also associated with higher self-reports of teaching abilities. This finding is consistent with research on professional development practices that has shown that sustained programs are more effective in fostering teacher growth and development (Garet et al., 2001).

One study (Schaffer, Stringfield, & Wolfe, 1992) which reported positive changes in effective teaching behaviors utilized an evolving curriculum approach during a two-year induction program. The first year focus was on classroom organization, management skills, and instruction. The second year focus was on alternative instructional methods, higher cognition questioning, matching methods to content, peer coaching, and the development of professional growth plans. The positive outcomes of this approach support the curriculum focus argued for by Bice (2005) in his comprehensive review on induction literature as described earlier in this section.

And last, Lopez et al. (2004) describe several problematic features uncovered in the review that may limit the feasibility of empirical research on the effectiveness of new teacher induction. Conflicting results for teacher quality as measured by increases in teacher competencies were obtained in one study (Klug & Salzman, 1991). While quantitative results based on ratings of teacher competencies during observations showed slight declines, qualitative data from the same study (beginning teacher questionnaire results) suggested that teacher competencies increased over the course of the year.

The authors also indicated a number of characteristics of the studies examined in their review which contribute to weak research designs which need to be overcome by other studies of this type. They note that adequate definitions of the constructs of induction, retention, and teacher quality are lacking, that too much emphasis is given to self-reporting of outcomes, and that many of the studies used only one measure of outcome and didn't always align the outcome assessed with the treatment the teachers received.

Induction Literature: A Conceptual Approach

In a conceptual review of the literature on new teacher induction, Feiman-Nemser et al. (1999) take a critical look at the way the concept of induction is understood. Though concluding that induction is a complex concept that involves varied practices and activities associated with systemic reform initiatives designed to retain teachers and improve the quality of teaching, they identify three uses or meanings of the term induction which tend to determine how programs are framed, developed, and implemented.

First, induction is seen as a unique phase in the life of a teacher – one in which the teacher is learning to teach and fulfill the same responsibilities as seasoned teachers. This phase can be seen as a part of a broader continuum of teacher development in which the teacher, now in a real classroom, needs all types of support including management, discipline, instruction, resource, and emotional support as they work on the development and evolution of teaching competence and expertise. Understanding induction as a formative phase in learning to teach allows induction programs to, not only provide emotional support and just in time support regarding immediate issues and problems, but also to consider adjustments in the expectations of beginning teachers and to consciously provide professional learning opportunities that are connected to subject matter, students, and the daily tasks of teaching.

A second construct of identified by Feiman-Nemser et al. (1999) as a result of their literature review frames induction as a process of socialization. It is a time of transition when teachers move from preparation to practice – transition from being a "student of teaching to a teacher of students" (Moskowitz & Stevens, 1997, p. 178). This concept of induction focuses on the messages received by beginning teachers about what it means to be a teacher in the new school setting and professional community and how emerging identities and evolving practice are influenced by these messages. This view of induction appears with varying degrees of understanding. It can be seen simply as "easing the transition into teaching" where teachers "learn the ropes" or begin to "fit in" as a result of an orientation process. A more comprehensive view is that of a "professional socialization" in which the teacher is inducted into the cultural and

professional communities of teaching through a program that interacts within the context of the school, its professional community, and its students. Through situated learning opportunities and in the company of trained mentors who are also experienced teachers, the beginning teacher not only learns to "fit in" but also moves forward in his or her teaching practice, "learning to size up teaching situations, investigate what students are thinking, and use the information gathered to inform and improve practice" (Feiman-Nemser et al., 1999. p. 18).

And third, induction can be seen as a formal program for beginning teachers. Programs vary widely in length, design, and purpose, ranging from a principal's informal welcome to a formal mentoring program and further to a state-wide system of induction mandates. Feiman-Nemser et al, (1999) list characteristics of quality programs compiled from frameworks of programs described in empirical studies and from accepted "best practices" described in professional practitioner literature. A developmental stance, a supportive context, a mentoring component, and adequate resources are characteristics that help to define the effective induction programs studied in the review.

Induction Literature: A Program Comparison Approach

This section looks at recent comparisons of mentoring and induction programs both internationally and within the United States. It looks at programs across disciplines and also considers programs specifically for teachers of science and mathematics. By examining comparisons of programs, their characteristics and successes, a lens can be provided for insight into the design and implementation of effective induction programs, those that accomplish broad and robust goals. Britton et al. (2003) describe effective

induction programs as those in which efforts go beyond the supportive role. Not limited to general teaching tips and teachers' day-to-day crises, effective programs help beginning teachers learn subject-specific issues in curriculum and instructional practices and basic professional skills such as evaluating student learning and reporting on their progress (Britton et al., 2003). Comparisons of effective programs help to identify the benefits, best practices, and components necessary for effective induction programs to accomplish their various goals.

Examinations and comparisons of comprehensive induction systems across the United States and across other countries (Britton, et al., 2003; Rhoton & Bowers, 2003; Villani, 2002) help to reveal how successful induction programs go well beyond supplying basic survival skills for new teachers. They demonstrate how induction programs can be designed to promote learning about teaching and to support the evolution of more effective classroom teachers. Examination of these programs, as Britton et al. (2003) point out, leads to reflection on the purposes for the creation and use of induction programs, who should be served by these programs, what the curriculum should look like, and how, by whom, and when the programs should be implemented.

Comprehensive Teacher Induction (Britton, et al., 2003) describes a three-year study of established induction programs in five different countries. In this comprehensive study, Britton et al. (2003) identify themes across these international programs that describe how induction systems can successfully promote learning about how to teach along with providing basic teacher support. In *Science Teacher Retention: Mentoring and Renewal,* Rhoton & Bowers (2003) have assembled a collection of works

from noted science educators that provides background and strategies regarding science teacher induction and presents exemplary programs designed to retain, develop, and renew science teachers, and ultimately, to enhance student learning. And, in *Mentoring Programs for New Teachers: Models of Induction and Support*, Susan Villani (2002) has provided a compilation of descriptions of successful induction program across the country that demonstrates a variety of ways in which institutions and organizations can support beginning teachers.

Though vast and distinct differences existed in the programs studied and reported on in these comparisons, similar themes were and can be identified in cross-case analyses. The following characteristics of effective induction programs identified by Britton, et al. (2003) give new insights into the current and popular notion of induction as only a solution to the problem of teacher retention and/or teacher quality. Examinations and reports of programs in this country by Rhoton & Bowers (2003) and Villani (2002) provide support that these characteristics help to promote teacher development and effectiveness as well as to increase retention of new teachers.

First, effective induction practices go beyond a simple problem-based approach. They focus on early career learning, necessarily and historically embedded in social and political cultures to which the beginning teacher belongs. Induction, in this fashion, "becomes a part of their teaching, not extra to it (Britton, et al., p. 328).

Secondly, effective programs are unquestionably seen as valued, though for different reasons. They tend to include broad and robust goals of improving teacher quality, promoting personal development, and/or improving student achievement.

Induction is treated as a distinct phase in a teaching career that contributes uniquely to the development of teachers and their place in the profession. With this attitude, induction programs take on the role of developing something desirable, improving the quality of teaching by targeting significant and complex issues of teaching, rather than being primarily about fixing a problem. The program design takes into account pre-service learning and training of the beginning teacher and builds upon that by providing support and opportunities for learning within the context of the teaching assignment.

Effective programs contain a curriculum that links what teachers need to learn with activities and opportunities designed to help them learn that are directly connected to their own practice. In addition to providing training and support in survival skills during the first several years of teaching, effective programs provide learning opportunities in strategies for classroom management, assessing student understanding, understanding and meeting student needs, promoting reflective practice, and opportunities for learning effective methods for subject-matter teaching. Luft (2003) points out that many induction programs overlook the critical aspect for content-specific support described by various researchers (Adams and Krockover, 1997; Emmer 1986, Roehrig and Luft; in review; Sanford, 1988). She highlights the unique opportunity, during the induction period, to advance the knowledge of science-specific pedagogy, such as learning to plan and manage lab instruction, implementing inquiry and standards-based lessons, and fostering an understanding in students of the nature of science. Her own research has shown that teachers in a science-specific induction program implemented more student-centered inquiry lessons and held more student-centered

beliefs than science teachers in general induction programs (Luft et al., 2001). Britton et al. (2003) describe various levels of exposure in international induction programs to what Lee Shulman (1987) termed pedagogical content knowledge, PCK. Loucks-Horsley et al. (1998) describe the importance of PCK as

> The critical and specialized knowledge that experienced teachers have – pedagogical content knowledge – is [the very knowledge] that helps teachers understand what their students need, how they come to understand certain concepts and principles of the content, and what they need to increase that understanding (p. 128).

And last, effective induction is multi-faceted. It provides multiple opportunities for support and opportunities to link theory with practice. It is not the provision of a single activity but includes a variety of practices and opportunities that are provided over a period of time with adequate frequency and intensity. In other words, successful induction consists of a sustained system of uniquely designed activities based on the individual purposes of the institution that will be implementing the induction. The activities may include a variety of components including mentoring, facilitated peer group discussions, work to promote reflective practice, observation feedback, etc. The most common component of induction programs is mentoring (Britton et al., 2003; Rhoton & Bowers, 2003; Villani, 2002). Other practices are widely varied and, in effective programs, tend to be tailored to the unique needs of each institution. Reasons for induction can vary, as well, though the belief that induction is important is almost universal (Britton et al., 2003). It can be seen in Villani (2002) and Lopez et al. (2004) that teacher retention appears to be one of the most common and consistent purposes for

beginning teacher induction programs in the United States. Interestingly, retention was not listed as a reason for induction in the international programs studied by Britton et al. (2003). The goals of these international programs varied but were more related to developing teachers as both professionals and individuals.

Summary – Mentoring and Induction

New teacher induction has been shown to have multiple conceptual understandings, varied professional practices and components, varied goals and purposes, and varied reported benefits. Induction has been viewed as a unique phase in a teacher's career, as a process of socialization as the new teacher transitions from preparation to practice, and/or as a formal program for beginning teachers (Britton et al., 2003; Feiman-Nemser et al., 1999). Components of induction have been shown to vary widely ranging from a single event, such as an orientation session for new teachers, to a complex system of activities and opportunities designed to promote the development and growth of the new teacher's practice (Britton, et al., 2003; Fideler & Haselkorn, 1999; Lopez et al., 2004; Villani, 2002). The purposes and goals of induction programs have been shown to include, among others, the retention of new teachers, enhancing teacher quality, promoting the professional growth of the new teacher, and increasing the achievement of students (Britton, et al., 2003; Lopez et al., 2004; Villani, 2002). And, research has shown that induction programs can help to stem the attrition of beginning teachers (Dana Center, 2002; Cheng and Brown, 1992; Gold, 1987; NYC Board of Education, 1993) and help to improve their classroom practice (Britton, et al., 2003; Lopez et al., 2004).

Though differences exist among induction programs in understanding, components, goals, and purposes, reviews and comparisons of effective programs and reported best practices reveal common themes and important characteristics in allowing programs to reach their broad and robust goals. Effective induction goes beyond simple problem-based approaches and is treated as a distinct phase in a teaching career, embedded in the professional context of the teaching assignment (Britton et al., 2003; Feiman-Nemser, et al., 1999; Rhoton & Bowers, 2003). Its practices target complex issues of teaching in order to build something desirable, for instance, a quality teacher, personal development, and/or increased learning for students. Effective programs include adaptable and evolving curricula that are designed to provide multiple types of support and opportunities for new teachers to grow in personal adjustment, pedagogical knowledge, and pedagogical content knowledge (Bice, 2005; Britton et al., 2003; Lopez, et al., 2004; Rhoton & Bowers, 2003). Effective induction contains multiple activities and practices, including mentoring which is overwhelmingly the most common component of induction programs. And effective induction is sustained, typically lasting a period of one to three years. Finally, effective induction is uniquely designed, with activities and practices fitted to the unique needs and goals of the system (Britton et al., 2003; Villani, 2002).

The knowledge compiled in this section is reflected in the design of the eMSS induction program. With multiple components, including a mentoring aspect, that target emotional support, general pedagogy, science content, and science-specific pedagogy, an evolving curriculum guides new teachers in their personal and professional growth and

development. The overall curriculum, which encompasses program modules, dilemmas, and certain aspects of the content areas (see Figure 1, p. 3), has been developed with a focus on reflective and collaborative discussion. An evolving training process, which includes an intentional curriculum for mentors and facilitators, helps to foster practices and interactions consistent with the desired professional growth of the beginning teachers. These curricula have been developed using strategies and methods that have been shown to be successful in distance communication. This study sheds light on the impact of computer-mediated communication on mentoring relationships and provides insight into the effectiveness and best practices of distance mentoring, an approach still in its infancy.

Learning through Computer-Mediated Communication

In order to create effective online communication it is essential to understand ways in which participants interact within distance learning environments. Cook (2002) described the challenge of identifying the relationships between learning theory, empirical work, and the implementation of learning environments so that understandings can be formed of how electronic dialogue may be effectively used to promote learning. Constructivist learning theories, widely accepted in all fields of education, have been applied to the use of technology in teaching and learning. Driscoll (2000) cites the potential of the interactive environment of computer-mediated communication to create "an effective means for implementing constructivist activities" (p. 395). The use of computers and telecommunications technology supports the social construction of

knowledge as it simultaneously creates an archive of the interactions. This section of the literature review examines learning and growth among participants of computer-mediated conference environments from a constructivist point of view.

Constructivism

> Why is it, in spite of the fact that teaching by pouring in, learning by a passive absorption, are universally condemned, that they are still so entrenched in practice? That education is not an affair of "telling" and being told, but an active and constructive process, is a principle almost as generally violated in practice as conceded in theory. Is not this deplorable situation due to the fact that the doctrine is itself merely told? It is preached; it is lectured; it is written about. But its enactment into practice requires that the school environment be equipped with agencies for doing, with tools and physical materials, to an extent rarely attained. It requires that methods of instruction and administration be modified to allow and to secure direct and continuous occupation with things.
>
> John Dewey

Dewey, as early as 1915 in *Experience in Education* challenged educators to teach in such a way as to allow students to meaningfully construct their learning. The idea of individual and active construction of learning described here has come to be known as constructivism. It is supported by an extensive body of literature and research which includes works by such well known philosophers, psychologists, and scholars as Piaget, Bruner, Kelly, and Skinner (Brooks & Brooks, 1993) and more recently Goodman, Gibson, von Glasersfeld, Kuhn, and Vygotsky (Driscoll, 2000). General constructivist theory rests on the assumption that knowledge is not independent of the learner, but is constructed by learners as they attempt to make sense of their experiences. How learners construct knowledge depends on what is already known. What is known depends on experiences and how those experiences have been organized into existing knowledge

structures. Thus, we all have a different understanding of the world based on individual experiences and beliefs about those experiences (Jonassen, et al., 1995).

Constructivists maintain that learners should identify and pursue their own learning goals and strategies (Driscoll, 2000). Constructivist pedagogy gives the learner much of the responsibility for deciding what and how to learn. Describing constructivist practices, Driscoll (2000) states that "self-regulation is clearly desirable to constructivist educators" (p. 380). Constructivism advocates instruction that guides a learner by providing them with real-world examples and proposing problems that promote reflective thinking in an environment designed to enhance communication. Jonassen (1995) described the role of the constructivist instructor as a "facilitator" who creates learning environments that foster personal and social meaning making through interaction within communities of learners.

There is no single constructivist theory of instruction, rather several epistemological positions that underpin various aspects of constructivist theories. Common to each position is that knowledge is constructed based on what is already known by the learner, and that learning is an active process rather than a passive process. Learners are "not empty vessels waiting to be filled, but rather active organisms seeking meaning" (Driscoll, 2000, p. 376).

Social Constructivism

One widely accepted constructivist theory is "social constructivism" (Kanuka & Anderson, 1998). Kanuka & Anderson (1998) proposed that "social constructivism" is currently the most accepted epistemological position associated with online learning.

Others' views parallel this position (Cook, 2002; Gunawardena, Lowe, & Anderson, 1997; Jonassen et al., 1995; Miller & Miller, 1999). The assumption of this view is that "knowledge is grounded in the relationship between the knower and the known. Knowledge is generated through social intercourse, and through this interaction we gradually accumulate advances in our levels of knowing" (Kanuka & Anderson, 1998, p. 60). Knowledge develops and continues to change with the contextual social experiences of the learner. Learning, thus, is a continual, life long process.

The Russian psychologist, Vygotsky (1978), is most often associated with social constructivism. He emphasized the influence of cultural and social contexts in learning. Many constructivist and situated cognition theorists adhere to Vygotsky's notions about the social negotiation of meaning, believing that higher mental processes in humans develop through social interaction, and that learners test their own understandings against those of others (Driscoll, 2000). Social constructivism uses language as a medium and conversation as the process by which meaning is negotiated and knowledge is constructed. According to Jonassen et al. (1995), "… learning is necessarily a social dialogical process in which communities of practitioners socially negotiate the meaning of phenomena" (p. 9). Constructivists, thus, emphasize collaboration as a critical feature in the learning environment where learners are provided opportunity for exposure to and means to understand others' points of view. Cook (2002) explains that "interaction has an adaptive mediating role, helping students to recognize and resolve inconsistency". That learners become explicit about their own understanding, by comparing and contrasting it with that of other learners, mandates that the learning environments be

created to provide opportunities for focused and constructive dialogue to occur (Miller & Miller, 1999). Through collaborative dialogue, learners are provided means to communicate their understanding, listen to the views of others, explore alternative perspectives, are challenged in their beliefs, and are provided opportunity to challenge the beliefs of others.

Constructivism in Online Learning

Constructivist pedagogy uses technology tools to design systems that provide opportunities to enhance communication through collaboration. Various features of the web environment are well suited to support constructivist learning goals. Computer-mediated conferencing and e-mail are common web based features that permit communication among learners. Both are readily available and relatively easy to use which has made them the tools for choice for collaborative courses (Jonassen, et al., 1995). Ravitz (1997, p. 2) notes that the "Internet has helped to bring about a shift from an 'instructional' model to an information-age 'conversation' model of learning …" that fosters constructivist learning goals. In the "physical absence" of the instructor, learners are given more responsibility for meaning making and knowledge construction. Through the use of collaborative assignments, facilitation of active discussion, and the promotion of the development of critical thinking and research skills, the instructor or facilitator can support this process. "The outcome is an environment rich in the potential for collaborative learning and the social construction of meaning (Palloff & Pratt, 1999, p. 17)."

Driscoll (2000) listed five conditions for constructivist learning collectively compiled from recommendations of numerous constructivist researchers. Shown below in Table 1, these conditions for constructivist learning are believed to bring about the learning goals of constructivist instruction; problem solving, reasoning, critical thinking, and the active and reflective use of knowledge (Driscoll, 2000).

Table 1. Relationship of Web-Based Constructivist Instructional Goals (Miller & Miller, 1999) to Conditions Necessary for Constructivist Learning (Driscoll, 2000).

Conditions for Constructivist Learning	Constructivist Instructional Goals of Web-Based Instruction
• Embed learning in complex, realistic, and relevant environments. • Provide for social negotiation as an integral part of learning.	Present a problem solving situation in a realistic context.
• Provide for social negotiation as an integral part of learning. • Support multiple perspectives and the use of multiple modes of representation.	Provide opportunities for learners to collaboratively construct knowledge based on multiple perspectives, discussion, and reflection.
• Provide for social negotiation as an integral part of learning. • Nurture self-awareness of the knowledge construction process. • Encourage ownership of learning.	Provide opportunities for learners to articulate and revise their thinking in order to insure the accuracy of knowledge construction.
• Nurture self-awareness of the knowledge construction process. • Encourage ownership of learning.	Create opportunities for the instructor to coach and facilitate construction of knowledge.

Miller and Miller (1999) proposed four primary instructional goals of web-based instruction based on a constructivist learning approach. In Table 1 these instructional goals have been matched (by this author) to Driscoll's five conditions for constructivist

learning. A brief explanation of the relationships of Miller and Miller's instructional goals matched to Driscoll's conditions for learning follow.

Instructional Goal #1 (Miller & Miller, 1999): Present a problem-solving situation in a realistic context. Miller & Miller (1999) explain that the primary communication strategy for this goal is to provide "real life" scenarios that include opportunities for learners to collaborate in problem solving. In this light, this goal can be matched to Driscoll's first and second condition for constructivist learning: 1) *embed learning in complex, realistic, and relevant environments* and 2) *provide for social negotiation as an integral part of learning.* The relevancy of working with real life problems might also match this goal with Driscoll's fourth condition: 4) *encourage ownership of learning*.

Instructional Goal #2 (Miller & Miller, 1999): Provide opportunities for learners to collaboratively construct knowledge based on multiple perspectives, discussion, and reflection. Communication strategies proposed for this goal (Miller & Miller 1999) include the provision of collaborative communication opportunities. With the creation of a social atmosphere where participants can share their viewpoints, this goal can be matched to Driscoll's second and third conditions for constructivist learning: 2) p*rovide for social negotiation as an integral part of learning* and 3*) support multiple perspectives and the use of multiple modes of representation.*

Instructional Goal #3(Miller & Miller, 1999: Provide opportunities for learners to articulate and revise their thinking in order to insure the accuracy of knowledge construction. Applicable communication strategies proposed by Miller & Miller (1999)

for this goal include bulletin (discussion) boards to record learner responses for later analysis and reflection and e-mail to pose questions and solicit information. This goal can be matched to Driscoll's second and fifth conditions for constructivist learning: 2) *provide for social negotiation as an integral part of learning* and 5) *nurture self-awareness of the knowledge construction process.* That learners have opportunity to share and refine their learning through these strategies also matches this goal to Driscoll's fourth condition for constructivist learning: 4) *encourage ownership in learning.*

Instructional Goal #4(Miller & Miller, 1999: Create opportunities for the instructor to coach and facilitate construction of student knowledge. Miller and Miller suggest using e-mail as the primary communication strategy for this goal. Group coaching might also occur through interactions on the discussion board. This instructional goal can be matched to Driscoll's fourth and fifth conditions for constructivist learning: 4) *encourage ownership in learning* and 5) *nurture self-awareness of the knowledge construction process*.

The matching of these conditions for constructivist learning with constructivist goals for online learning might indicate the potential of computer-mediated communication for enhancing construction of knowledge. That essential constructivist learning conditions can be met in online learning environments speaks to the ability of distance communication, mediated by written dialogue through computer technology, to be effective in the growth and construction of knowledge. However, as discussed in later sections of this literature review (see sections on "Distance Mentoring", p. 54 and "Facilitating Distance Learning Systems", p. 67), simply designing online learning

systems around these goals may not be sufficient in promoting construction of knowledge. Online participants will likely need guidance (from an instructor or a facilitator) for conversing in ways that are likely to lead to the achievement of learning goals. Knowledge of the dialogue process (discussed below) may help facilitators to intervene in appropriate ways to move dialogue forward and improve learning among participants.

Learning Through Dialogue

The work of Peters and Armstrong (1998) focused on how meaning is constructed through the dialogue process in relationships, particularly in formal teaching and learning settings. They identified three types of teaching and learning used in educational environments. In the first two, *Teaching by Transmission, Learning by Reception* (the predominant mode of teaching and learning) and *Teaching by Transmission, Learning by Sharing*, the teacher is the primary source of information and the manager of the learning environment. However, the third type, *Collaborative Learning,* involves the teacher as a member of the group. The teacher relinquishes the role of the principal source of information and its transmission to students. Dialogue is the principal mode of discourse that learners use to construct meaning. Computer-mediated conferencing is an ideal medium to support collaboration in learning. In fact, the nature of learning in computer-mediated systems requires this type of teaching and learning. For collaborative learning, dialogue has been identified as a central component as it helps learners achieve parity in their relationships while facilitating mutual reflection, growth, and change (Clark, 1991). Regarding collaborative dialogue, Clark (1991) cited that it is

> … a stance that transforms communicating people into coequal collaborators who cooperate in the process of negotiating meanings they can truly share, meanings that do not embody the dominance of one (but) enable people to develop a shared understanding of their common experience in an interaction that becomes more than the sum of its individual participants because the shared knowledge that emerges from it cannot be reduced to what each one of them separately knows. (p. 3)

Isaacs (1999), a leader in working with dialogue in organizational learning, argued that learning to think together means learning to dialogue. He proposed that members of social institutions learn to think together in order to resist the fragmentation of the institutions and the cultures they represent. For Isaacs (1993), dialogue can produce "an environment where people are consciously participating in the creation of shared meaning" (p. 26). Something that is done *with* others, rather than *to* others, dialogue is a way of thinking and reflecting together, sharing inquiry. It allows a relationship with the world, others, and with our own intentions, feelings, and desires.

As a result of his extensive work with organizations around the world, Isaacs (1993) proposed a four-phase model of dialogue which describes its evolution in groups. A slightly modified version (for clarity) of this model is shown in Figure 3. Building on the work of physicist and author, David Bohm, philosopher Martin Buber, and psychologist Patrick DeMare, Isaacs' model of the dialogue process (1993) relies upon the relationship among learners and the ability of individuals to think and communicate critically and reflectively. Figure 3 also shows where dialogues may stop progressing (and turn into argumentative discussion) at which point intervention is necessary in order to move the dialogue forward.

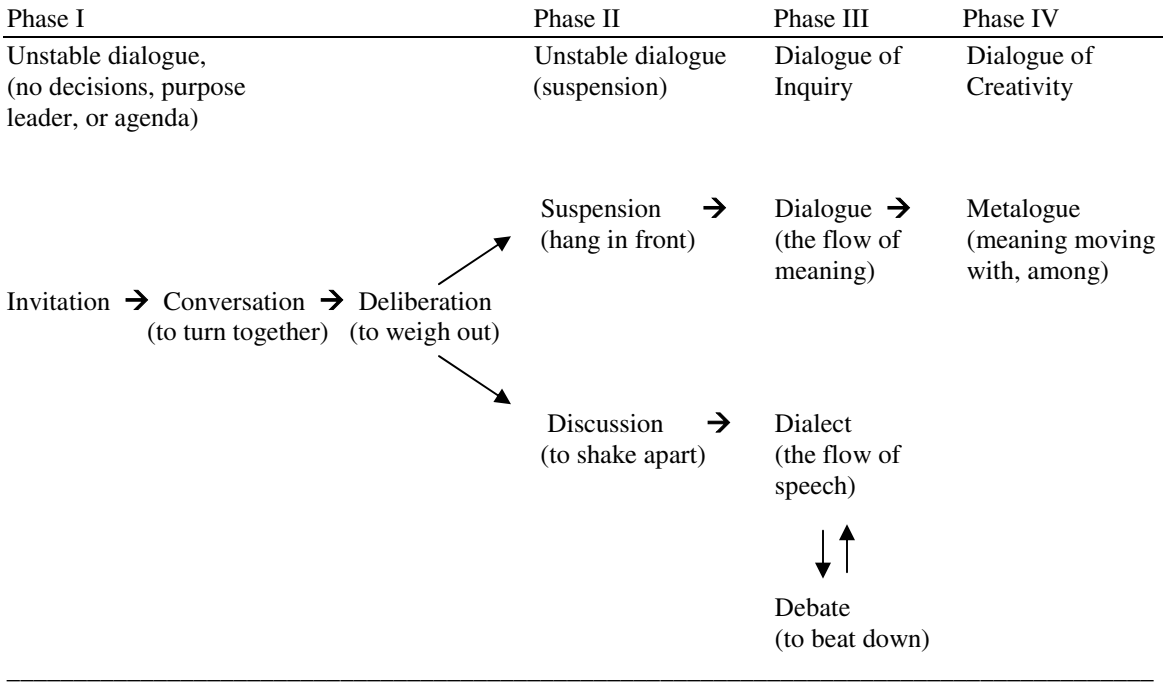


Figure 3. Evolution of dialogue (Isaacs, 1993) modified for clarity.

Phase one is characterized by conflict. Though they may be defensive of their own views, group members begin to realize that they can listen to others and suspend judgment. Exploration of different views begins in phase two during which time group members may experience frustration and disorientation. In the inquiry process of phase three, group members begin to develop respect for the views of others and the limitation of their thinking is realized. In phase four new levels of creativity and intelligence are created as group members become free from the thought patterns that previously limited them.

Interestingly, the ideas represented here are seen in the work of Gunawardena, Lowe, and Anderson (1997) as they examined the social construction of knowledge in an online conference (see Table 2). They observed and identified five phases which they

believe characterize negotiation of meaning among participants engaged in the social construction of knowledge.

Table 2. Author's Summary of Interaction Analysis Model constructed from Gunawardena, Lowe, and Anderson (1997).

Phase of Interaction	Description of Interaction
I. Sharing/comparing of information	Statement of observation, opinion, or agreement or a question thereof, corroborating examples, identification and/or description of a problem
II. Discovery and exploration of dissonance or inconsistency among ideas, concepts, or statements	Statement of disagreement and/or question thereof, advancing arguments and/or considerations of position using references to experiences, etc.
III. Negotiation of meaning/co-construction of knowledge	Clarification of terms, Identification of areas of agreement or conflict, negotiation embodying compromise, co-construction
IV. Testing and modification of proposed synthesis or co-construction	Test of co-construction against fact, experience, data, cognitive schema, contradictory literature
V. Agreement statement/application of newly-constructed meaning	Summarization of agreement, application of new knowledge, statement of awareness of change in thinking as a result of interaction

The steps of Gunawardena, Lowe, and Anderson's (1997) interaction analysis model indicate movement from lower to higher mental functions as the group moved from the sharing and comparing of information, through cognitive dissonance, and into negotiation of meaning and construction of knowledge. These steps, through which participants advanced as a result of written asynchronous dialogue, closely parallel the ideas of the dialogue process proposed by Isaac (1993). The interaction analysis model

has been used by researchers (or modified for use) to assess learning in asynchronous online environments where written dialogue is used to mediate the learning process (Gunawardena et al., 1997; Hew & Cheung, 2003a;, 2003b; Kanuka & Anderson, 1998). Evidence of each phase has been seen, though the overwhelming majority of messages were coded at the first phase of knowledge construction. If this corresponds to the first phase of Isaacs' evolution of dialogue, knowledge of the dialogue process may help facilitators to intervene in appropriate ways to move dialogue forward and improve learning among participants.

Knowledge Construction in Online Learning

Gunawardena et al. (1997) provided evidence that learning can be enhanced through collaboration within an online learning community. As they examined social construction of knowledge in an online conference, they observed five phases that characterize learning through online dialogue processes. As seen earlier, their work led to the development of the interaction analysis model (see Table 2) for analyzing interaction in computer-mediated conferences. Though evidence of all five phases was observed in the electronic messages that participants posted to the conference, the large majority of messages (93%) were coded at the lowest level of interaction, the sharing and comparing level.

Kanuka & Anderson (1998) used the constructivist interaction analysis model of content analysis developed by Gunawardena et al. (1997) to examine construction of knowledge in an online forum designed to create a professional development "learning space" for managers of workplace learning centers across

Canada. Like Gunawardena et al. (1997) these researchers found that though discourse analysis provided evidence of knowledge construction by participants in this online conference, most of the online interactions were at the lower phases of the interaction analysis model. However, in studying the interaction patterns that occurred during the forum, researchers found significant time engaged in social interchange. Occasionally, social discord followed and served as a catalyst to the knowledge construction process observed. Thus, a key finding was the benefit of social interaction in knowledge construction.

There is evidence from various studies of cognitive presence in computer-mediated conferencing. Perhaps a pre-requisite to knowledge construction, cognitive presence is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (Garrison, Anderson, & Archer, 2001). Cognitive presence, thus, reflects higher-order knowledge acquisition and application. Garrison, Anderson, and Archer (2001) used a practical inquiry model to examine cognitive presence in graduate level online courses. Relying on discourse as a means to knowledge acquisition, they assessed critical thinking through the analysis of written dialogue in online messages. They found that nearly 60% of messages illustrated cognitive presence. However, consistent with previous research (Gunawardena, et al., 1997; Kanuka & Anderson, 1998), the highest frequency of coded responses was of the "sharing and comparing" nature. Similar to the first phase of Isaacs' (1993) dialogue evolution (Figure 3), this is a

relatively low level of dialogue. Garrison et al. (2001) suggested that improved facilitation in terms of guiding and shaping the discourse toward higher-order cognitive activities might have resulted in higher level interaction.

Hara, Bonk, & Angeli (2000) documented a relatively high level of cognitive presence through content analysis of messages in an online college course. Using a combination of analysis tools (Henri, 1992 and Bloom, 1956) they discovered that 70% of students' messages illustrated cognitive presence. Hara et al. (2000) described these messages as "lengthy, cognitively deep, embedded with peer references, and indicative of a student oriented environment" (p. 1). High level cognitive skills such as inferencing and judgment were observed as well as metacognitive strategies such as reflection and self-awareness. As a result of studying the interaction patterns among students in this course, these authors recommended that instructors (or facilitators) should find ways to encourage social interaction in an electronic environment and to recognize student contributions when they result in significant dialogue and negotiation of meaning.

In his dissertation study, Bice (2005) provided evidence that beginning teachers participating in the eMSS online induction program increased their understanding of the culture of their students. Many of these teachers adjusted their classroom practice to help students develop and participate in a climate of understanding and respect and to apply appropriate strategies for teaching and learning science and mathematics that reflected the cultures of their diverse

students. Interestingly, Bice (2005) discovered evidence that within the collaborative group that developed online, learning in some cases took place through reading and reflecting on others' discourse without the reader contributing dialogue of his or her own.

Webb et al. (2004) conducted a study of the interactions among participants in asynchronous computer-mediated discussion forums in undergraduate courses. They found a positive association between students' participation in online dialogues and learning outcomes. Participation was defined as either active (contributions to the forum to either reply to conversation strands or to initiate new conversation strands) or passive (used the forums to read contributions and find information but did not contribute to the online discussions). In support of Bice's (2005) findings, Webb et al. (2004) found that both types of participation were significantly related to improved learning outcomes. Passive participants are commonly called lurkers. Salmon (2000) links their activity with browsing and suggests it is a normal first step in a socialization process within computer-mediated communication.

However, Webb et al. (2004) reported that there was very little deep discussion in the forum. For many of the students the quality of the contributions tended to show a lack of thought and reflection on the subject. The authors recommended that not only tutors or e-moderators be trained for online work, but that participants should be trained regarding contributing to and using online forums for learning purposes.

Several recent studies involving computer-mediated conference systems have shown only superficial levels of dialogue for learning (Angeli, Valanides, & Bonk, 2003; Hew & Cheung, 2003a; Hew & Cheung, 2003b). Angeli et al. (2003) found that online discourse from pre-service teachers' discussions of teaching cases from their field experiences was mostly an exchange of personal experiences and did not reflect well-supported reasoning. The reported results showed that "students' interactions did not involve critical thinking aimed at seriously examining course content" (p. 40). The researchers reported that participants were only offering opinions without grounding them on evidence from any reliable source. They also assessed the level of mentoring by instructors during the conference. It was found that only 1% of mentor postings utilized high level mentoring which involved cognitive task structuring, encouragement to explore, elaborate, and explain, fostering reflection or encouraging articulation.

Hew and Cheung (2003a, 2003b) studied participation and the quality of thinking of pre-service teachers in an asynchronous online discussion environment. Using a combination of frameworks for analysis (Gunawardena et al., 1997; Henri, 1992; McKenzie & Murphy, 2000), Hew and Cheung (2003a) reported relatively little interaction among participants with 94.4% of communication being at the sharing/comparing level, results similar to that of Gunawardena et al. (1997) and Kanuka and Anderson (1998). Hew and Cheung (2003b) also investigated the contributions for (a) clarification and understanding content, (b) creative thinking, and (c) critical thinking. They found that a high

percentage (41%) of the codings fell under the category of surface-level information processing. Evidence of critical thinking was only seen in 16.7% of the messages. Evidence is provided by these studies and others (King 2002; Paulus & Roberts, 2006) that improved training and greater efforts by facilitators may be needed in fostering higher quality dialogue for improved learning. As a result of their findings, these researchers suggest that facilitator roles are essential in scaffolding participants to think more in-depth, to instruct participants on how to justify statements with examples or data (Hew & Cheung 2003b), to provide guidance on how to ask questions, invite responses, and challenge others' ideas (Paulus & Roberts, 2006), and to model critical thinking skills in an online environment (Angeli et al., 2003).

It has been seen that there have been a variety of frameworks used for analysis of online interaction (Angeli et al., 2003; Garrison et al., 2001; Gunawardena et al., 1997; Hara et al., 2000; Hew & Cheung, 2003a, 2003b; Kanuka & Anderson, 1998; King, 2002; Paulus & Roberts, 2006). Meyer (2004) evaluated online discussions that occurred in two doctoral level classes using four different frames of analysis, two development models (King & Kitchener, 1994; Perry 1999) and two frameworks that captured levels of thinking (Bloom & Krathwohl, 1956; Garrison et al., 2001). Though Meyer (2004) found the discussions to elicit mid to high level responses, she found a lack of consistency across the four frames. She reported this finding as "tentative evidence that the four frames capture four unique and different qualities of student thinking that are

not simply a correlate of the other frameworks" (p. 111). Meyer implied, as a result of her findings, that there may not be one best frame for analyzing online conferencing and that the choice of model for analysis depends upon the goals of the discussion or learning situation. Hara et al. (2000), who used a framework of analysis modified from Henri (1992), suggests that "since every computer conference will have its own unique attributes, researchers may have to design electronic discussion group evaluation criteria on a case by case basis".

Summary of Learning through Computer-Mediated Communication

It is important to identify the relationships between learning theory, empirical work, and the implementation of learning environments so that understandings can be formed of how electronic dialogue may be effectively used to promote learning. Constructivist learning theories, widely accepted in all fields of education, have been applied to the use of technology in teaching and learning. Dialogue has been identified as a central component in constructing learning as it helps learners achieve parity in their relationships while facilitating mutual reflection, growth, and change. Knowledge of the dialogue process and the way that it evolves may help to effectively design online learning systems and may assist instructors and/or facilitators to intervene in appropriate ways to move dialogue forward and improve learning among participants.

The eMSS program is designed to promote the growth and development of beginning teachers through online dialogue with experienced teachers, mathematics and science content experts, and other novice science and mathematics teachers. Studies indicate that distance systems (including distance mentoring programs) for learning and

development can be effective (Berge, 1997; Bice, 2005; Collins and Berge, 1997; Gunawardena, Lowe & Anderson, 1997; Hara et al., 2000; Hiltz, 1994; Kanuka & Anderson, 1998; Meyer, 2004; Webb et al., 2004; Wells, 1993). However, there are indications in these studies that online learning systems can be enhanced by the use of an instructor or facilitator who implements strategies for advancing the level of participant dialogue and increasing the level of participant learning. These indications are consistent with suggestions made by Horizon Research, Inc. in evaluation reports of the eMSS program (Ford, 2004; Ford, 2005; Pasley, Madden, Ford 2006). Though learning and growth was seen in examinations of the program dialogue, a recommendation was made to train and use facilitators to promote a higher level of reflection, accuracy, and application in discussions occurring among program participants. These same indications are seen in literature specific to online mentoring programs.

Distance Mentoring

Professional literature indicates that computer-mediated conferencing can be highly effective for developing collaborative communities that promote learning and development (Berge, 1997; Collins and Berge, 1997; Hiltz, 1994; Wells, 1993). Electronic communications have opened up new pathways for social interaction within communities of individuals that allow examination of perspectives, personal reflection, and negotiation in constructing meaning (Garrison, et al., 2001; Gunawardena, et al., 1997; Keeley, 2004; Miller & Miller, 1999).

Research focused on online learning environments suggests that instructors can facilitate the development of a sense of community in which online participants feel genuinely connected to each other and are able to comfortably share ideas. High-level, reflective dialogue in which participants communicate their understanding, are challenged in their beliefs, listen to views of others, and explore alternative perspectives, is instrumental in facilitating the availability of experiences that can lead to the growth and development of a novice teacher's practice (Britton, 2003; Miller & Miller, 1999; Stansbury & Zimmerman, 2002).

Distance mentoring, also called e-mentoring, tele-mentoring, cyber-mentoring, or virtual mentoring (Single & Muller 1999), brings together mentoring and computer-mediated communications. In distance mentoring, the interaction between a mentor and a mentee is allowed to occur in an environment in which the barriers of time and space are reduced. Single and Muller (2001) defined e-mentoring as:

> … a relationship that is established between a more senior individual (mentor) and a lesser skilled or experienced individual (protégé), primarily using electronic communications, and that is intended to develop and grow the skills, knowledge, confidence, and cultural understanding of the protégé to help him or her succeed, while also assisting in the development of the mentor. (p. 108).

Going further in identifying the importance of program structure to develop and implement successful e-mentoring programs, they (Single & Muller, 2001) defined structured e-mentoring programs as:

> … e-mentoring that occurs within a formalized program environment, which provides training and coaching to increase the likelihood of

> engagement in the e-mentoring process, and relies on program evaluation to identify improvements for future programs and to determine the impact on participants. (p. 108).

Distance mentoring opens wider possibilities for more effective matching in a mentoring relationship by linking mentors and beginning teachers who otherwise would not have the opportunity to interact. In existing distance mentoring programs, which are still relatively few in number, the interactions between members of a mentoring pair have typically occurred through e-mail, though other modes of communication such as instant messaging, chat rooms, online discussion boards, and audio and videoconferencing have been used (Guy, 2002).

This section of the literature review examines how distance mentoring (which for this study is limited primarily to computer-mediated communication) has been utilized. Distance mentoring has been implemented in a variety of ways, for example, for mentoring school children in content areas and for mentoring service personnel in the military. This section will provide a glimpse of what has been learned about distance mentoring, including the benefits, successful practices, and the challenges that remain.

Electronic Mentoring for Students

To date, the greatest volume of work in distance mentoring has focused on providing distance support to K-12 school students and/or college students. Relatively large projects that were implemented in the dawn of distance mentoring, Electronic Emissary Project (Harris et al., 1997), the Telementoring Young Women Project (Bennett et al., 1998a) the International Telementoring Project (International Telementor Program,

2003), and MentorNet (MentorNet, 2004), along with various smaller distance mentoring projects (O'Neill et al., 1996; Freidman et al., 2004) have involved the mentoring of students through computer-mediated communication, primarily e-mail. These projects were designed to match K-12 public school students and/or college students with subject matter experts and industry professionals in specific discipline areas to provide assistance on school projects and/or to promote interest in particular subject areas. Research on these projects (Harris et al., 1997; Bennett et al., 1997; Bennett, et al., 1998a; Single & Muller, 2001) has begun to provide information and guidance on the benefits, best practices, and challenges of distance mentoring.

In addition to the benefits reported from face-to-face mentoring systems (see the first section of this chapter), research on distance mentoring projects has identified further benefits specific to a distance mode of delivery. Impartiality and a certain degree of anonymity have been reported as being important benefits to students of distance mentoring programs (Harris et al., 1997; Bennett, et al., 1997; Bennett, et al., 1998a; Friedman et al., 2004; Single & Muller, 2001). Relationships, in the distance environments, were reported to be less hindered by boundaries of individual differences and role responsibilities normally enforced when relationships are developed face-to-face within a school or institution. Students appreciated being mentored by someone who was not judgmental, as a teacher, parent, or administrator might be. By being paired with someone not in a role of authority over them in the computer-mediated context, students were allowed to be in as much control over the relationship as the mentor. This tended to

allow the development of safe, trusting relationships in which members could be honest and open in their interactions.

In these distance mentoring programs, the absence of barriers such as geographical distances and scheduling difficulties provided more opportunities for matching a student with a suitable mentor (Friedman et al., 2004; Harris et al., 1997; O'Neill, et al., 1996; Single et al., 2002). The asynchronous nature of the communication allowed mentoring relationships to overcome differing time schedules and provided for relatively frequent interactions. In addition, without the pressure of responding immediately, participants had the opportunity to construct thoughtfully written messages (Single & Muller, 2001). In pairing students with content experts and industry professionals, the students were able to "reach beyond their own community and to talk to people they would not normally have access to" (Friedman et al., 2004, p. 20). Additionally, O'Neill et al. (1996) discovered the value of the scientists' expertise as a resource, not only for students, but also for students' teachers. The expertise provided by the content experts expanded and enhanced the knowledge base of the teachers.

Research on these projects has also identified challenges associated with distance mentoring. Technology issues were identified as a major hurdle to the success of computer-mediated distance mentoring programs (Harris et al., 1997; Bennett et al., 1997; Bennett et al., 1998a; Single and Muller, 2001). Thomas (2005) reports that when mentors were used to support students in online college programs "dealing with the medium was every bit as challenging as the coursework for new distance-learning students". With the internet being the medium of communication among mentors and

their protégées, access to the internet, access to technological equipment, and basic computer skills were essential to the communication process. Friedman et al. (2004) described a dramatic increase in the quality of distance mentoring relationships when urban writing students were provided with adequate technology through which to write and to communicate.

Another challenge identified by research on distance mentoring projects is that of maintaining relationships. A challenge also seen in face-to-face relationships, the development and maintenance of online mentor/mentee relationships, even with the reduction of geographical and time obstacles, has been noted. Noting the ease with which participants can ignore messages from mentoring partners and/or staff and fail to follow through with the responsibilities of a distance mentoring relationships, Kasprisin et al., (2003), found that required training for participants in the MentorNet program resulted in more frequent interactions between mentors and their protégés. Research has shown that increased participant involvement relates to positive outcomes in distance mentoring programs (Bennett et al., 1998a). Thus, strategies, such as training, coaching, and moderating, to encourage the frequency and duration of mentoring interactions are important.

Electronic Mentoring for Teachers

The work on electronic mentoring for teachers has been primarily limited to the support of pre-service teachers in field experience placements (Green & Zimmerman, 1996; Hallenbeck et al., 2000; Riedl et al., 1999). In addition, a few reports of projects involving the distance mentoring of new teachers can be found (Eisenman & Thornton,

1999; Luebeck, 1998; Thoreson, 1997). Electronic dialogues in pre-service programs and in beginning teacher support programs have provided forums for examination of knowledge, problem solving, social and emotional support, and general exchange of ideas (Greene & Zimmerman, 1996; Luebeck, 1998; Schagel, Trathen, & Blanton, 1996; Thomas, Clift & Sugimoto, 1996; Thoreson, 1997). Pre-service teachers and beginning teachers who were mentored through e-mail or other types of computer-mediated conferencing have reported receiving practical support regarding pedagogy, discipline, communication skills, and encouragement (Luebeck, 1998; Riedl et al., 1999; Thoreson, 1997) within the context of their school placements.

Reducing the isolation of pre-service teachers in their field placements, technology has helped to bridge the gap between university and school environments (Greene & Zimmerman, 1996; Riedl et al., 1999; Hallenbeck et al., 2000). Providing supportive connections through computer communication has helped to reduce the isolation of beginning teachers, especially in rural placements (Eisenman & Thorton, 1999; Luebeck, 1998; Thoreson, 1997). Riedl et al., 1999 reported a freedom of exchange among pre-service teachers and their doctoral student mentors facilitated by an environment free of judgment and subsequent consequences. These benefits were also realized by pre-service teachers in a project connecting them to practicing classroom teachers (Hallenbeck et al., 2000). Pre-service teachers found "cyberspace to be a 'safe, secure' environment for sharing questions, concerns, and ideas without fear of embarrassment or evaluation" (p.33). In her dissertation study on the effectiveness of an early distance mentoring program for beginning teachers of science and mathematics,

Luebeck (1998) reported that novices in the program benefited from both one-to-one exchanges with their mentors and from broader experiences within the full community of online mentors. Thoreson (1997) noted that beginning teachers in this same program "found it easier to talk about local dilemmas because they were speaking with a mentor from outside their district" (p. 289).

Computer-mediated communication allowed interaction in a way that maximized convenience for equally busy pre-service teachers and practicing educators (Eisenman & Thornton, 1999; Hallenbeck et al., 2000; Thomas, 2005; O'Neill et al., 1996; Friedman et al., 2004). The use of e-mail provided timely feedback and ongoing dialogue without disrupting work routines of the participants. However, both pre-service and in-service teachers also reported a "significant commitment of time and energy" (Hallenbeck et al., 2000, p. 36) creating what some consider to be "an extra task on top of an already hectic schedule" (Riedl et al., 1999, p. 1823).

Studies involving the electronic mentoring of pre-service and beginning teachers have suggested the potential for the electronic communication in these projects to serve as a model of technology use in the classroom (Hallenbeck et al., 2000; Riedl et al., 1999; Eisenman & Thornton, 1999). Work in computer-mediated communications may also promote the potential of computer networking as an avenue for professional development (Hallenbeck et al., 2000).

Riedl et al. (1999) witnessed that "the reciprocal nature of the mentor/mentee relationship experienced on-line provided the opportunity for professional development of all participants" (p. 1825). The idea of mutual growth among both members of online

mentoring teams is supported in other studies as well (Hallenbeck et al., 2000; Luebeck, 1998; MentorNet, 2004; O'Neill et al., 1996; O'Neill, 2004; Thoreson, 1997). Mentors reported experiencing the satisfaction of helping others, the opportunity to engage in self reflection regarding their own career, and the opportunity to develop networking contacts.

In these distance mentoring programs, as well as programs involving students (discussed above) and professionals (discussed below), opportunities to interact with program participants outside of the mentoring pair were beneficial. Group involvement in discussion areas allowed participants to benefit from the wisdom and encouragement of others as they developed a greater affiliation with the program or organization in addition to their mentoring partner (Single & Muller, 2001). Protégés were able to learn from other mentors and protégés (O'Neill, 2004) recognizing the strengths of mentors other than their own (Luebeck, 1998; Thoreson, 1997) and developing a network of support. Mentors were able to interact with other mentors (Luebeck, 1998; Single, et al., 2000; Thoreson, 1997) and develop relationships that supported their electronic mentoring experiences and skills.

And, as seen in programs that involve electronic mentoring of students, technical difficulties in the electronic mentoring of teachers were reported to create frustration and anxiety (Riedl et al., 1999; Hallenbeck et al., 2000).

Electronic Mentoring in Other Areas

There are reports of distance mentoring programs in areas other than education. Distance mentoring has been used to mentor professionals in business, law, the military,

and medicine (Carnall, 1999; Knouse & Webb, 2000; Rickard, 2002; Stell, 1999). The benefits and challenges that are reported closely mimic those found in educational distance mentoring programs (Bierema & Merriam, 2002; Knouse, 2001). Because of isolated conditions (especially for small business professionals) and frequent relocations (especially for those in the military and medical professions), e-mail based mentoring greatly facilitated participation in the programs. And, as seen in education-based distance mentoring programs, a positive correlation was found between contact frequency and program outcomes (Knouse & Webb, 2000; Rickard, 2002).

A particularly important benefit, especially described as a result of studying distance mentoring programs in these "other" areas, is the potential to cross barriers of race, gender, age, and social status, in addition to the barriers of geography and time already described. In the asynchronous computer-mediated environment, the stereotypes that accompany race, gender, and social status become less visible, allowing mentoring to become the primary focus of the relationship (Bierema & Merriam, 2002).

Recommendations Resulting from Research on Distance Mentoring

As a result of research and practice with distance mentoring programs, important program features have been identified for the effective design and implementation of distance mentoring systems. Recommendations gleaned from the literature have been categorized by this author into four areas as shown here. They are further described below.

- Training for participants
- Alignment of expectations with program goals

- Group e-mentoring
- Online program facilitators

Training for Participants. Training for participants has been identified as an important component in distance mentoring programs (Harris, O'Bryan, & Rotenberg, 1996; Single & Single, 2005; O'Neill & Harris, 2004; O'Neill, 2004). Building on the features of training in face-to-face mentoring programs, distance mentoring programs have begun to develop online training to prepare participants for online communication (Bennett et al., 1998; Harris & Figg, 2000; Kasprisin et al., 2003). The training, though implemented differently for each program, has served to get e-mentoring relationships off to a good start. These relationships, easy to abandon before given a chance, may become more familiar by "walking students through" (O'Neill, 2004) examples of model telementoring relationships. Kasprisin, et al. (2003) provides evidence that up-front training can make a difference in outcomes of e-mentoring programs. Harris, O'Bryan, and Rotenberg (1996) have recommended that protégés be prepared to communicate "appropriately and adequately" online because computer-mediated communication "lacks the full range of communication cues that humans rely on in face-to-face interactions" (Guy, 2002, p35). Murray (1985), in describing online communication, which he has termed "composition as conversation", demonstrates how it is a blend of oral and written discourse:

> … more formal than face-to-face conversation and telephone conversation, but less formal than written memos and documents … semi permanent: can be partly planned; is subject to time delays; and lacks visual paralinguistic and nonlinguistic cues. The interaction of these

> characteristics results in complex turn-taking, with the turn-taking principles of oral discourse being violated; indication of topic shift; glossing of reference items to avoid ambiguity; less fragmentation than in oral discourse; and the use of graphical representations of paralinguistic cues (Murray, p. 206).

Making participants familiar with these differences lessens the risk of misinterpretation and misunderstanding in online program discourse.

Alignment of Expectations with Program Goals. It is recommended that participant expectations be explicitly communicated in terms of program goals (Single and Muller, 2001; Harris et al., 1996). Boyle and Boice (1998) and Murray (1991) report that face-to-face mentoring relationships meet more regularly and are rated as more successful when participant expectations are aligned with program goals. Program requirements such as eligibility and frequency of contact should be made clear. Participants should know how often and for how long they are expected to exchange messages with their mentors and/or respond to general discussion areas. Program staff should let participants know when and how program information will be communicated and should inform participants how their concerns, comments, and suggestions will be addressed.

Group E-Mentoring. Providing opportunities for group e-mentoring has proven beneficial to participants in distance mentoring programs (Single & Muller, 2001; O'Neill, 2004). Group e-mentoring involves interaction among multiple participants in the program, not just between the mentoring pair. Features providing for group interaction have served to increase the participants' involvement with the program or

with their organization or field (Single & Muller, 2001). Mechanisms such as internet list-serves (Eisenman & Thorton, 1999) and the development of "working groups" (O'Neill & Harris, 2004) have provided opportunities for participants to benefit from the wisdom and encouragement of other mentors and protégés as they share concerns, ideas, and experiences. These opportunities have also allowed interaction among mentors as they seek the advice of other mentors (Luebeck, 1998; Single & Muller, 2001; Thoreson, 1997). As participants were given opportunities to interact as a group, a sense of community developed in which participants connected with one another and felt comfortable sharing thoughts, ideas, and feelings (Single & Muller, 2001; O'Neill, 2004). Variables identified in research (Single & Single, 2005) that contribute to group e-mentoring programs in which goals are realized are:

- discussion groups based on themes rather than participant characteristics
- critical mass of participants
- participant or staff facilitators
- providing simultaneous discussion threads
- the development of safe and supportive communities.

Online Program Facilitators. Experience with distance mentoring programs has revealed the "critical need" (Harris, et al. 1996) for online facilitators familiar with techniques for helping participants construct online relationships capable of promoting successful learning experiences (Garrison et al., 2001; Harris, et al., 1996; Harris et al., 1997; Salmon, 2000; Single & Muller, 2001; Single & Single, 2005). Harris, et al.

(1996) believe that experience with computer-based communication and experience with education are requisites to knowing how to help participants build effective online mentoring relationships that adequately support students. They have found that by helping participants to use the same communication medium, the facilitator's actions can help the mentoring partners to collaborate more effectively. And, by using facilitators to guide and mediate in distance mentoring programs, programs are given means to model effective messages and actions and encourage similar action among participants. Facilitators, being careful to "assist and suggest, rather than direct" (O'Neill & Harris, 2004) can help mentoring teams to establish and maintain effective online relationships, set and adjust goals and expectations, resolve miscommunications, and to gain from online activities. Research on the Electronic Emissary Project (Harris et al., 1997) and MentorNet (Single & Muller, 2001) has demonstrated multiple purposes for coaching or facilitation (Single & Single, 2005):

- providing reminders to stay in contact helped to reconnect the mentoring partners when exchanges were disrupted
- delivering information to help guide the e-mentoring relationship during the developmental stages of mentoring
- providing timely and appropriate topics and customized information helped to foster involvement in the e-mentoring process
- coaching allowed program staff to maintain contact with participants which allowed program staff to provide consultation, troubleshooting, or re-matching.

Research supports that more frequent coaching messages, in these respects, were more effective than less frequent coaching messages. Single, et al. (2000) reported that protégés who received more frequent coaching messages had higher ratings of satisfaction with the program compared to protégés who received less frequent coaching messages.

The concluding section of this literature review examines the use of facilitators in distance learning systems in much more detail.

Facilitating Distance Learning Systems

This section of the literature review examines research and practice involving effective facilitation techniques in distance learning environments. Though empirical studies in this area are limited, there is increasing practitioner literature that shares experiences in the field and makes recommendations for practice. Both types of resources are used in this section of the literature review. Examined in this section are the differences that have been identified in face-to-face communication and computer-mediated communication in learning environments. These differences provide a rationale for the use of facilitators in distance learning systems. The discussion of this need is followed by a look at the various roles that facilitators have played in distance learning systems. The section ends with a discussion of techniques that have been identified for focusing participant dialogue in computer-mediated conferencing systems and for fostering the development of a sense of community and collaboration in online environments.

Introduction

Literature indicates that computer-mediated communications can be highly effective in facilitating learning and development by promoting discourse, reflection, and negotiated meaning (Berge, 1997; Collins and Berge, 1997; Hiltz, 1994; Wells, 1993). The written asynchronous dialogue of electronic communication has opened up new pathways to the social negotiation of learning and growth (Garrison, et al., 2001; Gunawardena, et al., 1997; Keeley, 2004; Miller & Miller, 1999). Research focused on online learning environments suggests that instructors can facilitate the development of a sense of community in which online participants feel genuinely connected to each other and are able to comfortably share ideas. Experience with distance mentoring programs has revealed the "critical need" (Harris, et al. 1996) for online facilitators familiar with techniques for helping participants construct online relationships capable of promoting successful learning experiences (Garrison et al., 2001; Harris, et al., 1996; Harris et al., 1997; Salmon, 2000; Single & Muller, 2001; Single & Single, 2005). Owen (2000), in describing a project whose aims were to develop collaborative virtual learning environments among teachers, found, as has been suggested by others, that in computer mediated conferencing good moderation and structure is needed to sustain good learning. Garrison et al. (2001) state that the complexity and challenge of facilitating higher-order learning in an asynchronous text-based environment "necessitates skilled facilitation" which "requires an understanding of the medium of communication, the process of higher-order thinking, and the critical role of teaching presence in attaining higher-order learning outcomes" (p. 21). Research on the Electronic Emissary Project (Harris et al.,

1997) and MentorNet (Single & Muller, 2001) demonstrated multiple purposes for coaching or facilitation (Single & Single, 2005) such as promoting frequent contact between mentors and their protégés, delivering important program information, fostering involvement in the program, and serving as a contact between participants and staff. O'Neill & Harris (2004) acknowledge that the nature of facilitators' responsibilities is dependent largely upon the ways in which particular projects are structured. Still, they have identified a variety of ways in which facilitators might be beneficial in supporting participants in any computer-mediated communication system. They have found that online facilitators can help participants to:

- Set up and test communications facilities (e-mail lists, web fora, etc.)
- Introduce themselves, getting to know each other personally and professionally
- Set realistic project goals and expectations
- Get answers to procedural questions
- Adjust goals and expectations according to project developments
- Keep communication flowing throughout the project period
- Identify, address, and resolve miscommunications
- Structure and participate in different kinds of online activities
- Evaluate individual and group contributions to learning/teaching (O'Neill & Harris, 2004, p. 121).

In their practical guide for facilitating online learning, Collison et al. (2000) further state that the purpose of online moderation is to enrich and deepen the dialogue and foster

learning. Importance, thus, is being given in distance learning systems to strategies such as coaching and/or moderating to encourage the development of online environments conducive to participant growth and development. In *Building Learning Communities in Cyberspace*, another practical guide for promoting learning and growth in online conferences, Palloff and Pratt (1999) note

> In the online classroom it is the relationships and interactions among people through which knowledge is primarily generated. The learning community takes on new proportions in the environment and consequently must be nurtured and developed so as to be an effective vehicle for education (p. 15).

Computer-Mediated Conferencing – Interaction Characteristics

Online communication is noticeably different in several respects than face-to-face communication. These differences can have both positive and negative effects for participants in an online conference. As participants interact in an online environment, the physical cues that one depends on so heavily in face-to-face communication are absent (Collier & Yoder, 2002; Collison et al., 2000; Murray, 1985; Palloff & Pratt, 1999). There are no facial expressions, hand gestures, body language, and/or voice intonation to help understand the true meaning of the interaction. There is no visual feedback to the "speaker" as to how he or she is being understood. The absence of these cues requires explicit writing and reading skills to ensure that understanding within the text-based communication is clear. Participants who find explicit writing a challenge may need extra support as they build their online communication skills.

Communication in many distance learning systems, including the eMSS program, is asynchronous. Delays in response due to different schedules, time zones, and/or expectations can be problematic when a more timely interaction is desired. However, higher level responses often result as participants have more time to consider the issue at hand before they respond (Collison et al., 2000; Palloff & Pratt, 1999). Also contributing to deeper and more meaningful discussion in computer mediated communication systems, is a permanent electronic record of the interaction. This allows participants, at any time, to return and reflect on previous discussions or contributions in efforts to negotiate individual meaning of the material and to contribute to moving the group toward a common goal.

The asynchronous nature of this type of communication allows participants to read within the parameters of their own schedules and responsibilities. While this feature certainly provides flexibility to participants, it can also create challenges as frequent posters can create burdensome numbers (or lengths) of messages that must be read, while others read but may not have the opportunity (or the desire) to post. On the other hand, shy or introverted people, who are hesitant to contribute to face-to-face conversations, are provided with the time to plan and carefully construct an online entry (Collier & Yoder, 2002). In an asynchronous system, the ability to think and plan responses may encourage active participation among more reticent personalities as well as participants who are second language learners. Such systems provide each participant with equal opportunity to contribute both original and evolving ideas.

Online interactions provide a degree of anonymity even when real names are used. With lack of physical cues and proximity among participants, communication may be less inhibited. Anonymity may provide shy participants with an increased confidence to respond. In the asynchronous computer-mediated environment, the stereotypes that accompany race, gender, and social status become less visible (Bierema & Merriam, 2002; Single & Single, 2005) and allow learning and development to become the primary focus of the system.

For many participants, online interaction is a new experience. They will, most likely, be unaware of the differences between these modes of communication. Facilitators, trained to act as guides in online systems, have the potential to ease difficulties in participant adjustment to the unfamiliar characteristics of online interaction. By carefully planning interventions, they can help to maximize the advantages of these communication differences and minimize the challenges.

Considerations for Effectively Facilitating Online Conferencing

Research and practitioner literature on distance learning environments has identified the need for facilitation in order to foster healthy, productive environments. Eastmond (1992) considers "healthy" computer conferences as those in which the topics are engaging and evolve as participant comments build upon each other. Collison et al. (2000) notes that a facilitator's charge is to foster the culture and learning in an online dialogue. What follows are activities and practices, identified by research and practitioner literature, that have helped facilitators foster healthy, productive online learning environments in systems that depend on computer-mediated conferencing as the

medium of communication. Activities provided by facilitators of online conferences have been classified into roles (Berge, 1995; Mason, 1991; McGee & Boyd, 1995) that vary somewhat, but that include social, pedagogical, organizational, technical, and/or managerial functions. Below, this author has categorized the guidance provided by online facilitators, identified and discussed in existing literature, into four important roles:

- The provision of community building activities
- The provision of clear procedural and organizational expectations
- The provision of timely and adequate intervention
- The provision of acknowledgement and synthesis of participant contributions

It should be noted here that earlier parts of this literature review reveal that there is a need for an additional category of facilitator guidance which is not identified in existing studies in this area. The need for facilitation of knowledge construction and conceptual development has been identified and is called for in some practitioner literature (Collison et al., 2000; Palloff & Pratt, 1999), but its application has not been discussed in previous research studies.

The Provision of Community Building Activities. Researchers report that the provision of community building activities by the facilitator can encourage a sense of community in the conference (Berge, 1995; McGee & Boyd, 2002; Collier & Yoder, 2002; Stuckey, Hedberg, & Lockyer, 2002). Activities in which participants get to know one another and share personal and professional information in a social environment have

been found to be important to developing a safe, comfortable environment in which participants share thoughts and feelings freely. It is considered to be appropriate, as a part of these community building activities, for the facilitator to share his/her own background information and interests as well as to nurture the development of a friendly, social environment by providing frequent and positive feedback to participant input. Kerr (1986) advises facilitators of online conferences to:

> Provide positive feedback and reinforcement in both messages to individuals and conference comments to the group, especially for their early efforts and periodically after that. Be sensitive to the needs of participants. Create a context conducive to thought, creativity, and self-esteem. Demonstrate that their contributions are valued. Reward positive contributions.

In a study of global virtual teams comprised of business students in masters programs from around the world, Jarvenpaa & Leidner (1998) found that social communication and communication of enthusiasm were behaviors that facilitated trust early in a virtual group's life. Results from a study involving computer mediated communication of graduate students and their instructor (Ahern, Peck, & Laycock, 1992) indicated that a conversational style of interaction produced higher levels of student participation and more complex interaction patterns online than questions only or statements only from the instructor. And, while studying group development in an asynchronous computer conferencing course, researchers McDonald and Gibson (1998) found that interpersonal issues constituted an average of between 45% and 75% of the communication and that affective needs were important throughout the duration of the

course. Acknowledging the feelings of others can help to create a sense of belonging in the group (McGee & Boyd, 2002) promoting a sense of community.

Studies of online systems indicate that facilitators can set the stage for collaborative learning by engaging all participants in dialogue and by providing opportunities for reflection (Collier & Yoder, 2002; Markel, 2001; Miller & Miller, 1999). As a result of an analysis of interactions in an online forum conducted by Kanuka and Anderson (1998, p. 72) the following implications for facilitating the construction of new knowledge in an online environment were reported:

- the provision of learning opportunities that capitalize on inconsistencies and contradictions between participants, and
- the incorporation of activities that help participants become explicit about their own understanding by comparing it with that of other participants.

Computer conferencing demands that participants become actively engaged with the course content and through interaction with their peers negotiate meaning and construct knowledge utilizing the shared experiences of all participants. Vygotsky's explanation of the internalization of social knowledge stresses regular and frequent interaction with others as a mediation tool of cognitive development (Moll, 1990). The facilitator's role in web-based communication is to arrange conditions that foster participants' construction of knowledge.

In their book about successful online teaching practices, Palloff and Pratt (1999) suggest that when participants engage in discussions with each other, rather than the instructor, possibilities for collaborations grow significantly. Participants' desire to

contribute to the group, as well as the quality of discussions, can be enhanced as facilitators encourage feedback from participant to participant (McGee & Boyd, 2002; Slocum, Towns, & Zeilinski, 2004) by mediating the development of shared goals, clearly articulating expectations, facilitating introductions, creating opportunities for small-group discussion, sharing facilitation responsibilities, and using dialogue as a form of inquiry (Palloff & Pratt, 1999). The frequency of interactions can be increased when facilitators communicate in ways that require responses from participants (Collier & Yoder, 2002; Collison et al., 2000). Facilitators can model appropriate interaction and collaboration in their practice as they pose thoughtful questions or ask for help, ideas, and/or elaborations.

The Provision of Clear Procedural and Organizational Expectations. An initial duty of an online facilitator is to set the agenda and norms for the conference (Mason, 1991).

> The lack of adequate leadership is one of the factors sometimes responsible for conference failure; unless a moderator sets an agenda and keeps the group working toward its goal, nothing much will occur. (Kerr 1986)

Mason (1991) suggests that participants need to know the objectives for the course or conference, expectations and requirements, schedule and activities, and rules and norms. She states that the use of a facilitator is a good way to communicate this information. Articulating standards for interaction, such as the number and frequency of expected discussion posts, is important, along with descriptions and examples of what might be considered acceptable message types (Berge, 1995; Collier & Yoder, 2002; McGee &

Boyd 1995). These researchers report that it is important that facilitators keep the group working toward its goal. This may mean addressing unsatisfactory participation through e-mail or the telephone, providing specific feedback and guidance; and/or refocusing the discussion.

The Provision of Timely and Adequate Intervention. Facilitators must be responsive, flexible, and adaptive to the needs of the group (Berge, 1995; Markel, 2001). Timely feedback is especially important in online communication. Markel (2001), an experienced online instructor, describes a "negative loop of participation" that results from slow instructor feedback that can lead to a lessening of participation in online discussions. She advises, "Feedback needs to be specific, personal, and within 24 hours of the posting." Dependable and consistent monitoring of communication forums is essential in order to determine the guidance needs of the group. It is important that facilitators not be the central focus of the discussion and that they remain neutral in heated discussions. Yet, knowing when to intervene with critical guidance is crucial. Few, but timely and well constructed interventions by online facilitators have been shown to be effective in promoting deeper and more thoughtful contributions about a topic (Collier & Yoder; 2002; Slocom, Towns, & Zielinski, 2004). It has been seen that a facilitator may only need to ask a probing question or share a relevant story in order to re-direct or deepen a discussion. Collison et al. (2000) describe the role of the facilitator as a "guide on the side" with a task to identify the need and time for interventions, develop rationales, and then craft effective interventions that target tensions, unresolved issues, or gaps in thinking of the group.

The Provision of Acknowledgement and Synthesis of Participant Contributions. As one of the most important actions of online facilitators, practitioners identify an online facilitation skill called "weaving" (Collier & Yoder, 2002; Markel, 2001; Mason, 1991; McGee & Boyd, 1995; Slocom et al., 2004). Mason (1991) acknowledges weaving to be one of the most highly prized skills of computer conferences. Feenberg (1989) describes the value of weaving comments:

> Such weaving comments supply a unifying overview, interpreting the discussion by drawing its various strands together in a momentary synthesis that can serve as a starting point for the next round of debate. Weaving comments allow online groups to achieve a sense of accomplishment and direction. They supply the group with a code for framing its history and establish a common boundary between past, present and future.

For the online facilitator, weaving consists of making regular comments that summarize, compare/contrast and/or point out themes in discussions. Mason (1991) reports that these serve to boost a discussion that is slowing down, trigger new responses, point out themes that have emerged from the discussion, or to promote reflection by summarizing participants' thoughts on a particular topic. Referred to as setting a "landscape" by Haavind (Collison et al., 2000), this strategy acknowledges different viewpoints and encourages further exploration of the issue or promotes the exploration of a different slant or different issue. Slocom et al. (2004) conclude after studying the interaction in several online chemistry modules:

> … it appears that effective online facilitation involves monitoring student postings so that responses summarize or weave together previous postings,

> challenge the students' reasoning by pointing out discrepancies, and requesting feedback. (p. 1064)

Summary – Facilitating Distance Learning Systems

Research and experience has shown that computer mediated communication is significantly different from other forms of interaction. It is asynchronous, primarily text based, with participants who are often widely geographically distributed. Though it lacks the full spectrum of visual and audible cues that we tend to depend upon in face-to-face exchanges, other visual and audio opportunities for interaction are available. Therefore, somewhat different interaction strategies are required to create maximal educational benefits for participants. Interaction techniques can be directly suggested and/or modeled by someone who is closely following the online conversations such as a facilitator or moderator. Web-based resources can be provided by a person with knowledge of the content of discussions among participants. The need for people to fulfill these roles has been identified in programs and courses that depend on text-based communication in a computer mediated environment to help participants construct teaching, learning, and support experiences in mutually beneficial ways. Facilitators have been found to be helpful in building a sense of community among program participants by providing activities that promote safety and belonging within a group. Providing clear procedural and organizational expectations has been an important role for facilitators to fulfill in distance learning systems. Acting as a "guide on the side" with timely and adequate intervention, facilitators have been shown to encourage group progress along with the individual progress of participants. Online facilitators have been important in promoting

meaningful dialogue among participants by acknowledging contributions to discussions, encouraging interaction among participants, and encouraging reflection and meaning by providing summaries or landscapes and future directions of discussions.

Knowledge that has been gained from research and practice involving the use of facilitators to enhance distance learning experiences informed the design of the facilitator training for the eMSS program, the context for this study. Many of the features identified by the literature and discussed here were incorporated into the training curriculum to be discussed in the next chapter. In an effort to improve learning and development among participants, the eMSS program staff identified the need to improve the quality of dialogue that was taking place in the discussion areas of the program and developed training for its participants. By training facilitators, the program staff sought the development of a different "class" of facilitator than the technical and structural roles identified and discussed in much of the literature. They sought a facilitator with a more professional role. They sought the development of a more knowledgeable facilitator with a vision of the learning goals of the program and skills in guiding participants toward those goals through meaningful and productive dialogue. They sought a facilitator who could assess the learning taking place in the online discussions and adapt the curriculum according to the progress of the participants.

Though many roles for facilitators have been identified and discussed, this kind of facilitator intervention is only mentioned in the literature reviewed for this study. Studies of knowledge construction in distance learning suggest that knowledgeable facilitators may have the capacity to promote increased learning through focused and productive

dialogue. This study explores whether well trained facilitators can promote the improvement of dialogue in distance learning environments, a key component in the construction of knowledge in such systems.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

This chapter describes the design of this study and provides important contextual and background information necessary for understanding the objectives of the study and the selection and use of research methods and data collection and analysis techniques. The purpose of this chapter is to inform the reader of what has been done, how it was done, and what quality measures were in place during the study.

The eMSS program, on which this study is based, is described in the context section. An overview of the program is given, and program areas in which observations were made and dialogue samples were taken are described. Further, the participants in this study are described and information is given on selection of participants and program areas for this study.

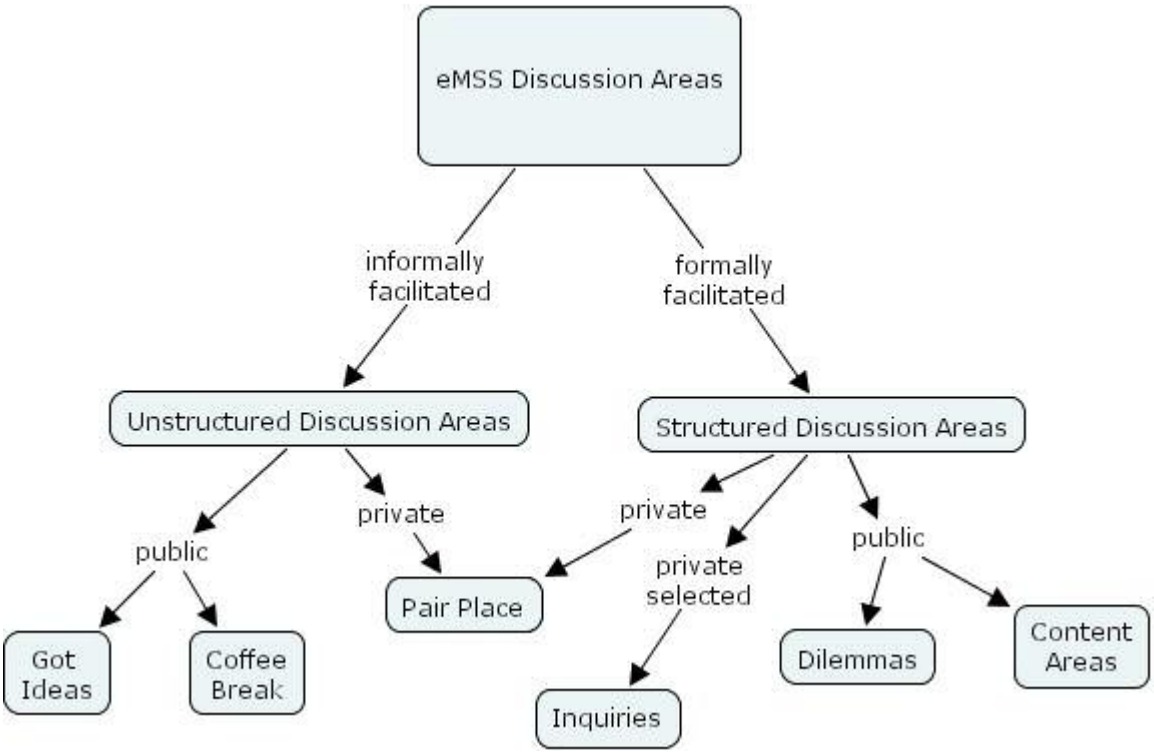
This research involved a mixed-methods design utilizing both quantitative and qualitative techniques. The research procedures used in this study are discussed here, beginning with a detailed background and description of the intervention used in this study, a three-part training and support process implemented in the summer of 2005 for eMSS program facilitators. This section includes a discussion of several different data collection methods that were used in this study including 1) a pre/post survey of facilitator knowledge, disposition, and skill; 2) an analysis of dialogue; and 3) a case study approach to investigate the practices of seven program facilitators. The case

studies included interview data, observation data, and a qualitative approach to dialogue analysis. Data analysis methods used in the study are explained. Also, included in this section is a discussion of the measures that were applied to this study to improve its quality.

Context of Study

Program Structure

The e-Mentoring for Student Success (eMSS) program is designed to improve teacher practice and student achievement in mathematics and science by providing support and professional development for beginning teachers of science and mathematics using a distance format. Drawing upon various models of mentoring and relevant research, support for growth in pedagogical knowledge is provided. Utilizing the vision of providing content-centered support for beginning teachers, pedagogical content knowledge and enrichment in science/mathematics content are stressed. Figure 4 gives an overview of the design structure of the 2005 – 2006 program. Online collaborative activities in structured areas of the program are designed to help beginning teachers move beyond a survival mode into developing expertise in specific areas to strengthen their science and mathematics teaching. Examples of these areas include classroom organization, managing student behavior, and best practices of science and mathematics teaching. An important feature of the program, the content areas provide for participant



eMSS Structured Area Descriptions

Dilemmas: The Dilemma area contains short, open-ended scenarios that pose questions about specific teaching issues. Participants conduct online discussions offering possible solutions to the dilemmas. The nature and structure of dilemmas invites a wide range of ideas, offers opportunities to exchange and contrast perceptions—and motivates teachers to respond. Dilemmas are grouped under five main themes: beginning of the school year, teaching issues, student learning, classroom organization, and content.

Inquiries: Inquiries are conversation guides designed to help mentees—with the help of a mentor—deepen their teaching practice and boost their effectiveness with students. Each Inquiry is flexible and adaptable for a mentee's own special teaching situation. Mentee/mentor pairs work on Inquiries over a period of six to eight weeks, and mentees participate in Inquiries several times during the school year. With each round of Inquiries, mentees have a choice of topics so they can select areas relevant to their teaching.

Content Areas: The content areas provide participants with science and/or math resources to use in the classroom, professional development opportunities, national and state content standards. They contain discussion areas that engage participants in professional conversation about mathematics and/or science education and allow participants to post questions, comments, or concerns about science or mathematics as they interact with established research scientists and mathematicians.

Pair Place: This is a private area for mentee/mentor pair discussion. The discussions in this area are of both unstructured and structured nature. For example, pairs are asked to conduct conversation around the Inquiries in the pair place.

Figure 4. Overview of the 2005/2006 eMSS program.

growth in knowledge of science or mathematics content. Unstructured discussion areas are provided to promote an environment for social interaction and informal sharing of ideas, practices, and experiences.

The focus of this study was on the conversation within the structured areas of the program – the content areas, the dilemmas, and the inquiries. These areas are formally facilitated with trained staff and participant facilitators, and structured with activities meant to promote the pedagogical knowledge, pedagogical content knowledge, and content development of the beginning teacher. Conversation threads for analysis and observations of participant practice in this study were taken from these structured, facilitated areas of the program.

Participants

During the summer of 2005, the eMSS program conducted an Advanced Mentor Institute that consisted of three weeks of online training designed to increase participants' knowledge, skills, and dispositions for furthering participation and high quality dialogue in the program's discussion areas. Participation in one of the two institute sessions was a requirement for any returning mentor from the 2004-2005 program. Persons interested in facilitating in the various structured areas of the program were also required to successfully complete the advanced institute if they had not completed a similar facilitator training piloted during the previous year. In addition, university scientists and mathematicians were encouraged to participate in the training institute in order to prepare them to work in the program's content area discussions. All participants of the advanced training were surveyed both at the beginning of the training and then again at the end of

the program year after receiving practical experience and guidance in implementing the leadership skills taught in the summer institute training. Successful institute completion consisted of adequate participation in the institute's online discussions and completion of guided weekly self-reflections. Of the 42 participants who were admitted to the advanced training, 31 successfully completed and thus were involved as advanced mentors and/or facilitators in the 2005-2006 program. From these institute completers, seven individuals were chosen using a purposive sampling approach (Patton, 2002) for in-depth case studies. Criteria for case study selection included the following:

- Participation in the eMSS Advanced Summer Institute (either 2004 or 2005)
- Placement as a facilitator in one or more of the 2005-2006 program areas
- Active participation in the ongoing facilitator training and support forum
- Willingness to participate in interviews for study

Of the individuals who completed the summer training institute in either 2004 or 2005, 16 ultimately indicated an interest in facilitating and thus were placed as facilitators in one or more areas of the 2005-2006 program. Of these 16 facilitators, 12 actively participated in the ongoing online facilitator training and support forum throughout the program year. By successfully completing the summer training, working as program facilitators, and actively participating in the facilitator forum, these 12 facilitators completed all phases of the intervention (described in detail below) on which this study is based. Of these 12 facilitators who completed all phases of the intervention, eight agreed

to participate in interviews for this study while four never responded to requests for participation. One of the eight facilitators left the program before the completion of the 2005-2006 year and was not available to complete the interview and review process. Thus, seven facilitators remained as possible case study participants. The practices of all seven of these facilitators were examined for this study. Selection bias for the purpose of producing desired results (Dereshiwsky, 2003) was not a concern in the quality of this study. All of the cases that met the selection criteria were used in the study.

A somewhat representative sample of cases in terms of facilitator/program experience resulted from this selection. Five of the cases selected for study, using the purposive sampling approach described above, were relatively experienced in the program. These relatively experienced facilitators had been involved in the program since its first or second year, had been trained and served as mentors to at least one mentee in the program, and had some experience facilitating program discussion areas and/or in online summer beginning mentor or mentee orientations. The remaining two cases were relatively experienced as mentors, but had no prior facilitation experience or training in the program. Five of the people chosen for case study had distance communication/education experience prior to their involvement with the eMSS program. This distance experience, described in more detail in the case study narratives in Chapter 4, included participating as students in online graduate programs, participating in online professional development opportunities, and managing an online listserve. Two of the cases had no prior experience with distance delivery. All case study participants were experienced and seasoned teachers of science and/or mathematics and five had

experience in the face-to-face mentoring of beginning teachers. One case study facilitator was male, the rest were female. This male/female ratio (14%) was similar to the male/female ratio (18%) for the 16 facilitators who worked in the program during the 2005-2006 program year. Thus, the gender representation in the case studies was consistent with the program facilitator population. However, male facilitator representation was much less than overall male participation in the program. For instance, of those advanced mentors and facilitators who successfully completed the advanced summer institute, 38% were male. Exploring the reasons for this discrepancy would make a worthwhile topic for future research.

As required by the Institutional Review Board of Montana State University all requirements for the protection of human subjects were met in this study. As a requirement of the exemption approved by the IRB for this study (Appendix B), all case study participants were provided with and signed consent forms which were securely filed. In addition, names and identifying information of all the participants were changed to protect their identities.

All threads of discussion in structured, public discussion areas during the months of November (2004 and 2005) and March (2005) were analyzed for dialogue quality in terms of the goals of the eMSS program. Table 3 illustrates the number of threads analyzed, the number of participant messages in each thread, and the discussion area in which the thread was found. By the beginning of November 2005, the program included 234 participants, mentors, mentees, content experts, and facilitators. All had access to the

content areas and the dilemma areas. Mentoring pairs selected one inquiry area in the fall and two inquiry areas in the spring to which they had access.

Table 3. Messages and Threads Used for Dialogue Analysis.

Discussion Area	# Threads Analyzed	# Messages in Thread
November 2004		
Chemistry	3	16
Earth Science	11	117
Life Science	3	35
Math	2	15
Physics	6	42
Classroom Procedures	7	74
Effective Labs	8	75
Effective Labs II	9	55
Managing Student Behavior	9	53
Understanding Student Learning	5	33
November 2005		
Chemistry	1	17
Earth Science	8	70
Life Science	4	85
Math	6	58
Physics	4	74
Classroom Procedures	6	48
Design Challenge	2	52
Managing Student Behavior	2	60
Using Data	4	30
Angry Students Dilemma	1	53
Holiday Anxiety Dilemma	1	66
Physics Dilemma	1	22

Table 3 – Continued.

Discussion Area	# Threads Analyzed	# Messages in Thread
March 2006		
Chemistry	2	18
Earth Science	3	15
Life Science	4	43
Math	6	53
Physics	2	22
Scientific Articles	5	54
Lesson Design	7	95
Effective Labs	8	76
Looking at Student Understanding	10	111
Pink Slips Dilemma	1	49
Frequently Absent Dilemma	1	45
Too Much Curriculum Dilemma	1	62

Research Procedures

Description of the Intervention

The Advanced Mentor Institute, mentioned above, is only one of three parts to the intervention designed and implemented by the eMSS Facilitator Development Team, of which this author is a co-coordinator. The team consisted of the two coordinators for facilitator development along with several project staff members who provided input into the design of the intervention, especially the Advanced Mentor Institute. This section of Chapter 3 describes the three key components of the intervention along with implementation information and goals for each. In addition, a more detailed discussion

follows of the design and implementation of the curriculum for the Advanced Mentor Institute, the most structured and formal of the three components of implementation.

Components of the Intervention. As seen below in Table 4, which outlines the components of the intervention, the training institute was conducted in the summer of 2005, prior to the program year, in an online format. This highly structured component of the intervention was designed to introduce and examine eMSS vision and goals, to provide opportunity for the development of supportive relationships among participants, and to learn about online environments, quality dialogue in terms of the eMSS program, and the development and growth of beginning science and mathematics teachers' practices. A second feature of the intervention was to provide mentors and future facilitators with actual facilitation experience in various areas of the program. This was accomplished by providing them with facilitation positions in the beginning mentor summer institute, in the summer mentee orientation, and/or in various areas of the 2005-2006 program, all of which occurred in an online format. The third component of the intervention was the development and implementation of an ongoing online forum designed to support facilitators in their work and to continue their training as they were implementing their newly learned skills. Through these three venues, discussed in more detail below, opportunities for facilitators to learn about the various components of quality dialogue specific to the program and effective facilitation skills and strategies were provided.

Table 4. Components of Intervention with Implementation Timeline.

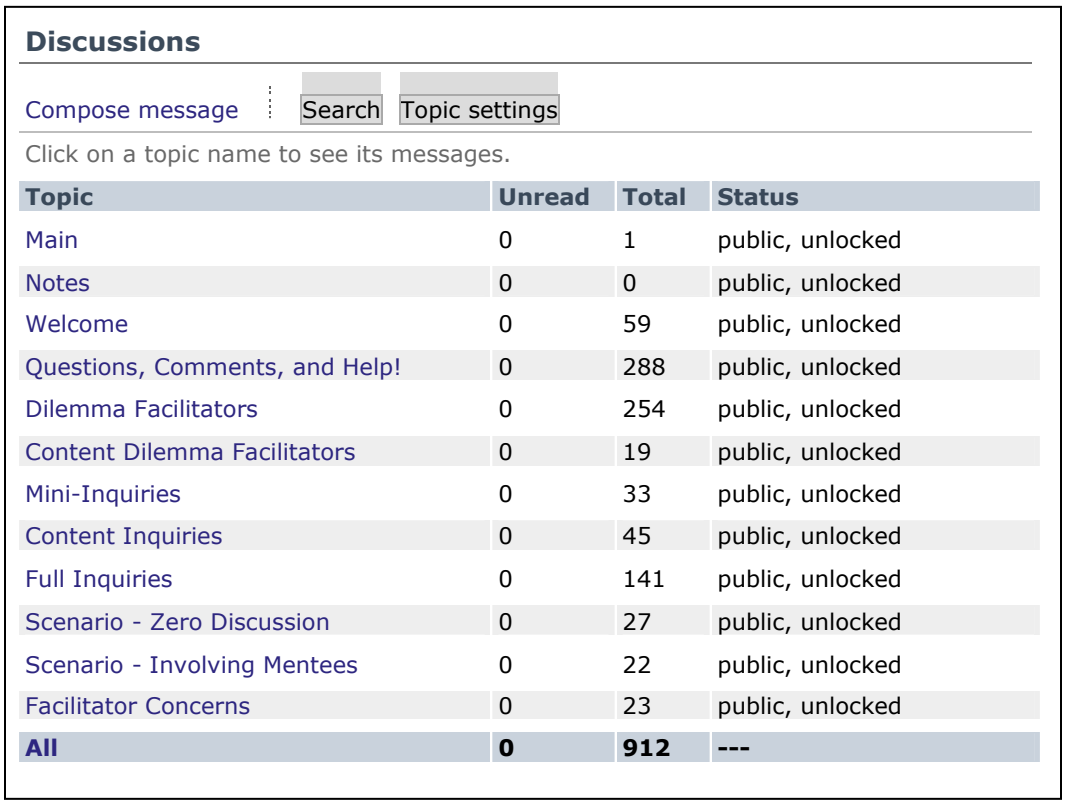
Component	Implementation	Purpose
Advanced Mentor Institute	Summer 2005 (prior to program) Online within the program's WebCT platform	Examination of program's vision/goals Development of supportive relationships Awareness/practice of quality online program dialogue Development of skills and strategies for leading and promoting online dialogue capable of advancing teaching practices
Placement in Program Areas	Summer 2005 (prior to program) Mentor and/or mentee training 2005-2006 (program year) Program discussion area facilitation	Opportunity to grow in practice with support and guidance from staff Opportunity to grow in practice while learning in context Opportunity to view and learn from the work of other facilitators
Facilitator Forum	2005-2006 (program year) Online within the program's WebCT platform (separate shell)	Venue for guidance and support from peers and staff Mechanism for questions, feedback Discuss and refine facilitation skills and strategies Development of confidence and expertise in facilitation

Advanced Mentor Institute. The online summer facilitation training was designed and implemented for the first time completely in a distance format. The development team sought to create a community of learning and support as common facilitation topics were introduced, discussed, and explored. However, before these topics could be appreciated and understood, the facilitators needed to explore and accept the vision and goals of the program. They not only needed to become familiar with the types of support that are essential to the growth and development of beginning science and/or mathematics teachers, but also how that support could be fostered in an online environment. Through the discussions in this and ongoing components of the intervention, facilitators discovered the answers to these questions and explored, within the context of their own participation in the program and in the training, what constitutes dialogue quality. The participants constructed this knowledge in relation to their own experiences in the classroom and in the profession and through their identified role in the program. Participants used conversations pulled from years one and two of the program as a means of learning to identify and analyze program dialogue for quality. Drawing upon relevant research and literature (such as Collison, et al, 2000; Palloff & Pratt 1999; etc.), participants investigated methods and strategies for initiating, guiding, and deepening online conversation within the context of the program. Participants practiced summarizing within their own discussion areas of the training. And, participants reflected on and analyzed their own dialogue in these sessions. The design and implementation of the curriculum for this institute is discussed in more detail later in this section.

Placement in Program Areas. With the awareness, knowledge, strategies, and skills developed in the summer training institute and support provided in the form of the facilitator forum (see below), participants were placed in various facilitator roles (see Table 4) in the program through which they practiced and refined their newly learned skills. There, facilitation knowledge and skills were further constructed within the context of practice. And, while in practice in various discussion areas of the program, facilitators were given access to other facilitators' discussion areas where they could view and learn from the work of their peers.

Facilitator Forum. Participants continued the supportive group relationship that began in the summer training in an ongoing facilitator discussion area of the program. Here, throughout the course of the 2005-2006 program year, facilitation issues and experiences were identified and discussed, questions were posed to the group (and the staff moderators), and application of research and literature to facilitation practice continued. In order to respond to relevant concerns and issues, participants helped to spearhead the discussions in this forum, with modeling having been provided by the staff coordinators of facilitator development. For instance, one facilitator sought advice regarding her concern that mentees seemed to be posting messages without reading (or considering) prior posts. Other discussions involved debate regarding the most timely and appropriate topics to be used in the dilemma discussions. And yet another example of discussions that occurred in this forum involved further conversations of how to guide participants in discussions while remaining "on the sidelines".

Figure 5 shows the various discussion areas of the forum in which facilitators participated. The forum was created in a separate WebCT shell so that only facilitators and eMSS staff had access to the discussions. In addition to areas in which facilitators were provided with information, direction, and discussion particular to a specific part of the program (dilemma, inquiry, etc.), general areas were provided for questions, comments, and concerns in which facilitators freely posted and received feedback from both peers and staff. A calendar was also provided in the forum with important program dates.



Discussions

Compose message | Search | Topic settings

Click on a topic name to see its messages.

Topic	Unread	Total	Status
Main	0	1	public, unlocked
Notes	0	0	public, unlocked
Welcome	0	59	public, unlocked
Questions, Comments, and Help!	0	288	public, unlocked
Dilemma Facilitators	0	254	public, unlocked
Content Dilemma Facilitators	0	19	public, unlocked
Mini-Inquiries	0	33	public, unlocked
Content Inquiries	0	45	public, unlocked
Full Inquiries	0	141	public, unlocked
Scenario - Zero Discussion	0	27	public, unlocked
Scenario - Involving Mentees	0	22	public, unlocked
Facilitator Concerns	0	23	public, unlocked
All	**0**	**912**	**---**

Figure 5. eMSS facilitator forum discussion board in WebCT.

Design and Implementation of the Institute Curriculum. The eMSS Facilitator Development Team, in its goal to prepare advanced mentors, content experts, and facilitators for their work in an online environment, primarily sought, with the design and implementation of the intervention, to improve the skills and strategies of facilitators and mentors in the following three areas:

- The development of supportive communities of learning capable of promoting the advancement of the professional practice of beginning teachers of science and mathematics consistent with eMSS program vision and goals
- The promotion of quality program dialogue (identification, analysis, introduction, maintenance, and deepening)
- The leadership and advancement of online discussions.

The entire training was designed to be implemented online, within a three-week period, using WebCT as the distance platform. The full curriculum for the training institute can be seen in Appendix D. For the reader's convenience, a matrix of the training design is provided in Table 5.

Table 5. Training Design Matrix.

Goals	Strategies	Activities	Desired Outcomes
Develop a community of learning that supports the development and growth of beginning math/science teachers' practices toward the improvement of student learning	Examine program vision/goals Examine roles of facilitators and mentors Opportunities to lead discussions, plan and implement activities Model various methods of providing feedback and encouraging participation Empower participants Examine stages of growth for beginning teachers	Read and apply the program's guiding principles Investigate roles and responsibilities of facilitators – discuss with which you personally identify Practice leading discussions on various topics Solicit and discuss participant advice, suggestions regarding program Practice with program areas – dilemmas and inquiries Determine "status" of beginning teachers in program	Use of effective strategies for encouraging participation Use of effective strategies for building trust and comfort Responsive to participants Provides support but encourages self-sufficiency Use of effective strategies for promoting self-reflection "Guide on the side"
Promote the use of quality online dialogue throughout the program	Opportunities to work with dialogue taken from earlier years of the program Opportunities for participants to lead discussions of dialogue analysis and methods to direct and deepen the discourse Focus on critical reflection of own dialogue in the program Model effective program dialogue	Compare online and face-to-face conversations Discussion of the challenges of online dialogue Analysis of dialogue using rubric – comparison and evaluation of rubrics Selection and discussion of "model" messages and conversations from program Practice in repairing inefficient messages and conversations Analysis and improvement of one's own messages	Knowledge of what constitutes quality program dialogue Ability to model the composition of effective program messages Ability to compose messages that elicit group response

Table 5 - Continued.

Goals	Strategies	Activities	Desired Outcomes
Lead and advance effective and meaningful online discussions	Conversation analysis Examine questioning techniques Work in advancing conversations given interests of group Work in deepening conversations given interests of group Opportunities to lead discussions Opportunities to summarize for the purpose of guiding facilitator practice Opportunities to summarize discussions	Analyze selected conversations for purpose and direction of discussion Practice questioning techniques – create messages meant to continue and/or steer conversations Practice with steering conversations Practice with summarizing conversations	Adaptable – responsive to participant interests Use of effective steering techniques such as guided questioning, re-directing Ability to align discussions with program goals while allowing the conversation to develop based on group interest Ability to recognize the effectiveness of the conversation Skill in summarizing at key points in discussion

It was the intention in the design of the facilitator training to facilitate the development of skills and strategies for facilitator practice that would foster quality dialogue in the online discussions. The facilitation of supportive relationships in the training was meant to provide a model of the type of community that the program wanted to develop for other participants. Thus, the training created learning opportunities for facilitators that served as a model of how facilitators might foster learning and growth of program participants. As can be seen in Table 5 and in the discussion below various learner-centered strategies (Lambert & McCombs, 1998) meant to promote inquiry,

reflection, constructivism, and social learning were used in the development of the training model.

Goal – Community of Learning/Improvement of Practice. In designing curriculum for the summer training institute, a primary consideration was to include activities that would assist participants to develop skills and strategies for fostering an online community of learning capable of contributing to the growth and development of beginning teachers' practices toward the improvement of the learning of their students. In order to accomplish this program goal, activities were developed and implemented that would expose participants of the summer training institute to the program's vision, expectations of facilitators and mentors in contributing to the growth and development of beginning teacher practices, and the common stages of beginning teacher development. Participants were provided with a variety of activities to this end (see the full curriculum in Appendix D). One example was a discussion of common roles and responsibilities of facilitators, taken from *Facilitating Online Learning* (Collison, et al., 2000), which was the text used in the training, matched to the desires of program staff (Appendix B, Table 5) to promote meaningful discussions leading to the growth of beginning teacher practice. A second activity called for participants, after investigating Stansbury and Zimmerman's (2002) continuum of beginning teacher support, to determine the "status" of beginning teachers in the program by analyzing mentee dialogue taken from program discussion areas. Other activities toward this goal served to empower participants in an effort to help promote the development of a sense of community within the program. Participants were given opportunities to actually lead discussions using their expertise on various

topics and solicited for feedback and advice on the program and its features. An important component in all areas, but especially in an attempt to accomplish this goal, was the modeling by program staff (eMSS Facilitator Development Team) of various methods, such as the use of the private mail feature, to encourage participation, provide feedback, and build trust.

Goal – Quality Online Dialogue. A second important consideration in designing the training for the summer institute was to develop skills in the identification and use of quality online dialogue. Important to the program's vision of improving teaching practice through interaction among members of an online community of learners, is an understanding of what constitutes quality dialogue both in an online environment and in terms of the program. Toward this goal, strategies involving first hand work and practice with identification and analysis of program dialogue were implemented through a variety of institute activities. Considered to be of utmost importance was the exploration of differences between online conversation and face-to-face interactions. The results of this exploration led to collaborative work among participants in identifying strategies for providing support specifically in an online environment. Additionally, participants received actual practice in analyzing dialogue using the eMSS Conversation Rubric (Appendix I) developed by HRI (Ford, 2005), the external evaluator of the project. Going further, participants critiqued the rubric for its effectiveness in evaluating program dialogue. Participants also received practice in critically analyzing their own dialogue in the program.

Goal – Leading Online Discussions. A third important focus for the summer training institute was to assist participants in developing strategies and skills in leading and advancing effective online discussions, again, in an effort to produce the kind of community interaction that might effect the development of reflective and responsive teaching practices. HRI (Ford, 2005) expressed concerns that dialogue in the eMSS program tended to be focused on logistics or an assignment reply rather than content or student thinking. There seemed to be a lack of "sense making" within the conversations, and sometimes misconceptions among participants in issues regarding content and teaching content. In response to these concerns, strategies were provided in the training institute with the intent to build facilitator skill in analyzing the accuracy and direction of conversations and steering them in directions consistent with program goals, while allowing the conversations to develop based on the interests of the group. Activities toward this goal included the analysis of selected conversations to determine purpose and direction of discussion. Further work allowed participants practice and discussion in re-directing conversations, especially when issues of accuracy or relevancy required attention. For instance, facilitators discussed and practiced how to intervene in a conversation when incorrect information was being shared regarding science or mathematics content. Activities that involved practice in summarizing conversations at key points in program discussions were designed to help to facilitators develop skills in reviewing conversations as a tool for directing their practices. Facilitators also practiced summarizing conversations for the purpose of encouraging reflection by participants in an effort to determine meaning of the discussion and to discover applicability and

relevancy to one's own practice. The examination and practice of questioning techniques, and their importance in online discourse, were activities included to provide facilitators with methods of advancing the discussions.

Data Collection

It is the intervention described above that is the basis of this research study that examined the major problem and focus questions presented in Table 6, basically to determine if the intervention 1) had an effect on the quality of online dialogue in the program and 2) had an effect on the growth and development of participants and their practice. Table 6 also includes an overview of the data collection methods used in this study along with a timeline showing when each of these methods was implemented.

Table 6. Matrix for Research which Illustrates the Examination of Data.

Overarching Research Question: What is the effect of facilitation training on the development and practice of participants in an online induction program for teachers of science and mathematics?

Focus Questions	Data Collection and Analysis	Timeline
How does the training affect the practice (including dialogue quality) of program facilitators?	1. Disposition/Skill Survey (pre/post) 2. Case observation of practice and analysis of dialogue in electronic record of program 3. Case interviews – perceptions of participants	Pre – June/August 2005 Post – Spring 2006 Fall 2005 & Spring 2006 Spring 2006
How does the training affect the practice (including dialogue quality) of program mentors?	1. Disposition/Skill survey (pre/post) 2. Case observation of practice and analysis of dialogue in electronic record of program 3. Case interview – perceptions of participants	Pre – June/August 2005 Post – Spring 2006 Fall 2005 & Spring 2006 Spring 2006

Table 6 – Continued.

Focus Questions	Data Collection and Analysis	Timeline
What components of the training are facilitating change in practice?	1. Case observation of practice in electronic record of program	Fall 2005
	2. Case interview – perceptions of participants	Spring 2006
What changes are seen in the overall quality of dialogue in the program?	1. Quantitative analysis of dialogue in public areas of the program – expand on preliminary research	November 2005/March 2006
	2. Qualitative analysis of dialogue of those selected for case studies	Fall 2005 & Spring 2006
What components of the training are facilitating change in dialogue quality?	1. Disposition/Skill Survey (pre/post)	Pre – June/August 2005 Post – Spring 2006
	2. Case interview – perceptions of participants	Spring 2006
What preliminary evidence is there, if any, that change in program participants' online practice is effecting change in the classroom practice of beginning teachers?	1. Qualitative analysis of dialogue	Fall 2005/Spring 2006
	2. Case interviews – perceptions of participants	Spring 2006

The study utilized a model of combined research designs as described in Creswell (2003). A case study approach (Yin, 2003) that included several methods of data collection and analysis from various sources examined and described the changes in selected participants' dispositions and facilitation practice as a result of the intervention. The case study methodology allowed the researcher to gain an in-depth look at the targeted phenomenon and its processes – specifically, in this study, how we can create effective online facilitators with skills that move conversations toward topics and levels of quality that are aligned with the goals of the project. The inquiry of this type of qualitative research looks for the emergence of patterns of experience, relationships

among occurrences, or the significance of events in the context in which they occur (Kincheloe, 1991). In this study, that context is asynchronous computer mediated communication, and the various facilitated discussion areas provide distinct sub-contexts. Judgments were then able to be made which connected the patterns and relationships to the larger picture of identified concerns.

The multiple methods of data collection and analysis that were used are outlined in Table 2 and aligned with the study's focus questions. For the reader's clarity, a timeline has also been included in Table 6.

The data collected, which allowed exploration of changes in practice, dialogue, and dispositions, involved a three part process: a pre and post intervention survey, case studies of program facilitators which included in-depth interviews and observation of practice in their respective discussion areas of the program, and analysis of program dialogue.

The Participant Survey. The pre and post intervention survey (Appendix E) was administered to participants of the 2005 Advanced Mentor Summer Institute. This survey was designed to assess the dispositions and skills of participants regarding the role of the facilitator, as well as the role and importance of dialogue in the program, knowledge of what constitutes quality dialogue, and knowledge of skills and strategies that foster quality dialogue. Its purpose was to determine and examine any change and/or growth in the practice and dispositions of program facilitators and mentors as a result of the intervention. Creswell (2003) states that

> A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (p. 153).

The survey was modified for use in this study from a pilot version (Appendix F) designed and administered to eMSS program participants by this author after sessions on dialogue improvement during the fall of 2004 (Taylor, 2005). Then used to determine differences in two different groups of eMSS participants (those receiving sessions on online dialogue awareness and those not receiving sessions), modifications were made in the survey to gauge the degree of growth and development of the same group of participants before and after the intervention of this study. Modifications were also made to align the survey with the objectives of the intervention, especially the summer institute training (see Appendix G). Further modifications for clarity and content were made based on feedback from the piloted survey where participants provided questions and comments on the clarity and perceived relevancy of survey items. Colleagues in the eMSS program, familiar with the purpose of this study, experienced in new teacher mentoring, and familiar with the goals of the program, assisted in the development of the survey contributing to the content validity of the instrument. And final modifications were made to allow administration of the survey in an electronic format via the private mail feature of the eMSS program platform (WebCT). As seen in Table 6, this survey was designed to help answer the following study questions:

How does training affect the practice of program facilitators?

How does training affect the practice of program mentors?

What components of training are facilitating change in dialogue quality?

The survey included both Likert-style questions and open response questions along with questions designed to collect demographic data from the participants. The Likert-style questions allowed for quantification of the survey results (Creswell, 2003) while the open response portion of the survey provided a means to illustrate the results more fully. For example, the following is an example of a Likert-style question taken from the survey (see complete survey in Appendix E):

I understand what it means to post a "quality" message online.

strongly disagree				*strongly agree*
1	*2*	*3*	*4*	*5*

Open-ended questions were included for the purpose of better describing participants' responses to the Likert-style questions. The following is an example of an open-ended question that will help to better describe participants' responses to the Likert-style question above:

What features should be included in a quality eMSS message?
(please rate your choices in order of importance)

The pre-intervention survey was administered online to participants prior to the Advanced Mentor Summer Institute in the summer of 2005. The institute included a total of 42 participants, 40 of whom returned the survey. Four of the surveys returned were unusable because they were not complete and did not have sufficient data for use in the analysis. That left 36 pre-interventions surveys (or 86%) for analysis.

The post-intervention survey was administered after participants had opportunities for practice and support of newly learned skills and strategies during the program year. The post-intervention survey was administered to participants of the 2005 Advanced Mentor Summer Institute in April 2006 through private e-mail in the program platform (WebCT). The return rate was somewhat less for the post-intervention survey. Several people had dropped from the program and were no longer active. After two reminders were sent via e-mail to remaining participants, 28 post-intervention surveys were returned to this author for analysis (67% of the original 42 participants, 70% of those who returned the pre-intervention survey, or 78% of those who returned useable pre-intervention surveys).

Case Studies – Facilitation Practices. Multi-method studies utilize multiple research methods. According to Yin (2003), "surveys provide an indication of the prevalence of a phenomenon", whereas, "case studies are used to gain insight into causal processes" (p. 151). In order to get a closer look at how participants developed, grew, and changed in their facilitation practice and components of the intervention that may have helped to facilitate the change, seven intervention participants (using criteria discussed earlier) were selected for in-depth case studies. Yin (2003) describes the role of the case study as part of a larger, multi-method study as the opportunity to "illustrate, in greater depth, the experiences" (p. 150) of individuals or phenomena. The case study allows the researcher to investigate "a contemporary phenomenon within its real-life context" (p. 13). Further, a study that includes multiple cases provides evidence that is considered to be more compelling which, in turn, results in a study that is considered to

be more robust (Herriott & Firestone, 1983). The seven case studies, then, were used to gain a greater insight into the following focus questions (see Table 4):

How does the training affect the practice of program facilitators?

How does the training affect the practice of program mentors?

What components of the training are facilitating change?

What components of training are facilitating change in dialogue quality?

What preliminary evidence is there that change in program participant' practice is effecting change in the classroom practice of beginning teachers?

The seven cases were selected using a purposeful sampling approach (Patton, 2002) based on the following criteria: 1) full participation and completion of the online training, 2) active participation in the online facilitator forum, and 3) placement as a facilitator and/or mentor in the 2005/2006 program. Patton (2002) describes the "logic and power" of the use of purposeful sampling as the selection of "information rich" cases, those "from which one can learn a great deal about issues of central importance to the purpose of the research" (p. 46). In an effort to enhance the credibility of this study, growth and changes in practice of each case study participant were explored through a variety of sources. As stated by Yin (2003), "any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several sources of information …" Thus, observations of practice in the electronic record of the program, analysis of selected dialogue posted by subjects, and personal interviews of subjects selected for each case were used in the construction and analysis of individual cases.

Observations. Observations of practice in the preserved electronic record of the program were conducted by this author who was necessarily classified as a participant observer due to the involvement in the development and organization of the program and with participants as one of the program's coordinators for facilitator development. The observations of participant practice allowed a look into the reality of the practice allowing views of practice in real time and in the context of the program (Yin, 2003).

Though participant observation allows a greater insight into interpersonal behavior and motives by offering the ability to perceive reality from an "insiders" viewpoint (Yin, 2003), care must be taken to avoid any bias that might result in an unintended manipulation of data. The following necessary precautions to eliminate bias were taken and considerations were made for distortion which could potentially arise from interaction with participants or from bias due to manipulation of events by the researcher.

1. Even though participants were notified at the start of the program that their online practice would be observed, due to the asynchronous nature of the observation of the program, visibility of the researcher was minimal (if any) and thus any effects of participant observation should be minimal or non-existent.
2. Throughout the year of the study, the 2005/2006 program year, this author remained invisible from the online program and decreasingly visible in the facilitator forum, posting only absolutely necessary information, and keeping other interactions with program participants to a bare minimum. Another staff

member gradually assumed the duties of this position as the intervention continued.

3. Reviews of the draft case studies (Yin, 2003), commonly called "member checks" were used for each case study. The case study subject reviewed his/her contributions to the study to assure that the author was accurately representing his/her thoughts and ideas.
4. Two different colleagues from the eMSS program staff reviewed the case study narratives to assure accurate and logical representation and interpretation. Their suggestions and comments were used in creating the final drafts of the case study narratives.
5. Actual dialogue samples from the electronic record of the eMSS program were included in the final case narratives allowing the reader to see examples of the evidence upon which interpretations were based.

Dialogue Analysis. Quantitative and qualitative analysis of the written dialogue for each case study subject was conducted. Case study participants' messages were retrieved from the discussion areas where each was facilitating and analyzed to determine the level of quality (see conversation rubric description below) and the style, direction, and purpose of the postings.

Interviews. Subjects were individually interviewed by telephone in order to discover behaviors, feelings, and/or meanings regarding facilitation and growth or change in practice that could not be observed in the electronic record of the program. Patton

(2002) states the purpose of interviewing as allowing the entrance "into the other person's perspective" (p. 341). The interviews were standardized open-ended interviews (Patton, 2002) with the questions and sequencing being determined in advance. This interview technique allowed better examination of areas of importance for the study. In other words, it provided a structure and focus during the interview and helped to ensure the efficient use of interview time. The structured open-ended interview technique also facilitated the analysis of data by making responses easier to find and to compare, which allowed for greater ease in cross-case comparison and analysis. Questions were of the "experience", "opinion and value", and "knowledge" types (Patton, 2002) and designed to elicit experiences and actions as facilitators and participants of the eMSS program, thought processes, values, and judgments regarding facilitation in the program, and knowledge regarding program direction and facilitation processes. The questions were designed with Patton's (2002) questioning guidelines in mind, striving for "open-ended, neutral, singular, and clear" (p. 353) qualities. In the development of the interview protocol, the questions were reviewed by several persons with great knowledge of the eMSS program, familiarity with the purpose of this study, and experience in interview techniques. After several revisions which took their suggestions into consideration, the final list of questions was created. Though several representative questions from the interview protocol are provided below, the complete list of interview questions and probes can be seen in Appendix H.

The interview protocol included questions, such as those shown below, designed to elicit evidence regarding changes in the practices of program facilitators and mentors, along with components of the intervention that may have contributed to the changes.

Describe your role(s) in the eMSS program.
- How do you view the responsibilities of each role?
- How did you find out about these responsibilities?
- How do you view the similarities and differences of each role?

How do you feel you have grown in your practice as a facilitator?
- Which components of training have been most beneficial in improving your practice as a facilitator? Least beneficial?
- Describe how the summer training affected your practice as a facilitator. Can you give me a specific example that you remember from that training nine months ago that you found very beneficial?
- Describe how the facilitator forum affected your practice as a facilitator.
- Describe how your experience facilitating has affected your practice as a facilitator.

Other questions were included to determine components of the training that may have led to any changes in the quality of program dialogue.

What are your views on the importance of dialogue in the eMSS program?
- What are some techniques that might be used to improve dialogue in the e-mentoring environment?

During the time that you have been involved in the program, what changes have you seen in program dialogue? Volume? Quality?
- What do you attribute these changes to?

Let's say you are asked to create a checklist for new participants to use when composing posts to discussion areas. What would you include in the checklist?
- In other words, what steps do you take, what things do you think about when composing a post?

Additional questions on the interview protocol were added to solicit facilitators perceptions of the benefits that improved dialogue may be providing to program participants.

> What benefits have you realized as a result of your work as a facilitator?
> What evidence have you seen that the program is having positive effects on mentees' practice?
> How do you feel that you have contributed to this change?

The list of questions was distributed to case study subjects well in advance of the interviews in order to "give interviewees a chance to think through some things before responding verbally" (Patton, 2002, p. 396). By receiving the questions in advance, interviewees were able to jot down their ideas for responses prior to the interview which allowed the facilitation of a more focused and less time-consuming process. The telephone interviews took an average of about 40 minutes and were all conducted and transcribed by this author.

Program Dialogue. Using a quasi-experimental approach (Gliner & Morgan, 2000), potential benefits of the training to the program were examined by a quantitative look at the change in dialogue quality in structured, facilitated areas of the program. Dialogue analysis helped to investigate the following focus questions in this study (see Table 6):

> *How does the training affect the practice (including dialogue quality) of program facilitators?*
>
> *How does the training affect the practice (including dialogue quality) of program mentors?*

What changes are seen in the overall quality of dialogue in the program?

Using a modified version of the conversation rubric developed by HRI (Appendix I), which was designed specifically for eMSS program evaluation, program dialogue from the structured discussion areas of the program (see Figure 4) was examined in four important areas important to the eMSS program:

- the content of the conversation
- if the conversation stays on task and moves productively forward
- its capacity to build community
- the reflective nature of the conversation

The modified rubric (seen in Figure 6 later in this chapter) was framed around these important areas of program dialogue.

Conversation analysis results from structured dialogue areas of the program during the month of November of 2005 were compared against preliminary dialogue analyses (completed by this author) during the month of November of 2004. In an effort to establish inter-rater reliability, multiple coders were used to mitigate possible biases of a single coder. In order to assure that similar numbers of participants and messages were used in each year's dialogue analysis, only the November dialogue from the California/Montana shell was used for analysis. California and Montana participants have been involved in the program since its inception. Keeping with the dialogue from the participants of these two states lent a level of consistency to the dialogue comparison across years.

A second analysis was completed using conversations from structured areas during the month of March 2006. Results from this analysis were compared to the November 2005 results to get a look at dialogue change over the course of the program year.

Program postings during the months of November and March provided meaningful samples of participant dialogue for several reasons. First, Horizon Research, Inc. selected the months of November and March from which to sample participant dialogue for eMSS program evaluation purposes. Since the intervention in this study, the facilitation training, was developed and implemented as a result of the findings and suggestions of Horizon's research, it is appropriate to sample from the same time period in order to determine any changes in terms of the suggestions of the evaluation. Second (and certainly considered by Horizon in its time period sampling procedures), postings during the month of November should represent the maximum number of program participants. Mentees continued to be added to the program and matched with mentors through the beginning months of school (September and October). By November, all mentees had been paired with their mentors for the program year. Third, the majority of participants had been oriented to the program and had been posting to the discussion areas of the program for at least several weeks. By the beginning of November a comfortable environment was established in which the participants felt safe to post freely. And last, during the program year of 2005/2006, the inquiry modules began in mid-November and the dilemma areas continued with classroom and subject related scenarios. These two important structured, facilitated areas were functional during March, as well.

During both of these months, content areas were well established and well attended. Thus, there were multiple established areas in which mentors and mentees could participate.

Study Quality

The methodological triangulation (Patton 2002) afforded by this mixed method design – qualitative and quantitative analysis of the participant survey, qualitative and quantitative analysis of overall program dialogue, and multiple case studies involving observations, interviews, and dialogue analysis – served to increase the internal validity of this study by neutralizing any bias inherent in any one data source and/or method of collection and analysis. Denzin (1989) states:

> By combining multiple observers, theories, methods, and data sources, [researchers] can hope to overcome the intrinsic bias that comes from single-methods, single-observer, and single-theory studies (p. 307).

Lincoln and Guba (1986) suggest an emphasis on trustworthiness and authenticity in qualitative research by being balanced, fair, and conscientious in taking account of multiple perspectives, multiple interests, and multiple realities. An effort was made toward this trustworthiness and authenticity by using multiple data sources when constructing individual case studies of each facilitator. Triangulation of sources (Patton, 2002) included the use of interview information, data obtained from observations of practice in the program discussion areas, and from facilitators' involvement and activity in the facilitator forum.

The external validity of the study was also increased by the mixed-method design. Validity concerns inherent in the sampling of case studies used to describe effects were neutralized 1) by the use of the selection criteria, 2) by the random sampling of message selection for overall dialogue analysis which was used to identify effects of training, and by 3) the analysis of the pre/post survey administered to all participants of the training to determine changes in facilitator dispositions and skills.

Reliability of the study was addressed through the establishment of inter-rater reliability among multiple message raters (discussed later in this section) and through cross-checks of discourse interpretation of thoughts and perceptions expressed in interviews and survey questions among case study participants. Representations of case study subjects' ideas and thoughts from the interviews were checked by each of the subjects themselves in order to assure accuracy of interpretations. Member checks of thoughts expressed in dialogue, interviews, and survey questions among case study participants affords greater reliability to this study. Through these efforts, a holistic picture of the effects of the intervention emerged which will help the program (and other e-learning systems) to answer its question of how best to train online facilitators to foster the quality of dialogue necessary to effect the growth and development of beginning teacher practice.

Researcher Perspective

> The principle is to report any personal and professional information that may have affected data collection, analysis, and interpretation ... (Patton, 2002, p. 566)

Because the perspective that a researcher brings to qualitative inquiry is a part of the context for the findings (Patton, 2002), it is recommended that a qualitative report should include some information about the researcher. The advanced presentation of the researchers experience, training, relationship, and perspective can advance the credibility of the researcher as an instrument in a qualitative inquiry (Patton, 2002). In this spirit, this section reveals information about the researcher (this author) of the study.

Fourteen years of experience in science teaching (12 years at the secondary level in Colorado and Utah, 2 years at the college level in New Mexico) has provided this author with an understanding and empathy for the situations of the teachers in the eMSS program. Serving as mentor to beginning science teachers for several years has given insight into the issues that beginning teachers face and the challenges that mentors experience in trying to support their mentees. Also contributing to this insight is this author's experience (3 years) in her current full-time college position, working with the preparation of new teachers as a coordinator, instructor, and field supervisor of a teacher preparation program.

This author has extensive experience in distance education. This experience includes a total of 24 courses from master's and doctoral programs that were delivered through asynchronous computer-mediated communication through a variety of platforms such as First Class, Blackboard, and WebCT. Feedback has been solicited from this author and provided to instructors, programs, and institutions on the successes and challenges of those experiences as they have sought to modify the courses to increase their effectiveness. This author has assisted in teaching distance education courses for

Montana State University, developed and taught hybrid (part traditional, part distance education) education courses in her current position, and facilitated discussion groups, assumed roles in planning and management, and has assisted in the development and implementation of training for participants in the eMSS program. These distance experiences have primarily consisted of asynchronous computer-mediated communication, the same format for information delivery that the eMSS program uses in its implementation of the program. This extensive distance education experience has contributed to the author's ability to understand the issues encountered in delivering the eMSS program and the experiences of the participants in the program. Involvement in the eMSS program since its inception has provided this author with a comprehensive understanding of the philosophy of the program.

Data Analysis

The Participant Survey. The pre and post survey of intervention participants was designed to assess the growth and development of knowledge, skills, and dispositions targeted in the summer online training institute. Modified from a pilot survey used by this author to assess growth and dispositions regarding quality dialogue in the eMSS program during the prior year (Taylor, 2005), the survey questions were developed around the objectives of the summer intervention training (see Appendix D) and goals of the eMSS program (see Appendix B).

Factor Analysis. After the administration of the pre-survey prior to the 2005 summer institute, a factor analysis study (Field, 2000) was conducted on the pre-survey results to validate factors expected to emerge from the data with respect to the objectives of the intervention, on which the survey questions were based. The factor analysis identified four factors (discussed in detail in Chapter 4) which were represented in the training objectives and named for the shared characteristics of the questions with which each factor was associated. Interpretation of the statistical analysis of the survey results (discussed in Chapter 4) was centered on these four factors:

1) Understanding Quality Dialogue,

2) Composing Quality Posts,

3) Advancing Practice, and

4) Building an Online Community.

Statistical Comparison. Likert-style and open-ended questions were designed to determine progress in each of the areas identified by the objectives of the intervention (see Table 5 and Appendix D). Responses were compared from the pre-intervention survey, administered prior to the intervention in the summer of 2005, to the post-intervention survey, administered in the spring of 2006 after the intervention had taken place. Likert-style questions were analyzed quantitatively comparing the pre-intervention survey responses to the post intervention-survey responses to determine any differences in group means and thus differences in attitudes, dispositions, and knowledge of skills and strategies

for facilitating deeper and more meaningful dialogue and for contributions to program community. Pre-survey responses from participants were compared to post-survey responses using paired sample t-tests to determine if mean differences in the four areas identified by the factor analysis existed prior to and after the intervention. Paired sample t-tests (Field, 2000) for repeated-measures studies (Gravetter and Wallnau, 2004) are appropriate since the same group of participants was surveyed for both the pre-intervention survey and the post-intervention survey.

Qualitative Support. Open-ended questions were used to further describe change and growth in participants' dispositions and practice in program facilitation that were observed through the quantitative analysis of the Likert-style questions. An inductive content analysis procedure (Patton, 2002) was used to make sense of the data gathered from the open-ended survey questions. A multi-step process which includes organizing the data into meaningful "chunks", coding with appropriate terms, and then generating themes (Creswell, 2003) was used to analyze this portion of the survey.

Case Studies – Facilitation Practices. Case studies of seven program facilitators were conducted which allowed exploration of the development, evolution, and implementation characteristics of facilitator practices. After collecting case data using methods described in the earlier data collection section, full case narratives were constructed of the practices of each case study facilitator through the multi-step process described below. Patton (2002) recommends using several distinct steps (p. 450) in

constructing case study narratives to ensure that each case study will consist of all the information one has about the case, and in an effort to do justice to each individual case. Patton (2002) states that the basic unit of analysis of comparative studies "remains the distinct cases and the credibility of the overall findings will depend on the quality of the individual cases" (p. 450). In order to ensure the quality that would contribute to the credibility of the cross-case analysis conducted in this study, these basic steps (described below) were followed as the data was organized and analyzed and each case was individually constructed.

Step 1. Assemble the raw case data. First, telephone interviews were conducted by this author (as described above in an earlier section) of each case study participant. Each interview was tape recorded in its entirety and transcribed by the author into written form within a four week period. Second, threads of conversation in each of the case study facilitator's areas in the electronic record of the eMSS program were gathered, compiled, and printed. The observations of practice (by this author) consisted of reading and studying the work of each facilitator within the context of his/her respective program areas. Certain facilitator messages, chosen for their elaboration of ideas and thoughts expressed in the interviews and for further description and illustration of the practices of the facilitators, were chosen and marked to use as artifacts when the final narratives were written. And third, each case study facilitator's activity in the facilitator forum was monitored and studied, again with this author noting certain trends, roles, and characteristics that further described and explained the development and evolution of facilitator attitudes and practices.

Step 2. Construct a case record. Patton (2002) describes the case record as a "condensation of the raw case data organized, classified, and edited into a manageable and accessible file" (p. 450). In this study, the case record took on a little different form but still worked to organize and edit the data. First, preliminary narratives were constructed of each interview in which thoughts, perceptions, and ideas of each facilitator were recognized, organized, and framed with a descriptive flow. The resulting narrative of each interview was sent to each respective facilitator and he/she was asked to read through the interview as a check to make sure that thoughts and ideas had been represented accurately and appropriately. Facilitators were asked to make any corrections, additions, and/or clarifications that they saw fit. With the exception of a few suggestions for minor modifications which were made immediately, all facilitators indicated that their respective narrative was accurate in its representation of their feelings, thoughts, and ideas. This member verified, preliminary narrative was filed along with the compiled transcript(s) of discussions from the program area(s) in which each facilitator worked during the 2005/2006 program year. Notes were made on the preliminary narratives regarding where elaboration and illustration would be needed. Observations of facilitator practice in the discussion areas of the program and activity in the facilitator forum provided material for elaboration and illustration.

Step 3. Write a final case study narrative. As a final step in producing each of the seven case studies, observations of practice and artifacts in the form of sample facilitator messages taken from the electronic record of appropriate program discussion areas, were used to expand on and elaborate on the preliminary narrative produced in step two of this

process. Names and any other identifying information were changed and/or deleted in order to protect the identity of the case study facilitators and their discussion area respondents. Special care was given in writing the final narratives to produce a "readable, descriptive picture" of each facilitator's practice which included comments on relevant contexts necessary for understanding the case. Effort and care was taken in "making accessible to the reader all the information necessary to understand the case in all its uniqueness" (Patton, 2002, p. 450). Written by this author, each narrative was reviewed by two colleagues with great knowledge of the eMSS program who provided feedback on accuracy, flow, readability, and understandability. With their suggestions and advice in mind, the final case study narrative was produced for reporting.

Cross Case Analysis. As individual cases were being developed, through an inductive analytic approach (Patton, 2002), patterns, themes, and categories began to emerge from the research related to the questions of this study (see Table 4), mainly how facilitators' practices developed and what affected the development of their practices.

Table 7. Cross Case Analysis – Emergent Dimensions for Describing Facilitator Practices.

Dimension	Analysis Strategy
Categories of facilitator types	Analyst constructed typologies
How facilitators work – purpose of action	Inductive content analysis
Factors that affect development of practice	Inductive content analysis
Evidence and direction of participant growth	Inductive content analysis

As these patterns, themes, and/or categories emerged and were identified they were organized into several tables (see results section in Chapter 4) which then allowed further description and elaboration of themes and ideas. As a result and shown in Table 7 above, analysis across cases revealed multiple dimensions for describing the development and evolution of the practices of online facilitators.

In the spirit of constructing typologies, or ideal-types (Patton, 2002) through analysis, several categories of facilitator types were identified and described while looking across cases, and facilitators were classified according to these categories. The case study narratives are reported in Chapter 4 of this study according to these classifications along with their descriptions which were derived from the data in the case studies. Additionally, content analysis (Patton, 2002) across the seven case studies revealed a pattern of certain themes regarding the purposes for different actions taken by facilitators in their discussion areas. Third, themes were revealed, identified, and described regarding factors that affected and continue to affect the development and evolution of the practice of these seven facilitators. And finally, also from the cross case comparisons, a list of qualities and characteristics that make a facilitator effective in an online environment was compiled along with evidence of program and participant growth and benefits of program dialogue to mentees.

Program Dialogue. Program dialogue from the structured discussion areas of the program was analyzed quantitatively to examine the dialogue in four important areas:

- the content of the conversation
- if the conversation stayed on task and moved productively forward

- its capacity to build community
- the reflective nature of the conversation.

In their work with dialogue, facilitators and advanced mentors were exposed to a "conversation rubric", specific to the eMSS program. The rubric (Appendix I), presented by Brent Ford of HRI in his 2005 formative program evaluation (Ford, 2005), viewed dialogue in terms of program goals. It was developed to be used in assessing conversation threads rather than individual messages. Ford (2005) and others (Bice, 2005; Harris & Jones, 1999) recommend the use of threads for evaluating dialogue after discovering that much of the meaning and direction of individual messages was lost when taken out of context. They discovered, as did this author in pre-studies of dialogue analysis (Taylor, 2005), that when coding online dialogue, it was necessary to read several messages prior to and after the message of interest in order to determine full meaning in context. Due to the lessons learned through multiple-message coding, and in keeping with the existing program rubric to which institute participants had been introduced, a modified rubric was developed by this author for use in the analysis of the program dialogue for this study. The rubric, shown in Figure 6, was adapted from the eMSS conversation rubric developed by Ford (2005) and used for dialogue analysis in the summer facilitation training. Modified for use by this author, the rubric used for dialogue analysis in this study, allowed a better identification of each of the four components of dialogue that were included in the rubric.

Figure 6. Study conversation rubric (Adapted by author from HRI, 2005).

In looking for dialogue that is likely to enhance the capacity of the participant to provide high quality mathematics/science instruction or to be an effective mentor and/or facilitator charged with helping move mentees forward in their practice, the following areas will be considered.

1. **Content of Dialogue**
   - The content (science, math, pedagogy) within the conversation is accurate or made accurate through the discussion.
   - The topics/issues are perceived as relevant by participants (e.g., mentees' questions are answered; common pitfalls are addressed).
   - The topics/discussions are important for practice in a science/math classroom.
   - The topics/discussions are made relevant to practice in a science/math classroom and explicitly discussed.

Not at all		To some extent		To a great extent
1	2	3	4	5

2. **On Task/Moving Forward**
   - The purpose of the conversation is clear and participants are addressing the specific question or discussion item.
   - There is sense making within the conversation (someone pulls the common ideas out – summarizes – fits these ideas within a larger context of teaching, etc.).
   - The conversation is taken to a higher level (generalized to larger themes/why the practice is important in promoting student learning).

Not at all		To some extent		To a great extent
1	2	3	4	5

3. **Community Building**
   - There is a positive culture within the conversation (participants willing to share; evidence of trust; collegial relationships; sensitive to the needs of participants).
   - The conversation invites inquiry, encourages others to think and respond, and creates an open, inviting framework.

Not at all		To some extent		To a great extent
1	2	3	4	5

4. **Reflection/reflective practice**
   - There is evidence of participants reflecting on their practice in one or more of the following ways:
     a. technical examination of one's immediate skills and competencies
     b. descriptive analysis of one's performance
     c. dialogic exploration of alternative ways to solve problems
     d. critical thinking about effects on others of one's actions considering social, political, and cultural forces

     *Taken from Hatton and Smith (1995)

Not at all		To some extent		To a great extent
1	2	3	4	5

All conversations from the public, facilitated areas of November 2004 (see Figure 7) were analyzed for quality in terms of the modified conversation rubric (Figure 6).

Modules: Modules are conversation guides designed to help mentees—with the help of a mentor—deepen their teaching practice and boost their effectiveness with students. Each Module is flexible and adaptable for a mentee's own special teaching situation. Mentee/mentor pairs work on Modules over a period of six to eight weeks, and mentees participate in Modules several times during the school year. With each round of Modules, mentees have a choice of topics so they can select areas relevant to their teaching.

Content Areas: The content areas provide participants with science and/or math resources to use in the classroom, professional development opportunities, national and state content standards. They contain discussion areas that engage participants in professional conversation about mathematics and/or science education and allow participants to post questions, comments, or concerns about science or mathematics.

Figure 7. Structured facilitated areas of the 2004/2005 eMSS program.

Conversations were defined as discussions within "threads" whose focus was consistent. In other words, all of the messages were about the same topic. In most cases, entire threads were used because they consistently focused on a given topic. In some cases, threads were split because the topic changed within the thread. In yet other cases, threads were joined because the messages that they contained were on the same topic and of the same conversation. The areas analyzed included the modules and content areas of the program.

All conversations from the public, facilitated areas (with the exception of the mentor forums as described above) of November 2005 and March 2006 were analyzed for quality using the same rubric (Figure 6). Due to program modification and growth, the areas analyzed were somewhat different than in 2004 (see Figures 4 and 7). Instead of the term "modules", the program staff renamed these areas as "inquiries". In addition,

several new inquiries were added in the 2005/2006 program year along with new structured, facilitated discussion areas called “dilemmas”. Public, facilitated areas for the November 2005 analysis and the March 2006 analysis, then, included the content areas, the dilemmas, and the inquiry areas. Because the dilemmas and inquiries were both structured, facilitated areas of the program, they were grouped together into the “module” category for the November 2005 and March 2006 analyses.

All threads of analysis were coded by this author using the rubric in Figure 6. To provide reliability in coding, a fellow doctoral student in the college of education coded the November content area conversations of both years using the same rubric. This second coder, trained in the use of the rubric by the eMSS facilitator development team (of which this author was a member), was experienced with the eMSS program as a mentor and as a facilitator. A test of inter-rater reliability was conducted to determine the extent of agreement in coding in order to provide evidence of coding reliability. The Pearson correlation coefficient, one of the most popular statistics for calculating the degree of consistency between judges (Stemler, 2004), was used for this test. The Pearson correlation for 25 content area threads from the 2004 program was .804 ($p = .00$), indicating a high degree of consistency between the two coders (Gravetter & Wallnau, 2004). The Pearson correlation for 22 content area threads from the 2005 program was .971, indicating even a higher degree of consistency between the two coders. The strong correlation coefficients, along with increasing agreement between the two coders, illustrated a high degree of reliability in the coding process.

An independent measures research design (Gravetter & Wallnau, 2004) was utilized to compare the dialogue in three groups of messages, the 2004 November conversations, the 2005 November conversations, and the 2006 March conversations. The independent variable was the level of training and support received by facilitators, advanced mentors, and content experts. The training levels ranged from minimal or no training in promoting high quality dialogue for the 2004 participants to the implementation of the intervention of this study which entailed structured and specific training in promoting high quality dialogue during the 2005 online summer institute. Further, by March of the 2005/2006 program year, participants would have had opportunities for extended support and training in practice through extended components of the designed intervention. These opportunities included the facilitator forum and/or interaction with the trained facilitators throughout the discussion areas and mentor forums of the program. The dependent variable in this part of the study was the change in the quality of dialogue as measured by the conversation rubric (Figure 6). The objective of this part of the study was to determine if the facilitator/advanced mentor training process used during the 2005/2006 program resulted in an improvement in the quality of dialogue in the eMSS program.

Threads of conversation in appropriate areas of the 2004 and 2005 November discussion areas and the 2006 March discussion areas were rated using the rubric seen in Figure 6. In using the rubric, after determining scores for each of the four components, scores were added together, for a particular thread or conversation, to give an overall

rating. For example, the electricity conversation seen in Appendix A would be rated as follows:

> Content of Dialogue – **5** (the topics are important for practice in a science classroom, the topics are relevant in that they help to answer a mentee's question, and multiple approaches are discussed)
>
> On Task/Moving Forward – **5** (the conversation is addressing the specific question, the topic is applied to the context of teaching, and a larger theme of building a repertoire is addressed)
>
> Community Building – **5** (evidence is seen of trusting, collegial relationships within the conversation, and participants are encouraged to think and respond)
>
> Reflection/Reflective Practice – **3** (to some extent reflection is seen in the conversation, mainly on the part of the mentee as she examines her own skills and competence and explores alternatives)
>
> Total Conversation Rating – **18** (a total of the above scores)

A mean rating for all conversations in the content areas was then calculated for each year. Likewise, mean ratings were calculated for module areas. In addition, mean ratings were calculated for conversations across all areas for each of the three years of analysis involved.

A One-Way Analysis of Variance (ANOVA) study was conducted comparing the mean ratings from the November 2004 discussion areas with the mean ratings from the November 2005 discussion areas and finally, the mean ratings from the March 2006 discussion areas. Comparisons of dialogue quality were made in just the content areas using the means of conversation ratings from each year, just the module areas using the means of conversation ratings from each year, and finally, for an overall dialogue

comparison, the means for both the content areas and the module areas (including both inquiries and dilemmas for 2005 and 2006) were compared across all three years.

Summary of Research Methodology

This study utilized multiple methods of data collection and data analysis (see Table 6, p. 102) to determine the effects of a training/support intervention on the development and practice of participants in the eMSS program, an online induction program for teachers of science and mathematics. Brief summaries of the methods used in this study follow.

First, a survey (Appendix E), created and piloted in an earlier study, and designed to assess knowledge, skills, and dispositions regarding facilitation roles and program dialogue, was administered to participants prior to the online advanced training institute during the summer of 2005. The institute, a major component of the intervention, was designed to develop skills in the facilitation of the improvement of program dialogue and the development of program community. The same survey was administered again at the end of the program year (April 2006), after the training and a year of support of leadership positions in the various areas of the program. The purpose of the survey was to determine and examine any change and/or growth in the practice and dispositions of program facilitators and mentors as a result of the intervention.

Second, case studies were conducted of the practices of seven program facilitators, using multiple methods and sources of data collection and analysis, in order to gain an insight into, and illustrate in greater depth, how participants developed, grew,

and changed in their facilitation practices as well as to reveal and describe components of the intervention that may have helped to facilitate changes. The case studies were constructed from data collected during personal telephone interviews (Appendix H) of each of the case facilitators, observations of their practices in the preserved electronic record of the program's discussion areas, and qualitative analysis of written dialogue collected from various areas of the program.

Third, program dialogue, taken from structured, facilitated discussion areas, was examined by quantitative methods to determine any changes from prior years of the program and across the duration of the current program year. A modified version (Figure 6) of a rubric designed by HRI (Ford, 2005) specifically for use in the eMSS program (Appendix I), was used to code and compare threads of conversation to determine if changes in dialogue quality had occurred, perhaps as a result of the intervention.

The study's strength and credibility was addressed by the use of the mixed-method design that involved the triangulation of these research methods and data collection sources. Pre-established criteria for case study selection using a purposeful sampling technique, along with selection methods used for the dialogue analyzed in the study and the survey participants, addressed validity concerns inherent in sampling techniques. Reliability was addressed through the establishment of inter-rater reliability among multiple dialogue coders, through cross-checks of discourse interpretation using various data sources, and through member checks of thoughts, perceptions, and ideas expressed in interviews.

Through these efforts, a holistic picture of the effects of the intervention emerged which describes effects of the intervention and gives insight on how best to train online facilitators to foster the quality of dialogue necessary to effect the growth and development of beginning teacher practice.

CHAPTER 4

RESULTS OF THIS STUDY

Introduction

This chapter presents the results of the analysis of data collected by the various research methods described in the previous chapter. Consistent with the format for discussion of the data collection and analysis procedures in Chapter 3, the following results are presented and discussed in the same three sections:

1) The Participant Survey,

2) Case Studies – Facilitation Practices, and

3) Program Dialogue.

A brief, explanatory introduction is given at the beginning of each section, followed by a presentation and discussion of results and finally, a brief summary of results obtained in that particular area of the study. Last, attempts are made to tie together the results from the three areas of the research to help to answer the major questions of the study, listed here again for the reader's reference.

1. *How does the facilitation training affect the practice of program facilitators?*
2. *How does the facilitation training affect the practice of program mentors?*
3. *What components of the training are facilitating change in practice?*
4. *What changes are seen in the overall quality of dialogue in the program?*

5. *What components of the training are facilitating change in dialogue quality?*

6. *What preliminary evidence is there that change in program participants' practice is effecting change in the classroom practice of beginning teachers?*

The Participant Survey

This section includes the presentation and discussion of the results from the pre-intervention survey and the post-intervention survey of participants in the 2005 Advanced Mentor Summer Institute. Designed to assess change and growth in the dispositions and skills in facilitating improved program dialogue toward building an online community of learning for teachers of science and mathematics as a result of the intervention training, the survey was administered to participants prior to the summer training and then again toward the end of the 2005/2006 program year. In particular, the results from the survey helped to answer the following study questions (see Table 6):

How does training affect the practice (including dialogue quality) of program facilitators?

How does training affect the practice (including dialogue quality) of program mentors?

What components of training are facilitating change in dialogue quality?

As seen in Table 8, four components from the survey, shown below, were identified by a factor analysis conducted on the results of the survey.

Table 8. Rotated Factor Structure for the Advanced Mentor Survey.

	Understanding Quality Dialogue	Composing Quality Posts	Advancing Practice	Online Community
Survey Item	Factor I	Factor II	Factor III	Factor IV
13	**.853**	.134	.204	.254
11	**.846**	-.137	.004	.001
12	**.790**	.140	.001	.256
19	-.128	**.852**	.007	-.191
18	.003	**.795**	.008	.167
14	.284	**.737**	.332	.117
20	.002	.006	**.876**	.007
21	.007	.230	**.724**	.393
10	.485	-.221	**.587**	-.148
15	.199	-.180	-.009	**.781**
17	.135	.237	.319	**.717**
16	.179	.532	-.434	**.568**
Coefficient Alpha	.8197	.7408	.6642	.6134

These four factors, (I) Understanding Quality Dialogue, (II) Composing Quality Posts, (III) Advancing Practice, and (IV) Building an Online Community were named for the shared characteristics of the questions with which each were associated. The factors were consistent with the design of the survey which was based on the objectives of the summer training institute (see Appendix G). Each factor is shown in Table 9 with its corresponding training objective. Also shown in Table 9 are the survey questions that loaded onto each factor in the analysis. The survey results and interpretations are concentrated on these four factors which are identified and described below.

Table 9. Components Identified by Factor Analysis of Survey.

Component Name	Associated Training Objective	Survey Questions
I Understanding Quality Dialogue	Gain skills and strategies in appreciating, identifying, using, and analyzing high quality online dialogue.	11. A focus on improving dialogue quality is important for the eMSS program. 12. I understand what it means to post a "quality" message online. 13. I make an effort to compose posts that are "quality".
II Composing Quality Posts	Gain skills and strategies in introducing, maintaining, advancing, and deepening online dialogues.	14. I find myself posting messages of higher quality more frequently than when I began the eMSS program. 18. I believe the quality of my messages has improved since beginning the eMSS program. 19. I have noticed an improvement in message quality on the eMSS site during the time of my involvement.
III Advancing Practice	Develop disposition that they can help to advance the professional practice of beginning science and mathematics teachers.	10. I can contribute to the growth of beginning teachers through online dialogue in the eMSS program. 20. Building participants' science or math content knowledge is an important theme for program messages. 21. Developing science or math teaching skills is an important theme in program messages.
IV Online Community	Gain skills and strategies in developing online communities.	15. I compose message posts in such a way that others are encouraged to respond. 16. I get more responses to my messages now than when I began the program. 17. When I compose a message I think about the effect it will have on others in the eMSS program.

Understanding Quality Dialogue

That participants would put forth a concentrated effort to focus on the quality of dialogue in the program and to understand its nature and importance were certainly objectives of the summer training. Specifically, in this case, the associated training objectives addressed the acquisition of skills and strategies in appreciating, identifying, using, and analyzing high quality online dialogue. The following three survey questions were loaded onto this particular factor during the factor analysis procedure (see Table 8 and Table 9).

11. A focus on improving dialogue quality is important for the eMSS program.
12. I understand what it means to post a "quality message" online.
13. I make an effort to compose posts that are "quality".

Using the item matrix that was constructed during the design of the survey questions to assure that desired objectives were being addressed in the survey (Appendix F), this component (Factor I) and its associated items were matched to the appropriate training objective mentioned above. Comparisons were then made between the means from each of the above questions on the pre-intervention survey to the means from each of the above questions on the post-intervention survey.

With a significance level of .05, paired samples t-tests comparing the responses of this group of participants on Factor 1 questions resulted in no significant differences across the two surveys as shown below in Table 10. Though means for each set of

responses were slightly higher for each question on the post-intervention survey, the differences were not large enough to be considered significant.

Table 10. Results of Statistical Tests for Equality of Means of Responses to Factor I Survey Questions.

Question #	N	Mean/Standard Deviation		*t*	*p*
11	28	Pre	4.5000/.57735	-.465	.646
		Post	4.5714/.63413		
12	28	Pre	4.3571/.62148	-1.567	.129
		Post	4.6071/.56695		
13	28	Pre	4.4286/.63413	-.812	.424
		Post	4.5714/.57275		

An analysis was conducted of the responses to survey question #22, an open ended question designed to assess participants' knowledge of components important to a quality post in terms of the eMSS program. The question is shown below.

> 22. What features should be included in a quality eMSS message? (Please rate your choices in order of importance.)

Knowledge of important components of a quality message certainly would follow an increased understanding of the nature of quality program dialogue, the focus of Factor I questions on the survey.

Responses to this question were rated as either acceptable or not acceptable based on criteria used in the rubric for coding dialogue for analysis in this program (see Dialogue Analysis section below). The rubric, modified from the eMSS Conversation Rubric (Appendix I) to which participants were introduced during the Advanced Mentor

Summer Institute, focused on four major areas of importance for quality messages: 1) the content of dialogue (a science/mathematics and/or pedagogy focus), 2) that the dialogue is on task and moving forward (opportunity is given for inquiry and/or response), 3) the community building capability, and 4) that the dialogue shows evidence of or promotes reflection in practice. For rating purposes of the responses to question # 22, an acceptable response contained evidence of at least two of the above areas of importance. An unacceptable or incomplete response contained less than two of the above areas of importance. For example, the following sample of an acceptable response is taken from the survey:

> *…elicit a response, self reflective with concern for student achievement, initiate idea/issue or offer valuable suggestion, descriptive/articulate…*

This response to question # 22 contains indications of at least two components of the criteria above: 2) that the dialogue is on task and moving forward (opportunity is given for inquiry and/or response), and 4) that the dialogue shows evidence or promotes reflection in practice. The next example was rated as unacceptable.

> *…thoughtful, honest responses that focus on student achievement …*

The unacceptable example is not necessarily wrong. However, it is somewhat incomplete in terms of the eMSS program.

Significant differences were found across the two surveys in percentages of participants who were able to articulate the components of a quality message in terms of

the program. For the responses given on the pre-intervention survey, 42% of respondents were able to give acceptable descriptions, 58% gave unacceptable descriptions. For the responses given on the post-intervention survey, 65% of respondents were able to give acceptable answers, 35% gave unacceptable answers.

Analysis of this part of the participant survey showed seemingly mixed results pertaining to these particular questions of the study. When asked to rate themselves on their ability to compose quality messages, no significant improvement was seen in participants responses before and after the intervention. However, responses to the open ended question showed that participants had a significantly greater understanding of the components important to a quality posting after having received the training. A 23% increase was seen in those participants who were able to describe the components of a quality post.

Composing Quality Posts

A second component identified in the factor analysis of the survey questions dealt with the ability to contribute postings with the potential to advance and deepen dialogue among program participants in the discussion areas of the program. Associated with the training objectives of the acquisition of skills and strategies in introducing, maintaining, advancing, and deepening online dialogues, the following survey questions were loaded on to this second factor:

> 14. I find myself posting messages of higher quality more frequently than when I began the eMSS program.
>
> 18. I believe the quality of my messages has improved since beginning

the eMSS program.

19. I have noticed an improvement in message quality on the eMSS site during the time of my involvement.

With a significance level of .05, paired samples t-tests comparing the responses of this group of participants on all three of the Factor II questions resulted in significant differences across the two surveys as shown below in Table 11. Participants reported that they perceived an overall improvement in dialogue quality contributing to advancing and deepening discussions throughout the program as well as a personal improvement in contributions to program dialogue.

Table 11. Results of Statistical Tests for Equality of Means of Responses to Factor II Survey Questions.

Question #	N	Mean/Standard Deviation		*t*	*p*	*d*
14	28	Pre	3.8214/.77237	-3.968*	.000	.75
		Post	4.5000/.57735			
18	28	Pre	3.9286/.71640	-2.469*	.020	.47
		Post	4.4286/.63413			
19	28	Pre	3.9643/.88117	-2.056*	.050	.39
		Post	4.3929/.68526			

There were no real differences in participants' responses to the importance of dialogue on open response question #23,

23. What is your opinion of the importance of dialogue in the online environment?

All who responded were in agreement that dialogue is important.

However, the responses on the post-intervention survey tended to give a better glimpse of participants perceptions of the kind of dialogue that helps to advance and deepen discussions and/or how the dialogue and discussions contribute to the growth and development of teaching practices, especially mentees' practices. The following responses to question #23 are taken from the post-intervention survey. Note how they elaborate on the original question of the importance of dialogue.

> Dialogue is what makes the online environment "real". The postings are similar to the conversations at a convention. Each area is a sectional … and we all know how hard it is to keep a room of teachers quiet! The networking involved is fantastic.
>
> The most important thing is that the dialogue be a safe place. Then dialogue can move forward. We have to remember that the pace is much different than face-to-face mentoring. Sometimes because of the pace I feel that the dialogue is much richer. It has more meaning just because it is written down.
>
> Regular and frequent dialog is essential to the online environment. Without that communication I feel helpless to provide any assistance and support to a mentee. My inability to keep mentees regularly involved has been a continuing struggle and frustration. When a mentee posts only once a month, etc., the dialog has no value.
>
> Very important, free floating posts are too much like the anonymous parts of the internet … faceless information that isn't clearly connected to people. I love seeing give and take of ideas … especially when the reply isn't just "thanks" … but includes some idea of how that person will/did apply the shared ideas.

Respondents to the post-intervention survey commonly elaborated in such a manner in their responses to this question. In fact, of those post-intervention responses that clearly

stated dialogue was important, 68% went on to appropriately describe how and what type of dialogue is important to the program.

Though elaboration was also seen in some responses to this question on the pre-intervention survey, the elaboration tended to be in different directions. For instance, the following responses were taken from the pre-intervention survey.

> Well, I would guess that it's very important … what else can you do in that environment other than lecture to them.
>
> It is important as a starting point to communication which might be followed up with phone conversations or even face to face. Sometimes, a phone conversation or face to face accomplishes more in less time which is important to busy mentees and mentors …

Note how these responses include an elaboration, but it is not related to how the program dialogue is important to participant growth. On the pre-intervention survey, only 32% of the responses to this question elaborated appropriately on how and/or why the dialogue is the important in the eMSS program.

Advancing Practice

The following set of survey questions loaded onto a third factor. These questions contained queries characteristic of facilitators' and mentors' perceived ability to contribute to the growth and advancement of the program's beginning teachers. The responses to these questions spoke to the effectiveness of the intervention's desire to strengthen the disposition within facilitators and mentors that they could help to advance the professional practice of beginning science and mathematics teachers.

10. I can contribute to the growth of beginning teachers through online dialogue in the eMSS program.

20. Building participants' science or mathematics content knowledge is an important theme for program messages.

21. Developing science or math teaching skills is an important theme in program messages.

With a significance level of .05, paired samples t-tests comparing the responses of this group of participants on Factor 3 questions resulted in no significant differences across the two surveys as shown below in Table 12. Again, means for each set of responses were slightly higher for each question on the post-intervention survey, but the differences were not large enough to be considered significant.

Table 12. Results of Statistical Tests for Equality of Means of Responses to Factor III Survey Questions.

Question #	N	Mean/Standard Deviation		*t*	*p*
10	28	Pre	4.2857/.85449	-1.613	.118
		Post	4.5714/.57275		
20	28	Pre	4.2857/.71270	-1.655	.109
		Post	4.5357/.57620		
21	28	Pre	4.6429/.55872	-1.162	.255
		Post	4.7857/.41786		

Question #24 asked participants to respond to the following:

24. What can you do as a participant in this program's online environment to improve the growth and development of beginning teachers?

There were many different ways described by respondents, in both versions of the survey, for helping beginning teachers in the program. Themes ranged from providing emotional support to answering questions to sharing multiple years of experience in the classroom. These themes were somewhat consistent from the pre-intervention survey to the post intervention survey. Something that did differ across the surveys, however, was the mention, as seen in the examples below, of how to provide this support specifically in an online format.

> Private emails, encouragement, moving the discussion forward, addressing issues as they arise.
>
> Create a safe place for my mentee to dialogue, model the type of responses that increase dialogue, participate in as many discussions as possible to keep myself and mentee up to date.
>
> As a participant the mentors should provide (meaningful) dialogue with the mentees. The posts should be short and to the point. Most mentees are strapped for time and appreciate us getting to the point.

Responses that referred to how to provide support specifically in the program's online environment increased across the two surveys. Such types of answers to question #24 were seen in only 7% of the responses on the pre-intervention survey. On the post-intervention survey, such answers were seen in 53% of responses. Though t-tests conducted on the Likert-style questions indicated no difference in the way participants perceived their ability to contribute to beginning teacher growth, it appears from the results of the associated open-ended question that after the intervention, they have more ideas about how to contribute to beginning teacher growth specifically in the program's online environment.

Online Community

And fourth, the last identified factor on the survey and its associated questions are related to participants' perceived ability to contribute to building an online community of learning and practice. These questions were concerned with facilitators and mentors efforts and abilities to get others to respond and contribute to discussions and how their messages might affect other members of the discussion.

15. I compose message posts in such a way that others are encouraged to respond.

16. I get more responses to my messages now than when I began the program.

17. When I compose a message I think about the effect it will have on others in the eMSS program.

With a significance level of .05, paired samples t-tests comparing the pre-intervention and post-intervention survey responses of this group of participants on Factor IV questions resulted in no significant differences across the two surveys on questions # 15 and # 17 as shown below in Table 13. Means for each set of responses were higher for each question on the post-intervention survey, but the differences were not quite large enough to be considered significant at the .05 level of significance. Responses were significantly different, $t = -3.464$ ($p = .002$), on survey question # 16, indicating that participants felt that their messages are more highly responded to after the intervention than before.

Table 13. Results of Statistical Tests for Equality of Means of Responses to Factor IV Survey Questions.

Question #	N	Mean/Standard Deviation		*t*	*p*	*d*
15	28	Pre	3.7857/.73822	-1.730	.095	.33
		Post	4.1071/.68526			
16	28	Pre	3.3704/.56488	-3.464*	.002	.67
		Post	4.0370/.80773			
17	28	Pre	4.2857/.59982	-1.730	.095	.33
		Post	4.6071/.56695			

These results indicate that participants are making advances in contributing to the development of a sense of community within the program. It seems that they are conscious of the need to encourage others to respond, to respond themselves, and to make a conscious effort to compose posts that are positive and supportive.

These thoughts are supported by the responses to open ended survey question #25 on both surveys:

> 25. What can you do as a participant in this program's online environment to foster a learning community of new and experienced professionals?

There were similar responses across the two surveys to this question regarding the necessity to share experiences, appreciate, acknowledge, and validate ideas and expertise (of beginning teachers, especially), and the importance of contributing to discussions. The following are just a few examples of responses to question #25 that show participants' attitudes regarding community building within the program.

> Make sure all involved are aware that I support a "give-and-'take" environment, and that I hope this is an expectation of all involved. We all have such richness in our experience, but all of our backgrounds are unique. Also, let it be known (in a nice way) that I expect mutual respect amongst all involved, and that we need not be presumptuous, but more of the inquiring sort.
>
> Model the type of responses that increase dialogue, participate in as many discussions as possible to keep myself and mentee up to date, I find myself contributing by having my own questions. I think if more mentors showed that it is okay to have questions and that our questions sometimes create a lot of dialogue. It also shows mentees that we are trying to grow in our own practice.
>
> As a participant I should put thought in all my posts. Sometimes listening and reading what others are saying or posting is much more important than just piggybacking on another's posting. A learning community is where both sides exchange ideas and both sides learn. Very often teachers have problems being learners.

Summary of Survey Results

The participant survey was designed to assess change and growth in the dispositions and skills in facilitating improved dialogue in the eMSS program toward building an online community of learning for teachers of science and mathematics as a result of the intervention of this study. The intervention consisted of a three-week summer training institute in addition to ongoing support for participants of the institute either through the online facilitator support forum or for mentors through interactions with facilitators and/or in mentor forums within the program after having been placed in program positions during the program year. The survey was administered to participants of the summer training institute both before the training and then after the completion of the intervention at the end of the program year. Survey questions were aligned with the goals of the intervention which included developing an awareness of the importance of

quality dialogue within the program, developing skills in leading and advancing online dialogue, and developing skills in building an online community of learning for the growth and development of beginning teachers of science and mathematics.

A factor analysis study of the survey questions revealed four areas for analysis, consistent with the goals of the intervention. The first had a focus on participants' perceived appreciation and understanding of program dialogue. Though post-intervention survey means were higher consistently, no significant differences were found in statistical analyses in this area across the two surveys. However, analysis of an associated open-ended question did reveal that after the intervention more participants (an increase of 23%) were able to articulate the features that should be included in a quality eMSS message.

The second area of analysis focused on participants' perceptions of the overall frequency of messages contributing to advancing and deepening discussions throughout the program, as well as of personal improvement in contributions to program dialogue. Significant differences were found between means of all questions associated with this topic area of the survey. Participants reported the frequency of quality messages (overall and personal) to be higher post-intervention as compared to pre-intervention. Participants were also better able to elaborate on the kind of dialogue that helps to advance and deepen discussions in the program and how the dialogue contributes to the growth and development of teaching practices.

The focus of the third area was on participants' perceived ability to contribute to the growth and advancement of the program's beginning teachers' practices. Again,

means across the two surveys were higher, but the differences were not large enough to be considered significant. Originally somewhat strong, their perceptions of the effect they could have on new teacher growth did not change from the pre-intervention to the post-intervention survey. However, analysis of an associated open-ended question revealed that participants focused more (an increase of 46%) in responses to the post-intervention survey on how to provide support to mentees specifically in an online format. It appears that the intervention helped them to develop mentoring and support skills specific to distance environments.

And, fourth, the last area of survey analysis focused upon participants' perceived ability to contribute to building an online community of learning and practice. These questions dealt with participants' awareness of the importance of responding to discussions with positive and supportive messages, of modeling quality postings, and of encouraging others in the program to contribute to discussions. Though statistical results at the $p = .05$ level were significant for only one of the questions associated with this factor, all three comparisons indicated an improvement in the perceived ability of participants to contribute to a sense of community within the program. It appears that participants are becoming conscious of the need to encourage others to respond, to respond themselves, and to make a conscious effort to compose posts that are positive and supportive. These themes were supported by the responses to an open-ended question regarding ideas on how they might contribute to the development of an online community of learning. Common themes from these responses dealt with the necessity to

share experiences, appreciate, acknowledge, and validate ideas and expertise, and the importance of contributing to the discussions.

The analysis of results of the participant survey provides evidence that the intervention has affected participants in the following ways:

- greater awareness of the message components that make dialogue "quality" in terms of the eMSS program,
- greater awareness of the kind of dialogue that deepens and/or advances discussions with the potential to contribute to the growth of teaching practices,
- greater frequency of quality messages (both overall and personal),
- greater awareness of how to provide support to beginning teachers of science and mathematics specifically in an online environment, and
- greater effort to compose messages that encourage others to respond in an effort to keep discussions active while helping to build an effective online community of support.

Case Studies of Facilitation Practices

This section presents the facilitation practices of seven eMSS program facilitators. Each facilitated in one or more areas during the 2005/2006 program year, participated in the facilitator support forum during the same year, and completed the facilitator and/or advanced mentor institutes during the summer of 2004 and/or the summer of 2005.

(More extensive description of the case study facilitators and the selection process is presented in Chapter 3 of this study.)

This author interviewed each case study facilitator in an effort to determine how each perceives his/her work in the program, characteristics of facilitator practices, what factors led to the development and growth of program facilitators, and how they perceived the benefits to participants of their efforts in practice. A more in depth description of each case study facilitator's work was provided by observations of each facilitator's practice in the relevant discussion areas during the 2005/2006 program year.

The information gained from the interviews, combined with the insights about the facilitators' practices garnered from the observations, is reported in the following seven narratives. As interviews were being conducted, transcribed, and written, and as observations were being conducted and artifacts being collected from the messages in the program, several categories of facilitator practice emerged into which each of the case study facilitators were classified (see Table 14). Based on interview and observation data, multiple descriptors were identified for each category which allowed the classification of case-study facilitators as shown in Table 14.

Table 14. Emergent Categories of Facilitators.

Facilitator Category	Descriptors	Member Facilitators
1. Participant Facilitator	Personal agenda apparent Expresses personal opinions Seeks advice on personal issues Seeks feedback for personal direction Seeks deep and thoughtful conversation Steers discussions to higher levels Frequent high-level questioning	Carolyn

Table 14 – Continued.

Facilitator Category	Descriptors	Member Facilitators
2. Expert Facilitator	Promotes true communities of practice Promotes reflection and practical application among participants Possess attitudes that he/she gains as much as any participant Values expertise of others Other facilitators recognize their work as expert Timing perfection Participants tend to mimic style and tone of message posting Quickly established as role models Discussions become self-sufficient Promotes community among colleagues – shares personal reflections on practice	Gina Madeline
3. Systematic Facilitator	Highly structured or focused areas Established/predictable routines Little interference/minimal presence Confidence in the abilities of the group to maintain conversation Sense of a particular duty Self-directed groups Efficiency a priority	Michael Cynthia Gayle
4. Nurturing Facilitator	Seeks and promotes personal connections Encourages participation Ensures comfort Contributes social tone to conversations Use of friendly emoticons Use of friendly greetings	Barbara

Caution is given to the reader that these categories are not mutually exclusive. A particular facilitator may possess characteristics and exhibit strategies from several different categories. The facilitators in these case studies have been classified into

categories based on the best fit between their practice and the category descriptors. There also appears to be no hierarchy involved in the facilitator categories identified. All of the case study facilitators demonstrated competency in their practices, with the ability to promote higher levels of participation and discussion.

The practices of the seven facilitators are presented in this section according to the classification of their practice. Descriptions of each of the categories are provided below along with the associated narratives of case study facilitators' practices.

To provide a clearer picture of each facilitator's development, each case study narrative begins with a brief description of the facilitator's background in teaching, experience working with beginning teachers, and experience in distance methods of information delivery. Direct quotations from each facilitator's interview, and sample messages from the discussion areas he or she facilitated in 2005/2006, are included to illustrate facilitators' perceptions of practice. (Electronic messages taken from the program were copied and pasted into this document as they were posted in the program. Therefore, the reader may see occasional grammar and spelling errors within the messages. It was determined not to correct these errors unless it affected the ability to understand what had been written. It should be noted that the names of the participants were changed for confidentiality purposes.)

Category 1 – The Participant Facilitator

"Participant facilitators" are different from other facilitators in that they tend to bring personal teaching issues, questions, opinions, and experiences into discussion areas. While other facilitators are observed to use personal experiences to further an existing

discussion, participant facilitators actually use personal experiences, issues, or questions to begin topics of discussion. They tend to express their opinions on issues of discussion much more frequently than seen by other facilitator types. Thus, in addition to acting as guides in directing, furthering, and enhancing discussions, participant facilitators become full participants in the discussion. While the potential is present for this type of facilitator to become dominant and directive, if combined with certain effective facilitation techniques, this style of facilitator can be effective in promoting quality discussions as seen below in the case of Carolyn's practice.

Carolyn. Carolyn has been in education for 11 years and has taught mathematics at both the junior high and high school levels. For the last 7 – 8 years she has taught primarily at the high school level. She is now teaching just freshmen. Carolyn did not have any experience in using the computer to deliver content information until her involvement with eMSS for the past three years. She served in the program as a mentor the first and second years, having one mentee each year. The second semester of the second year, she was asked, along with another experienced teacher, to "help out" in the content area when the position of the teacher leader for that area was left vacant. The duties of the position centered on helping the content expert design and implement discussions revolving around content. These positions are now called "content facilitators" and involve working with the content expert to start, steer, and summarize discussions that lead to increasing the content knowledge of participants and supporting them in the best methods of teaching content to their students.

That summer (2005), she worked as discussion leader in the mentor training institutes. She described her role there simply as "I trained mentors". During the 2005/2006 program year, Carolyn continued as mentor for two mentees and as one of the content facilitators in a content area. She also facilitated an inquiry during the spring.

Carolyn values her training and work as a facilitator, not only for the skills it provides her in her facilitating duties, but also for the guidance it provides her in her work as a mentor and as a teacher. Though she sees her job as a mentor as mainly providing support to her mentees, she also understands her duty to engage her mentees online and keep them on task with the current dilemmas and the inquiries in which they have chosen to participate. As a facilitator, she expands that role to both mentors and mentees – trying to engage them in rich content discussion – "to really think about what are we teaching, why we are teaching, what's tricky about it, and what do you think about this …". This attitude is evident in much of Carolyn's facilitator work as shown by this post from the mathematics discussion area:

Subject: Re: Terminology

(Sally) wrote:
As far as addressing the issue of "canceling" with my colleagues, I guess I would have to confer with the other high school teachers on this one. To some degree it probably would be worthwile, although it would have to be put gently I think. Also, who is to say that one or some of those teachers aren't in the same boat as our students except with a few more years of saying it that way? I'm unsure as to the real benefit. I don't want to be telling them they are doing it wrong especially if the kids understand what they are trying to get across.

(Sally) asks some great questions here.....if there is a terminology issue you want to address with your colleagues or students, how do you do it? Do you do it? Is correct terminology important if students still get it?

(Carolyn)

As a result of her facilitator training and work, she now realizes that she is there to guide, not "to have all the answers and just support". Carolyn feels that her roles as a mentor and facilitator in the program mesh with her role as a teacher.

> (In the classroom) you want to facilitate the discussion and let the kids lead the way. That's exactly how I feel (as a facilitator). I just need to ask the right questions to prod them and to really listen to them … I think I started on working on questioning techniques about 3-4 years ago (in the classroom) … I think that my working on my questioning techniques in class – my inquiry process in class – really lent itself perfectly to being a facilitator.

True to the common practices of a "participant" facilitator, Carolyn asks questions frequently in her work as a facilitator. She ends almost all responses with one or more questions and it is evident in her posts (see below) that she eagerly seeks to stimulate deep reflection and discussion among the participants in her discussion areas.

Subject: feeling useless

I know some mentors might not feel like they are being used to their potential. So, I thought it would be great if mentees could share their current situations/thoughts on how their year is going.

For mentees to answer:
What areas of teaching are "sucking" the life out of you?

What areas would you like to spend more time on.....but you just can't fit it in?

What is the hardest and/or easiest part of teaching math for you?

Thanks for your thoughts/comments!

(Carolyn)
mentor/facilitator

Subject: slope

So, no one else had questions, I came upon one yesterday........

Why is slope rise over run? Not run over rise?

(Carolyn)

Carolyn feels that her summer facilitator training was “eye-opening”. For her, the role modeling provided by the training staff was a “powerful, powerful experience”. One part of the training that was of particular importance to Carolyn was the modeling of reflective questioning. In Carolyn’s words:

> I think that I’m better with my staff members and student teachers and my mentees about not having the answers. I think that’s been really good for me – just ask the question and step back. I think it has made me a much better mentor … because again I think I just wanted to help people out and tell them the answers – this is the solution instead of giving them good questions so they could figure out their own path.

Two other components of the summer training of particular importance to Carolyn were the feedback that was given on her weekly reflection pieces along with the private replies from the training staff to her discussion posts. The validation of her thoughts and comments has led to Carolyn becoming a “better listener” than before the training. She feels that her work and training as a facilitator has opened her mind to different ideas and to really listening to mentees.

> I don’t know if I really listened before. I don’t think I really thought they had as good of answers as they do. They know a lot. I don’t think I gave them enough credit before.

Carolyn’s responses as a facilitator commonly repeat what participants have said, re-word and acknowledge to show understanding, and then, as seen in program messages both above and below, challenge further reflection and thought by asking extending questions.

Subject: Re: Terminology

(Jane) writes:
>I have some students that use the term "cancel" a quite a bit, as well. I just rephrase that they divide to one, or add to zero. I never force them to say it that way, but I avoid "canceling" out numbers. To me, understanding the concept that two numbers divide or add out, is more important than the word(s) they say to get the job done!--In other words, I am with (Bob)...and am not going to force the issue.

I hear (Jane and Bob) saying that forcing students to say "make a one" or "make a zero" would not be a battle they are willing to undertake because it seems that students do understand what they are doing - they have been using this terminology for years prior and it seems minor in the big picture.

Would addressing this issue of "canceling" be worth while for you to address with your math department/middle school teachers/elementary teachers? Why or why not?

How could we formally assess for understanding with the word "cancel" to ensure that students truly understand numbers aren't magically disappearing?

(Carolyn)
facilitator

Carolyn seems to depend and thrive on feedback in order to improve her practice. She claims that the feedback she gets from her students and her mentees helps her to monitor her effectiveness in her roles as teacher and mentor. Characteristic of the "participant" facilitator, she garners feedback from what is happening in her discussion areas in order to monitor her effectiveness as a facilitator. In fact, it may be that the personal agenda that she brings to her practice is a result of this dependence on feedback. She stressed that the feedback in the summer training helped her to further reflect on her facilitating skills and practices. In fact, she misses this type of feedback and the personal responses in her duties as a facilitator. As she commonly responds privately to participants in her discussion areas with words of acknowledgement, praise, and encouragement, she would like to receive occasional personal comments on her facilitation work in the program. She feels that this type of feedback would help her to

continue to grow and develop in her practice as a facilitator. Though the facilitator forum was designed to provide ongoing support and feedback for facilitators throughout the program year, Carolyn had not been very active in the area until the spring inquiries began in March and did not benefit from the support and feedback given by program staff for the majority of the year. However, even with her limited participation in the forum, she sees it as a valuable place for facilitators to get their questions answered … and to get and give feedback on what is happening in the discussion areas.

During the time that Carolyn has been involved in the program, she has seen positive changes in dialogue that she feels have led to growth in the practice of program participants. She feels that there are many less of the simple agreement or acknowledgement type posts such as "I agree" or "Great idea" that don't contribute to continuing or deepening a discussion. She also feels that there are fewer personal replies being posted in public areas. She has seen that more mentors have learned how to be concise, yet complete in their posts. She feels that these changes have really helped to un-clutter and streamline the discussion areas making them more manageable for mentees.

Carolyn attributes these changes to the focus on dialogue in the summer training institute and in face-to-face sessions as well as changes that have been made in the program in response to participant and evaluation feedback. She also feels that experience among participants, some of whom have been involved in the program for four years now, has led to a greater comfort in posting and a higher level of knowledge of how to compose posts effectively. Perhaps the posts of these more experienced

participants model effective online communication for those relatively new to the program.

Due to her belief that "dialogue is everything" in the program, Carolyn continues her quest for effective online questioning and dialogue-deepening techniques. Carolyn has learned that one must pose questions that have a variety of solutions.

> Like good assessment techniques in the classroom, you have to ask a question that doesn't only have one right answer - because I found that when I make a mistake and I make a question that only has one answer, that's all you get and you get that 50 times.

She becomes frustrated by mentees reading and responding to the original post without reading other responses in the thread and building on what has already been said. She commonly tries to steer and/or start conversations by using previous comments that have been posted in the thread. She has found that taking an edited quote from someone else in the group and building on that tends to be an effective strategy in steering conversations. The following message, posted by Carolyn to her inquiry discussion area was built from a previous participant post and resulted in a relatively healthy discussion of alternate assessments used in these teachers' classrooms.

Subject: Informal assessment

Thanks to you that have responded....keep up the great work! (Tom) talked about a couple of his methods of informally assessing his students about their understanding. He mentioned that they are quick, simple, and don't require grades.

Do you use any other techniques like these?

(Carolyn)
facilitator

Thinking that scaffolding (asking one question at a time – leading up to the topic of interest) was an answer to encouraging participants to continue and build on conversations, Carolyn has found that she has to be really careful about scaffolding because so many mentees "will pop in, answer the question, and then won't be back again …". Carolyn feels that creating smaller and fewer discussion areas may help her in facilitating deeper, more meaningful discussions – especially among mentees. In her effort to improve the dialogue among participants, Carolyn feels the need to model posting effectively. She therefore writes her messages, reflects on them, and re-writes if necessary before she posts, a practice stimulated by the focus on the dialogue in her facilitator training and the focus on reflection in her mentor training. Throughout the year in Carolyn's program areas, her posts have evolved into a collection of established coaching techniques (Costa & Garmston, 1994) used for promoting reflection and thought and continuing conversation … repeat what was said, reword and acknowledge, clarify for understanding, and question to further challenge thought and reflection.

Carolyn sees definite benefits to mentees as a result of their participation in the discussion areas of the program. Through conversations with her own mentees, she sees evidence of change in practice.

> (Bob) specifically talks about what he learned from his students from an assessment from the last inquiry we did that looked at student understanding. He'd been doing a lot of short answer questions and tried something more open ended. I know that if he's learning more about his students, his students are learning more about their mastery of the subject so I know that has to improve their success.

Carolyn also notices how mentees, as well as mentors, are developing more reflective skills. She has seen that some mentees, who thought they had all the answers and "that's all that they would post", are now beginning to ask questions and are becoming open to new questions and ideas. She tells of her own mentee who has become so much more reflective that now he posts questions, reflects, and comes up with his own answers.

Summary of Carolyn's Practice. Observations of Carolyn's facilitation work in the program reveal that she is more of a "participant facilitator". It is clear through observing her work in the discussion areas she is assigned to that she expresses her opinions and asks questions drawn from her own personal agenda more than most of the other facilitators. Earlier in the program year, the expression of her opinions and statements tended to contribute to ending the conversations as seen in the following two posts that seemingly ended the thread.

Subject: Re: MATH DILEMMA #1

(Julie) writes:

>i have done timings with students in the past and it has really helped. I have done this at both the HS and MS level. Students did improve their computation skills. I have used folders with a piece of acetate taped inside. Then, students can start timings with basic skills and need to master before going to the next sheet. A person could be practicing basic facts if that is what he/she needed, but I also have sheets involving fractions, etc. Someone could use this idea and incorporate timings involving integers, etc... Once it is organized, it only takes about 5 minutes of classtime (if a student helps pass folders out at beginning of class and gets it ready to go)

You know, I agree with the timings...expect I found it stressed many of my lower students out...so I still gave them the sheet...but we just keep track of how long it took....and we just worked on improving our times each week. They loved seeing their progress....still find success and improving computation!

(Carolyn)

Subject: Re: Grading Query

(Lisa) said: "Many would argue that the effort put into homework is not given enough credit, but I feel a student's grade in my class should reflect their understanding of the material."

Like (Brooks) said, homework is a place to practice their newly acquired skills. I do not think that we should put too much of a grade based on homework. If we put too many points on homework, students feel pressure to get it all right.....even if they didn't understand it or didn't finish it. I have found that this does the opposite of what I want, students start to copy and cheat in an effort to achieve the high grades.

Therefore, I give homework either full credit or no credit. All students receive full credit as long as they attempt every problem I've assigned (which is why I keep the number of problems to a minimum). They could get every problem incorrect (but are required to show all work), but still receive full credit for attempting the work. If they really have no idea on how to do the problem, I require that they copy the problem and write a note as to their confusion.

I find that students are not afraid to try the problems that they normally would skip because they are not penalized for getting it wrong. They are many times pleasantly surprised they did it correctly.

In addition, this makes correcting homework easy on me as well. Students correct their own homework in class....it gives them immediate feedback to whether they are doing things correctly. I am able to scan homework to see what problems students are struggling with....to guide my instruction. Plus, this eliminates my frustration of years past when I would kill myself giving them feedback that they would simply throw away after glancing at the grade.

This has worked for me.....but understand why this is not for everyone.

(Carolyn)

However, though she still tended to express her opinion and ask her own questions as the program year progressed, she increasingly validated what had been said by others, and attempted to solicit ideas from others. These changes reduced the tendency for her posts to become conversation stoppers. This can be seen in the following two posts taken from discussion areas during the second semester of the program year.

Subject: Re: School Resolutions

(Mike) writes:
"Do you have a back up plan in the event some of the students don't return the form?"

Great question (Mike)! I have been mulling this over in my mind....I plan to give the form out as a 'homework' assignment and give them a couple of days to return it to me since not all kids see their parents every night. Of course, I do expect many to 'lose' this form.....so I did make a lot of extras.

I suppose if I never get one back from a student.....I could mail it directly home.

Past that.....I have no great backup plan. Does anyone have some good ideas for me? The whole idea here is to improve parent communication.....

I welcome ideas!
(Carolyn)

Subject: parabolas and axis of sym.

Hi there Math gurus-
I was wondering if anyone knew where x = -b/2a comes from when you're finding the axis of symmetry for a parabola.

I don't need a formal proof.....I just can't get a handle on why it works.

(Carolyn)

Both of these later posts either began or continued conversations in that Carolyn either asked a question or posed a problem for others to respond to.

In her work as a facilitator, Carolyn has posted relatively frequently. She has often been observed to post several messages in the same area at the same time. The purposes of the messages she posts vary. They might serve to start or steer conversations, to stimulate deeper thought among participants, to express her opinions/practices, or to get answers to her own questions. Carolyn's focus as a facilitator is in posing just the right question to get participants to initiate and engage in deep and thoughtful conversation about content. She has become much more thoughtful

and careful in developing questions and composing the messages that she posts to discussion areas. As a facilitator, she craves discussion that involves a large number of participants, deep and thoughtful responses, and frequent responses. Though she tends to have multiple purposes for posting (as a facilitator, as a mentor, as a fellow teacher, as a member of a learning community), she consistently strives for a dialogue that is of the highest quality.

Category 2 – The Expert Facilitator

"Expert facilitators" are truly experts in their work. They tend to possess all the qualities of a professional facilitator, having the ability to guide discussions while remaining in the background, a true "guide on the side" (Collison, et al., 2000). The timing, tone, and wording of their responses tends to facilitate the development of a comfortable learning community in which participants frequently and comfortably join discussions. Thus, their practice enables participants to build productive professional relationships in a social context. These facilitators recognize and effectively manage the types and purposes of dialogue in online discussions and effectively use various questioning techniques to enhance the quality of discussions in their areas. It is these facilitators that tend to promote discussion areas that evolve into a relatively high level of self-sufficiency as participants begin to form true communities of learning. These facilitators are quickly recognized as experts when peer facilitators are given access to observe their work. It is the work of these facilitators that other facilitators desire to emulate in an effort to achieve full participation, dialogue of high quality, and productive

conversations. These characteristics can be seen in the following two case narratives. Gina and Madeline were both classified as expert facilitators.

Gina. Gina has an undergraduate degree in music and a graduate degree in science education with a bioscience emphasis. She has taught music, self-contained elementary classrooms, departmentalized 5th and 6th grade science, Spanish, and high school science. She is currently teaching in her 42nd year. Gina is experienced using the computer for content delivery having taken several distance education courses and having served as a facilitator in a distance physics course prior to her involvement with eMSS. Gina has served as a mentor in the eMSS program for two years and has had relatively extensive experience as a facilitator in several different areas (perhaps contributing to her "expert" classification as a facilitator which may suggest a developmental component to categorization). After receiving facilitator training during the pilot institute in the summer of 2004, she was a group discussion leader in one of the modules (now called inquiries) for the 2004/2005 program year. During the summer of 2005, Gina facilitated discussion areas in the summer online mentor training institutes. During the 2005/2006 program year, she was a content facilitator and facilitated a winter inquiry. And, in May of 2006, Gina facilitated the online eMSS facilitator training institute.

Gina describes her experiences in distance education as "extremely positive". She appreciates the networks that have been established that allow her to get teaching ideas from all over the country. The eMSS program especially has allowed her to get a "different slant" on teaching and learning approaches as she gets a more national view of education. Due to these teaching and learning connections and the relationships that she

has established online, Gina feels that she has gained more than anyone from her involvement in the eMSS program, a characteristic that may be typical of "expert" facilitators.

Gina values the practical experiences of working as a facilitator. She feels that her expertise in posing questions that keep the conversation moving in a positive direction comes from actually doing the job. According to Gina, "practice makes perfect – the more you do it, the easier it becomes". Experiences that were most beneficial to Gina when she went through the summer training institute involved the actual practice with looking at and analyzing posts, "the good and the bad, to look at the problems … and try different things". As a result of these experiences, Gina takes her time when she composes posts to her discussion area.

> I think more before I respond. I try to analyze. I'll start writing something, I'll read it, I'll re-read, I'll add, I let it sit a bit longer before I actually hit the post. I think it is – because just as we've discussed so many times – without the body language you have to be more aware.

Gina tells a story of making a comment in one of the discussion areas and having it taken in totally the wrong way. She had responded to a mentee with a suggestion that the mentee might want to use more reliable literature sources in her science classroom. This mentee and her mentor took the comment as a criticism of the mentee's choices and current practices. Not wanting others to mistake the comment and be discouraged from participating in the area, Gina posted an apology and clarification of her earlier post.

Subject: Re: Welcome to Teaching with Scientific Articles

(Frank), I'm sorry you misunderstood my message. I did not intend to imply that I felt the sites you offered were not good ones. I was trying to take care of two pieces of business with one message: (1) to acknowledge your listings and to thank (you) for them, and (2) to let people know who were searching for sources, that there were suggested sites within the inquiry site itself.

I also teach middle school kids and know what you mean when you say its difficult finding meaningful content for them. I apologize for any misunderstanding and hope you continue to bring other materials to our attention. Thank you for your participation and understanding.

(Gina), facilitator

In order to avoid situations like this, model effective dialogue, and make the most of her messages, Gina now takes care to make sure the following questions are addressed when posting to the program:

Is it short, but complete? …
Does it show thought and use of language?
Does it use the quote feature – the edited quote feature?
Does it use humor carefully?
Does it show reflection where that is appropriate?
Does it ask a question to encourage additional participation?
Does it contain the sign-off?

Gina has earned the respect of other facilitators because of her ability to compose meaningful and effective online messages. Throughout the interviews for this study, other facilitators would refer to Gina's work as that which they wished to emulate. Most admired of Gina's work is her expertise in composing messages. The following post, made by Gina to her inquiry area, demonstrates many of these qualities. She uses the edited quote feature of WebCT to highlight the part of an earlier response that she wants to address. Thought, use of language, and reflection are evident in the post. The

message is concise and to the point and ends with a question to encourage additional participation from others' perspectives and experiences.

Subject: Re: Article for Biology

In message (Ann) writes: I understood the process- but thought the article timely and intersting. I recently had my Biology students read the article from Science - I found that, for the most part it was way over their heads - and they were extremely challenged by the terminology and technical information in the article. I am also concerned that students see the source and automatically shut down. I will change articles for this inquiry - but does any else experience this shut down? It is almost as if the students realize they will have to think, and choose not to continue on...

You're right, (Ann), many science articles are difficult to comprehend from the stand point of a middle or high school student. Maybe that's one of the reasons for offering this inquiry, getting some discussion going about a variety of scientifically valid sources. I think we all face the situation from time to time where our kids don't want to do any more than they have to. (I know my seniors are definitely getting to that point as they look forward to graduation.) Perhaps we need to go for the middle ground, try to avoid the popular press but don't go to the scientific journals for the first attempt. Let your kids get their feet wet gradually. What about some of the rest of you? Have you had kids shut down when given particular assignments? What did you do?

(Gina), facilitator

Gina feels that skills she has learned in her roles as teacher and mentor have helped her in her job as a facilitator.

> As a facilitator you have to be able to ask questions, keep things going, and also be encouraging, summarize – I see that daily in the classroom … questioning, encouraging, supporting, all of that, just being there trying to keep the tone of posts positive.

Though she didn't have great experiences with mentoring (her mentees were relatively inactive), the skills in guidance, support, and encouragement that she developed have been valuable in her practice as a facilitator.

> … try to point them in the right direction, keep encouraging them to get online and post, and when they do, get back to them quickly … I try to close any posts I put with a question that have people coming back – steering, summarizing, encouraging, keep the conversation moving in a positive direction.

Gina uses timely and encouraging posts to steer conversations and activities in directions that align with program goals. She frequently summarizes discussions to encourage reflection on the personal direction and application of past discussions. And … she encourages participation by requesting feedback, probing for more information, and/or asking questions.

Subject: Re: Article for Biology

In message (Ann) writes: I agree about the last paragraph being coontroversial. The thing I liked about this article was how it gave some personality to Darwin- and looked at him as a person. I think that all too often we get caught up in the facts of science and forget the stories behind those facts. When I started teaching DNA - I taught it from the stand point of - how where why DNA was discovered- discussing the 'race' to determine the structure - my students really got alot out of this unit - and I was thinking of Darwin in the same way. To simplify my inquiry I am going ahead with the Smithsonian article, Medical Sleuth. Thanks for all of your constructive input and ideas.

Now that you've selected your article, how about moving into more of the PLAN phase of the inquiry. How will you incorporate your article? What are you expectations for your students, etc. Check out the discussion strand entitled Plan.

(Gina), facilitator

Subject: Re: PLAN: Questions to Consider about your Article

Your plan reads very well, (Ann). Thank you for posting it. I like the summary you've given of the article and the tie-in you've (made)to CSI. Using the same technique should intrigue most of your students. Your sum-it-up technique should help your students get to the meat of your article.

Let us know how it works, please.
(Gina), facilitator

Subject: SUMMARY: My First Teaching Unit

We've had some terrific discussions coming out of this first physics topic! In answer to the initial question as to what people started the year teaching in physics or physical science, we got a bit of variety.

(Sue), (William), (Jean), and (Lou) said they started with measurement to some extent. (Andrew) started with building skills such as graphical analysis and simple lab designs to introduce accuracy and precision and significant digits. (Diane) began with combustion and air pressure and other chemistry teasers to hook the kids. This opened up a side discussion about which was better at the middle school/ freshman level, beginning with chemistry or physics. Most participants agreed that it made sense to begin with physics, at least with Newton's Laws and kinematics, then go to chemistry, then back to light, sound, electricity and magnetism when math skills have developed more.

A discussion about teaching the concepts versus teaching the math developed. Most of the middle school teachers said concepts were a must, the math would come later. Several mentioned teaching math on a need to know basis, providing many learning clues and strategies to help. (Elaine) discussed her idea of math sense, helping the students look at reasonable answers and deciding which were unreasonable. She also uses a math page for equations with her students. (Andrew) brought up using the equation triangles to help students determine which factors are needed. This is a device that can be used for many different equations: density, velocity, acceleration, pressure, Ohm's law, etc. (Ed) agreed that a physics-chemistry-physics split through the year for middle school physical science made sense and worked well in reinforcing concepts.

(William) stated he had found that sometimes students could handle complex concepts at a gut level, intuitively recognizing their validity but also pointed out that sometimes honor students frequently got the correct answer but were really (clueless) as to what was going on conceptually. Good point.

All in all, the discussions were an excellent start to the year. What were some of the highlights for those of you who participated in this shell?

(Gina), facilitator

For Gina, the textbook used in training and other parts of her facilitator training provided her with background information, but she feels she has learned and grown more in her role as a facilitator from actual experiences. The guidance for her practice provided by the staff in the facilitator forum has been helpful to Gina during the program

year – "anything that keeps you on your toes as to knowing what is going on, what should be coming next … (and) the interaction … sometimes I'll have a question and it's answered before I even have it posted." Gina has used the facilitator forum for guidance, as an informational area, and as a place to get questions answered. The following post from the facilitator forum gives a glimpse of the ways that Gina and other facilitators have used the forum for support as they reflect on the activity in their discussion areas and how they might improve as facilitators and participants. (The thread was started by a facilitator who was concerned about the direction of conversation in her discussion area.) Characteristic of "expert" facilitators, it also shows how Gina uses her rules for posting (seen above) even when in discussions with other facilitators … a great model for others.

Subject: Re: Evol/Cretation

In message (Jackie) writes:
>This, by the way is in the MT/CA shell. Personally, I don't think the tone and >content will be very encouraging for mentees to jump into the discussion.

I agree with you, (Jackie). I've been following the discussion and have found it interesting but sometimes overwhelming. Those most involved have gone to great lengths to put forth their own ideas and stances. I'm seeing the same arguments over and over. The tone is not welcoming, certainly not welcoming to mentees. The topic is highly controversial and, as mentioned by others, is one that is likely to come up in many science classrooms on a fairly regular basis. How do we prepare our mentees to handle the subject? How do we leave our own biases outside of the science room? When should a facilitator just flat shut down the discussion? I've got more questions than answers.

(Gina), facilitator

Gina considers the dialogue in the program to be "critical". She sees it her duty as a facilitator to "lead by example" and to "make good postings that have something to say and that apply to a larger group and continue to encourage others to dialogue". To

her, the discussions that take place in the program are central to building relationships and developing the community sense that Gina has seen develop since she's been in the program. She feels that because participants are feeling more familiar with one another and because of the direction of leadership (modeling, training, involvement, and continued modification), both the volume and quality of discussions have increased.

> I would say there's been more reflection and it seems to me that we're getting help from a variety of sources – the mentors are crossing disciplines lines frequently in some of the discussions. And some of the new mentors this year (various mentor names) have just been terrific in providing resources. The first semester it was pretty much (the staff) doing the stuff and now there are more people jumping in - the content experts are posting more.

Gina has seen evidence that the program is having positive effects on mentees' practice. She has noticed, through reading the messages that mentees post in the program that they're actually reading other posts and responding to them. They seem to be more deeply analyzing their practice as a result of reflection on the program discussions. While she feels this is especially true of second and third year mentees, she's seen some first year mentees who have shown "excellent thought processes". Though she has not seen direct evidence that the achievement of mentees' students is improving, Gina has read posts that have implied improved student achievement. She has, however, seen evidence that mentees are implementing changes in the classroom as a result of their interactions in the program.

> Some of the lessons that they've posted show that they've done some thought and not just picked up the first thing in the book – they've done some searching. Or they'll come on and say that I want to do this and how

> do I do it? Looking for improvement … but the same has been true of lessons that have bombed – there have been a couple that have come back and said that 'I tried this and it didn't work for my kids' …

The following two messages show Gina's ability to encourage and model reflection on lessons and modification of lessons for one's own situation. Though reflection and lesson adaptation were built into the inquiry where this was posted, we see Gina here promoting further reflection regarding a successful lesson and also modeling how to consider the modification and use of ideas for one's own classroom.

Subject: Re: PRACTICE: Moving the Inquiry Forward

In message (Ann) writes: I found that the students really struggled, and I mean struggled, with the 20 word limit. I had a few go over and a few go under, but over all they enjoyed the reading. The students really seemed to enjoy the article- we had several lively discussions and I also had several students read their summaries to the class. A number of students kept coming up with the question, why isn't there more research on rare genetic diseases? which led us to discussions about funding and treatments as well as gene therapy. Reflecting on the lesson, I don't think I would change a thing - something I very rarely get to say.

Isn't it nice when something works the way we hope it will? I'm curious about your 20 word limit. Why did you select that number? I think your choice has benefits as well as challenge in it. Definitely cuts down on the long-winded. :-) Would you repeat this type of lesson with another article? Just curious.</p>

(Gina), facilitator

Subject: Re: using articles at the university level

In message (Jackie) writes: I use articles in my college level classes in a similar way. After covering the material from the book, I find it very helpful to provide a paper that takes the fundamental principal(s) and applies them to a real issue or problem. The class could take different sides and outline the strengths and weaknesses in both ideas. I can introduce questions too, such as - can either hypothesis be tested? what kind of evidence would support or refute the position?

> This same procedure can be used with modification at both the middle school and high school levels. I really like your use of opposing articles. This approach would help to show our students that science is not a cut-and-dried discipline. That there are disagreements among scientists and that from those disagreements better science is frequently achieved. Any time our students are shown the use of critical thinking skills and problem solving techniques, I think they come out the better. Thank you for sharing, (Jackie).
>
> How might this approach be used in other areas?
>
> (Gina), facilitator

Summary of Gina's Practice. Observations of Gina's work reveal that she seeks out and depends on the expertise of mentors and even the mentees in her group. She is quick to recognize the contributions of others to the group discussions. She frequently throws out questions from others to be discussed and answered by the participants in her discussion areas. She rarely "answers" a question herself and rarely asks a personal question not related to a topic introduced by a mentor or mentee. She is quick to acknowledge that she doesn't know it all and in doing so, acknowledges and values the expertise of others which seems to more strongly promote a true community of learning (Wenger& Snyder, 1999). Over the course of the program year, Gina appears to have posted less and less in her discussion areas making way for her discussion group members to play important roles in starting, steering, and continuing meaningful discussions. She is impressed and pleased with the number of participants, primarily mentors, who jump in and contribute to discussions, answer questions, probe for deeper thought, and provide resources for mentees. As participants have become more comfortable in the safe and inviting environment that Gina has created, she has been able to back off and gently guide the discussions as needed. Throughout the year, Gina has been steadily 'working herself out

of a job' with this kind of refinement of her facilitation skills. The following post to the physics content area (taken from the electricity discussion shown in Appendix A) is indicative of the nurturing environment that has resulted from her work.

Subject: Re: Electricity

In message (mentee) writes: >I have been gathering ideas like mad. I tend to print what I can, in color if available and the link, and store everything in page protectors in subject based binders. It seems insane but as a first year teacher I need that kind of variety because otherwise I get one option of how to do everything. So I have a binder for each major subject (Waves, Electricity, Gravity, Kinematics, etc.) This extra research (thanks mostly to all you guys!) allows me to gain experience and ideas for this year and the next twenty. And to that end I've attached my search results for the night (yes just tonight's!) including an awesome one for leyden jars. And some objectives and misc I like.

You might consider using electronic folders on your computer. I keep several in "My Documents" folder and when I see a great idea, I copy and paste it to the appropriate folder, just like I did with your Leyden jar link. The other attachments you included were likewise good. Thank you.

I think the sharing that goes on through people in the eMSS program is one of the strengths of the program. As you said, early service teachers need support and the fact that you're involved here shows how it's a two way street. We mentors learn as much from you mentees as you from us. It's always great to get new perspectives. Keep up the good work

(Gina), facilitator

(The entire conversation on electricity can be seen in Appendix A. Taken from the physics content area during the second semester of the program, the conversation demonstrates the freedom with which Gina's group members converse to give ideas and feedback to a mentee's question.)

Madeline. Madeline has been teaching for 27 years. Though she taught a variety of subjects early in her career, since 1982 she has been teaching primarily life science and physical science at the middle school level. Interestingly, however, since Madeline teaches at a performing arts magnet school, along with all her colleagues at the school, she also teaches literacy and various art electives. In her third year with eMSS, Madeline

had little experience in distance education prior to the program. Though she managed a list serve for a short time and worked "distance wise" via the internet in the development and planning of educator training, she was quick to point out that it wasn't anything close to distance education. Madeline served as a mentor in the program during her first two years, admitting that her first year of mentoring was "grossly unsuccessful". However, she describes her second year mentee as "amazing … a poster child for eMSS". She is proud of the work that they did together on a grant proposal for the mentee and tells about the personal rewards of that collaborative work when it was approved. Madeline has worked as a facilitator for the eMSS program in various areas. During the summer training institutes of 2005, Madeline served as discussion leader. During the 2005/2006 program year, she worked as a content facilitator, facilitated two separate inquiries, and facilitated one of the content dilemmas. According to Madeline and characteristic of an "expert" facilitator, her greatest reward for working with the program is the "ideas and interactions" that she gets from program participants. Since she is still in the classroom, she considers it professionally "refreshing" to be able to talk with other teachers.

> I think it has been awesome, just like a new lease on my teaching - the amount of resources, being able to interact with other teachers, the mentors and the mentees - just the knowledge and ideas that are floating out there. The activities, too, have just been wonderful.
>
> … Every time somebody brings up a problem, "Oh I know what I did for that". But it's always nice to hear what other people have done too because sometimes they bring in some things that I hadn't thought of before …

According to Madeline, her facilitation skills were learned from a variety of experiences. Face-to-face mentor training, summer facilitation training institutes, training materials such as the textbook, *Facilitating Online Learning* (Collison, et al., 2000), and guided, practical facilitation experience all contributed to Madeline's development as a facilitator. She assumed a leadership role early in the program when she was asked to help run the face to face mentor training and approached to lead discussion groups during the online training institutes. This practical experience was important to Madeline, "I think you get better with anything at practice". As an example she tells about developing her skills at summarizing:

> Last summer, really my first facilitating experience was running the forum, and that first summary I bet I spent four hours … well, I don't quite get to that extent (now), but I get the main ideas … more streamlined … Probably the hardest part (of being a facilitator) is writing those summaries … tying all of those ideas together.

The following program message is one of Madeline's summaries. Somewhat of an expert in summarizing, through practice she has refined her skills in summarizing and now provides her participants with concise, well-organized summaries that acknowledge the ideas of those who participated in the discussion and provide reminders for reflection to group members and other readers interested in the topic.

Subject: Dissection Dilemma Summary

How appropriate is dissection in a biology class? Opinions vary. Some feel dissections are more appropriate for an anatomy or physiology class, while others think dissections fit in well with biology. Some people use dissections to introduce or teach comparative anatomy, others to demonstrate vertebrate anatomy. It was suggested that dissections can help students develop manual dexterity and active observation so using invertebrates to accomplish this might be less controversial than vertebrate dissection.

The question was raised, "What example are we as teachers setting when we promote dissection in the classroom with animals that are dwindling in the wild, such as frogs?" Many people responded by saying they make sure to use animals or organs that are the by-products of slaughterhouses.

When students voice objection to dissections, alternatives such as websites and programs (A.D.A.M.) are excellent replacements. To encourage participation in actual dissections, some strategies teachers use include; letting students choose their own partner, not requiring everyone to dissect, using formaldehyde-free specimens, wearing disposable gloves and even letting students bring their favorite air freshener!. However, everyone seemed to agree that having an alternative assignment for those students who objected strongly to dissection is the best way to go.

People, who feel that hands-on dissections are important, also recognize the need for meaningful dissections. Several suggestions were given to make this happen including directed instruction to build a knowledge base before the dissection, using worksheets, quizzes, beginning with an on-line dissection or relating it to fishing or hunting experiences. Seeing things in a dissection that are unique to animals and not color coded as in the textbook is seen as a positive reason for dissections. Some people use it as a discussion starter for bioethics relating to the use of animal testing for products and medicines.

Hopefully this discussion raised issues that had not been thought about before or helped you clarify thinking about the use of dissections. Thank you to everyone who participated!

Feel free to continue to respond until the end of the week, and then this dilemma will be locked.

(Madeline), Facilitator

Also of great importance to Madeline was the modeling provided by program staff in the summer facilitation training, "everything from asking leading questions to

replying privately when somebody did something well, or 'really appreciate the comment you made' – those kinds of things". Through example and personal experience, Madeline learned the importance of personal recognition and acknowledgement of contributions to the discussion.

> You participate and you discuss and you think, "yea I'm really getting this" and then … that little private e-mail, saying you know, "good job you really hit it on the head". It's like, "gee whiz somebody else noticed", that's great. It meant so much – really – you think you're beyond that but you aren't.

As a result of this experience, Madeline responds privately to the participants in her group quite often. In addition to affirming, acknowledging, and praising participation, Madeline reports using the e-mail feature of WebCT to welcome participants to the discussions and to encourage folks to continue to contribute to the online discussions. In addition to the modeling provided in the training institutes, Madeline credits continued practice and discussions among fellow facilitators (in the facilitator forum and in institute trainings) with her developing expertise on appropriate private versus public postings. By properly placing messages that are important individually to participants, yet don't really contribute to the public discussion at hand, Madeline feels like she contributes to a higher quality of dialogue in program discussion areas.

> …techniques that could be used to improve dialogue – you know we talked a little about this in the facilitator forum, I think, is that in the summer course or whenever we just need practice with when to respond privately. Like "oh, I really like this site" or "thank you for posting" is obviously a private e-mail.

Two other issues that are really important to Madeline as a facilitator are to keep the discussion moving and to be tactful and professional in her interactions with participants. According to Madeline, one of her main responsibilities as a facilitator is to keep the discussion going.

> … to throw in resources when you know them, when the discussion slows down to put in an article or to pose a problem and keep things going, to ask leading questions, not just comment on it, but to 'so what else could you do' or 'how did you handle' -- to keep things going.

The following program messages illustrate Madeline's attempt as a facilitator to further discussions in various areas of the program. Here, she takes important discussion points, elaborates on them, and poses questions related to the topics that others have identified. These are great examples of the way that Madeline lets her discussion participants lead the way in issues important to them.

Subject: Re: Mentees only, please!

You raise an interesting point that I would love to hear others comment on. What about parent drivers? Is that an option in most districts? What does your disrict do to protect you, the teacher, should something happen with a parent driver? Does the driver have to be a parent? What about older siblings?
(Madeline),facilitator

<In message (Cari) writes: *English is easy to incorporate into science as research papers are a good outcome from information gathered and added to from a field triip. How to get them off school. Are there any current grants at the school that could provde money for a bus? Could a grant be written? How helpful is the parent population? Will the district allow parents to drive? We have used the latter in my children's school district to great success.*

Subject: Re: Common Misconceptions

Research also shows that only through inquiry can students get rid of misconceptions and even then it is difficult (refer to Annenberg videos on student misconceptions). Yet only 17% of America's teachers do any inquiry at all. Why is that? What can be done to make the traditional laboratory assignments more inquiry-oriented?
(Madeline), facilitator

<In message (Eric) writes: *I think Mike makes a great point. Laboratory assignments are often no more than a observation rather then a means for student discovery. Inquiry is is defined as engaging students in the intentional process of diagnosing problems, critiquing experiments, distinguishing alternatives, planning investigations, revising views, researching conjectures, searching for information, constructing models, debating with peers, communicating to diverse audiences and forming coherent arguments. Research shows that attention to inquiry when designing lessons is effective in helping students integrate knowledge. It is also just as important to illicit students prior knowlege. Some of their existing beliefs may actually be misconceptions in science. Without confronting these misconceptions, students are not able to integrate new ideas and experience a conceptual change. <*

Subject: Re: Demos vs. Inquiry Labs

Interesting....The national standards on inquiry use a continuum to describe inquiry. It can range from guided to open.. I think it depends on how much background knowledge a student has on a subject. It is pretty hard to generate a good question to investigate independently when a student has NO knowledge of that subject. So, at times guided inquiry is desirable and appropriate, at other times onpen inquiry is more appropriate. The trick is to know why you are using the type of inquiry you are using and giving students a varitey of inquiry experiences at in the classroom. What are some inquiry experiences you have used in the classroom? What aspects of inquiry did you use. Where would these experiences fit on the continuum between closed and open inquiry?
(Madeline), facilitator, Vista,

<In message (Anna) writes: *From another class... This was provided by Sheila Higgins. I thought you might find it interesting to hear how the author of a book I read this summer, Teaching High School Science Through Inquiry, describes the inquiry classroom. Inquiry-based classrooms are quite different. We can differentiate the characteristics of traditional and inquiry-based classrooms by examining three areas: what the classroom looks like, what the students do, and what the teacher does. To begin with, inquiry-based classrooms are often described as student-or learner-centered. That doesn't mean that traditional classrooms cannot be student inquiry-based environments. In these classrooms, we usually find a culture that is friendly and facilitating. The atmosphere promotes an effective learning situation by making the students feel that their teacher and peers value their ideas, thoughts, and opinions. The classroom provides a positive socialization promoting active involvement along with inter-and intra-personalization. (Anna) Mentor>*

Madeline's experience and training have made her more aware of the importance of how her messages are composed.

> It made me aware of suggesting things, offering comments more tactfully. When you have to think about it online – and spent quite a bit of time talking about the difference of online and face- to face – and just how it can be misconstrued so quickly – that made me more aware of things I say and how I say them.

Due to the focus on dialogue in the training sessions, Madeline has consciously worked on the timing and adequacy of her postings. She is careful not to respond unless she has something to add.

> … Just like, "oh great job" – you don't do that any more. Or even just "You know that's a good idea. I think I'll try it". No – so "how did you do that" or "could you clarify this" or "what else could have happened" or something like that. Unless you could somehow further it or offer a different idea or different take, I don't respond. I do a lot of reading without saying anything. Whole days will go by … even facilitating. I read every single post … As a general rule I'm just kind of following the discussion unless I've got something I think that will either add to the discussion or take it further, or someone's got a specific question. And even then sometimes when they've got a specific question, I may sit back and see what other people do instead of jumping right in.

The following message that Madeline posted during a content dilemma shows her ability to add questions that tend to deepen and further the discussion at hand. She tends to place these questions at "expert" times when a lot of ideas/thoughts/opinions have already been added to a discussion and a turn or twist is needed to move the discussion forward. This particular message was posted four or five days after the initial post for this dilemma and participants had had ample opportunity to reflect and respond.

Subject: Re: Mentees only, please!

I am SO glad the dilemma is something you can relate to. That was one of the goals of the life science team! Everyone is doing a great job of addressing the disucussion points that are listed. Some other things to think about: What concerns are unique to a trip focusing on an area of life sience that may not be true for other field trips? What other hints can you share with teachers who are thinking about putting together a field trip? Thanks in advance for your participation!
(Madeline), facilitator

<In message (Nancy) writes: *This Dilemma really hits home, because I am currently planning my first trip (in Middle School) to the local reservoir. I got the idea from another teacher who has done the same trip in the past. (Therefore, the administration had previously OKed it.) As far as logistics and standards go, everything was provided for me by the reservoir Ed Department when I contacted them requesting info. They gave me all the standards the trip would address, pre-trip activities to do with my class, and suggestions for planning. The best part is that the program is free of cost. YEAH!!! My suggestion to this teacher would be to do some research and find some sites in her area that have a really great Education Department. From my experience, they do most of the work for you, aid greatly in your planning, and serve as a support throughout the whole process!>*

When Madeline does respond in the discussion areas, she is sure to make her message complete. For Madeline, this means to "dissect" apart the message that she is responding to and either "tactfully agree or disagree" if appropriate. Then she gives a reason for her opinion and provides some evidence from her viewpoint. As seen in earlier examples of her messages, in order to keep an open-minded quality to the discussion, she finishes up with a question that invites others to respond and helps to continue the discussion. Though a thorough response is important to Madeline, she stresses that the message must be short, "offering a quick idea then turning it around to the participants". Madeline feels that the best facilitators follow this basic format and reportedly has learned a lot from being able to view the work of other facilitators in the various discussion areas. Like Gina, Madeline is a leader for other facilitators in that they look to her work as a good

example of expert facilitation. Several of the facilitators interviewed, including Gina, said that they view Madeline's work frequently and learn from her example. She provides a model for others to follow, but in turn, says that she learns from what other facilitators are doing, as well.

Madeline also values having an area (the facilitator forum) to discuss facilitation problems and issues with other facilitators.

> It's just nice to be able to take some place when you've got a question - when you've got a problem. You don't quite know what's going on, what to do about something. It's nice to be able to open that out and let other brains work on it. I just think that's really useful. And to find out what's going on with the program, too. "You know, we're thinking about doing this and this." That's kind of nice … I'm real nosey, I like to know.

Observations in the facilitator forum show that Madeline not only uses the forum to ask questions or pose problems, but also to share with her fellow facilitators (again, in line with characteristics of this category of facilitator). In the following posts to the facilitator forum, for example, Madeline is excited to share some of the great discussions that are occurring in other discussion areas. One can also see how Madeline uses the facilitator forum to ask questions and get thoughts on certain topics. These are only two examples of many messages in which Madeline is anxious to share good things that are happening in the program with the other facilitators.

Subject: Great Discussion

There is a great discussion on soils in (names of states) group beginning around (date). It starts with a question from a MS teacher, a content specialist jumps in, other teachers and facilitators continue the discussion. What a great example of teaching and learning taking place!

(Madeline)

Subject: Gems

This is my favorite part of facilitating an inquiry. As participants begin posting reflections, a few "gems" emerge. This came from a mentor whose mentee has dropped off the face of the earth but the mentor is still contributing to the discussion group. It seems like this should be posted for everyone somewhere. Any suggestions? (Madeline)

Some thoughts that I know you know or someone else has shared:

1. Not all classes will be equally enthusiastic about anything that is presented

2. Spring can be the best time or the worst time to try out something new-- either they are really turned on or really ready for school to end.

3. It takes three times through a lesson to "iron out all the bugs"

4. Pacing is everything!

5. Do not discard a lesson because it doesn't work the first time.

6. Make notes of what does and does not work--leave in the former, revise the latter.

7. Ask the students for input, they see things through different eyes and can help us modify a lesson or activity by giving us "kid clues"

8. If the teacher is enthusiastic the students will follow suit.

9. Pre-test for prior learning; you may have to modify the presentation, but in the long run it will assure greater success.

10. If the topic is a good one and the presentation (technology) bombs go back to the drawing board. You have an intuitive sense of what is good teaching; what will affect this just takes a little more research.

(Mentor)

Madeline feels that experience and a higher comfort level, along with appropriate responses that encourage people to think and respond, have contributed to an increase and improvement in the quality of dialogue and the resulting benefits to program participants over time.

> We've got mentors who have been around longer … they know the kinds of things that are appropriate. They know how to word them in such a way that its not "you've got to listen to me because I was a great teacher for 35 years". It's more like "this is a site that I use, you might look at it" type thing … 2nd and third year mentees know what questions to ask. They know what they don't know. First year - I'm not sure that they don't know what they don't know yet. They're just kind of letting it all go in …

Madeline feels that as a facilitator she has contributed to this improvement by helping to get people online, encouraging them to continue to contribute to discussions, and keeping the discussions going. She feels by throwing out her opinion with a question or two, it helps to stimulate participants' thinking and motivates them to join in or come back to a discussion. This acknowledgement, encouragement, and attempts to stimulate thought can be seen in the following two messages posted by Madeline to the content area that she was facilitating.

Subject: Re: Demos vs. Inquiry Labs

Great ideas (Candace)! Research shows that people learn best through inquiry, but how does that translate to the classroom? Your observation that it takes longer is very true. Think back to what you remember from school. Probably not the things you memorized (although I can still recite the preamble to the constitution) but the things you did. Especially the things that you did because you WANTED to do them. I think that is where developing your own questions and performing your own investigations comes into play. Kids take ownership of their learning. It can start with the types of questions that are asked in class. Inquiry oriented classrooms rarely get questions answered by the teacher. When a student asks What happens if..., the teacher turns it around, What do you think will happen if..., then let's try it and see. What are some other ideas or strategies people are using to incorporate inquiry in their classrooms? What successes and challenges have you had?
(Madeline), facilitator

>In message (Candace) writes: *I'm going to put myself out here and try to suggest a possible way to create inquiry labs. Given all the different definitions so far, I'm hoping it's not too far off :) I have always struggled with the standard that requires students should develop their own questions and perform investigations. This appears to*

be California's attempt to infuse inquiry into the standards (the National Standards do it so much more explicitly), but gives little direction about how to do this while still addressing the expansive content standards. I mean, those standards together can sound somewhat like a contridiction, can't they? Here, cover all these content standards but let the kids develop their own questions and perform investigations....How do you do both? My answer was to pursue an inquiry-based curriculum, and I have been using SEPUP's curriculum, Science and Life Issues (SALI), with my 7th graders for the last two years, so a lot of my activities are set up now as inquiry based experiences. But not everyone can afford this curriculum, and most of these are hard to pass along and replicate without the text and materials anyway, plus the curriculum builds on itself and it's difficult to pull one activity out and use it in isolation. However, one thing that this curriculum does well that anyone can do is teach an emphasis on the elements of good experimental design; we spend an entire unit on it at the beginning of the year. What makes a good experiment so that the data is reliable? As we continue through the units, these elements are reiterated over and over again to reinforce their meaning in different contexts. What I've done, with the help of these elements of good experimental design, is use experiments in the SALI curriculum as models, or jumping off points, for student investigations of content. In order to get students to develop their own questions and perform investigations, we do an experiment in class (for example, there is one in the first unit when they're just learning the elements, and they test if it is easier to catch a ball with one hand or two--it's their first attempt at designing an experiment, not content standard based) and we analyze all aspects of the experiment's design, collect the data together, and then analyze it and draw conclusions. Then their homework is to choose another variable to test (maybe type of ball, right hand versus left hand, etc) and do the experiment again. We're studying the human body now, and next week we'll be doing a cardiac recovery lab. I'm going to do the lab in the same fashion as mentioned above--pick apart its experimental design, collect the data, and analyze it together as a class to model. But this time their homework will be to not just change a variable (for example, type of exercise or length), but to also change one other aspect of the experiment's design (perhaps number of trials, increase the sample size by testing more subjects, etc.) and make sense of their new data. Most importantly, they bring their experiments back and we chart the different ideas they come up with, and then students share their design and results with another student who peer reviews their experiment using the elements of good experimental design. This is a slow and tedious process. It will probably take me an entire year before these kids finally develop their own questions and perform (an) investigation. But I feel like with 7th graders, this kind of scaffolding is necessary. And although it may be closer to guided inquiry than pure inquiry, I feel more confident that content standards are being addressed while they are also learning how to pursue questions in a methodical, scientifically sound fashion. I know that this isn't a discrete lesson I can post, but it's one idea and way to model an inquiry process.>

Subject: Re: Evolution vs Creationism in the classroom, mentee weighs in

Thanks (Cynthia), for posting a mentee's viewpoint. Most of the discussion so far has been from experienced teachers. What is the new science teacher supposed to do when faced with this issue? Especially when opposing viewpoints are bombarding him/her? NSTA has a position paper on the teaching of Evolution. It's URL is: http://www.nsta.org/position statement&psid=10. It refers to Evolution as a unifying concept in the teaching of science and without it, students will not achieve the level of scientific literacy they need. If you have experienced this controversy in your own classroom, how have you handled it? What advice would you give to a new teacher if asked how to handle this issue in the classroom?
(Madeline), facilitator

<In message (Cynthia) writes: Author: (Aaron): So much of this debate can boil down to an intellectual shouting match where the other view is absolutely discounted. This close mindedness can often be translated in the classroom which has the possibility to do harm to the student who falls on the other side of the fence. I try and keep this topic very open-ended. And while I teach evolution, I try and create opportunity for all students to express themselves. Unlike most subjects in science, this topic is politicized and I treat it as such. Just like I would not discuss abortion without allowing both sides to vent, so I find true with this issue.
(Aaron), Mentee<

Madeline also feels that she has helped to make the program areas valuable to mentees (as well as mentors) by offering practical resources, ideas, and suggestions. She gets a kick out of seeing the positive effects that the program is having on mentees' practices.

> I love it when they say, 'I'm thinking of this lesson, my goals are such and such, I want to do this, what do you think?' Three or four mentors will jump in and say 'great idea, watch out for (this and this)' or 'be sure you include (this and this)'. I'm thinking - what a great resource! Field-test your lesson before you give it to the kids instead of waiting until third period to perfect it!
>
> … When I worked on the design challenge – that was a part of the reflection. A lot of them would say, 'Well, this went well … next time I would do this'. What a great – (number 1) they got to try an inquiry based activity that they may not have had the nerve to do before. Secondly, if they do it again then they've thought about, 'well this is what I would

> change' and that helps them improve. Of course, that was a part of the structure of the activity, but you do it a few times and maybe it becomes a habit.

Summary of Madeline's Practice. Program observation reveals that Madeline seems to have a knack for building a real sense of community in her discussion areas. Her participants seem to feel comfortable as revealed by the relatively large number of posts when compared to other areas. For example, in her spring inquiry discussion area, there were 224 posts. The next closest in number of posts to an inquiry during the spring was 110. And … in the content area in which she facilitated, during the months of April and May, there was a high of 283 postings. The next closest in number of posts to a content area was 227. Though other factors certainly contribute to the large numbers of posts, participants must feel safe and comfortable in order to share their thoughts in any area. As an "expert" facilitator, Madeline apparently has been able to foster this feeling of community. These numbers are despite a relatively few number of postings by Madeline. As seen, in her own words, earlier in this section, Madeline lets participants "guide" the discussions and posts only to add something new in order to further a discussion. Though the following message (posted by Madeline to the content dilemma that she was facilitating) does not ask a question to further the discussion, its somewhat humorous tone seems to help to foster the kind of community environment that we see in Madeline's discussion areas in which participants feel safe to add the thoughts and experiences that continue and enhance the discussions.

Subject: Re: Disastrous Field Trips

Great story! I have another one. I took a busload of kids to Scripps Institute (an aquarium). We were then going to walk along the beach (about a mile) to a park where the kids would eat their sack lunches and then explore some tidepools about 1/4 mile past the park. The bus was going to drive to the park, to be ready to pick us up when we finished at the tidepools. I had plenty of parents, and had given them an itinerary of the day's events. During lunch, I made a point of going around to each group and pointing out the bus in the parking lot. Well, as I was doing a head count as the bus was ready to leave, I realized I was missing two dads and their sons. They had broken away from the rest of the group and were hiking back to the aquarium. The result was the bus was quite late for its after school run so the bus driver was not happy with me. It is not only the kids who do not read the directions! (Madeline)

<In message (Charles) writes: *"Let's go for a hike" started a trip in the Pinnacles National Monument, in Monterey County. The class climbed up into the hills whining and groaning, chugging water so fast they had to send it on through and onto the lichen encrusted volcanic rock. Atop the Pinnacles, they admired the view and circled the spires, climbing up and down >steep staircases of tiny steps cut almost vertically into the rock. They circled too many times it appears, because on the way down they noticed the camp >did not have many cars or a bus. They had crossed the Pinnacles and ended up on the >West Side. The bus was on the East Side and no road directly connects the two! The hike back is 7 miles long and the road around takes about two hours. Clear choice - call the bus driver. Fortunately the call went through and the rangers found the bus driver (also in the days before cell phones). The bus driver said just one thing to the misplaced teacher, "Look in your pocket." In her pocket she found the keys to the bus. True story as told to me by a teacher at my science camp years ago! (Charles), mentor>*

Category 3 – The Systematic Facilitator

Then next three narratives of facilitation practices fall into the category of the "systematic facilitator". These facilitators seem to have a very organized system which guides their practices. The "systematic facilitator" works in a very structured and/or focused manner. This type of facilitator tends to establish a predictable routine within discussion areas regarding the purpose and/or timing of their messages. Their work reveals the confidence (and expectation) that they have in the ability of their participants

to maintain meaningful conversations with little guidance and interference. These facilitators describe their discussion groups as self-directing or self-supporting. Expectations are clear and routines have been established. The predictability of the system in these discussion areas allows participants to use them more efficiently – saving them time, yet being productive in providing information, ideas, and issues to reflect upon. Because of the routines established in these predictable systems, participants in these areas tend to develop a relatively high level of self-sufficiency as well. It seems that the facilitator must continue the routine for the system to function. The case narratives presented below, those of Michael's, Cynthia's, and Gayle's, illustrate the various strategies, methods, and attitudes with which "systematic" facilitators practice.

Michael. Michael is in his 15th year of teaching and is currently teaching mathematics at the 8th grade level. Michael's primary teaching assignments during his career have been in mathematics, but he also has experience teaching physics, chemistry, and computers. Prior to his involvement with eMSS, Michael took two online classes through the National Teachers Enhancement Network (NTEN), a program created by Montana State University (MSU) that delivers quality teaching resources and professional development opportunities through the Internet directly to K-12 science teachers. Through the Burns Telecommunications Center at MSU, Michael helped to create an online class for teachers, but is unsure of what happened to the class after its creation and trial run. This is his third year in eMSS. The first two years, Michael served as a mentor. Though he felt successful in his role as a mentor and witnessed tremendous growth in his mentee's practice, Michael opted to concentrate on being a facilitator this

year. He felt that the new role would "broaden" him and give him a "little different approach" to things. Michael feels that he's always been a leader and had a "knack" for solving problems and felt that the facilitating work would be a natural next step in his work in the program. Michael worked with participants from five states as a dilemma facilitator throughout the 2005/2006 program year.

As Michael transitioned from his role as a mentor to that of a facilitator, he found similarity in the two roles. He feels that his job in both roles is to "wean" the mentees so that they can become self sufficient.

> I kind of handled the dilemma facilitator role that way - led them a little more in the beginning of the year and then didn't really have to do too much … my group is really self directed.

Michael composed and posted the following messages early in the program year. Both show the guidance practiced. In the first, Michael provides a model of how to consider what has been discussed so far in light of individual situations. In line with expectations of a "systematic" facilitator, the second demonstrates guidance, especially in structure, as Michael encourages the development of a routine in posting messages that would allow participants to better be able to identify each other and the perspectives in their responses.

Subject: Re: Let's get the dilemmas started!

Hello all. (Michael) (Dilemma Facilitator) here again. It is ironic that the mentees from Louisiana are first to step up. Way to go (Cynthia), (Sherry), and (Ana)! I hope and pray for the best to any and all connected to New Orleans, or any area affected by Katrina.

It seems a common theme so far is "grade the lesson introduction/opening exercise." I know I have had better luck when I do this. I also connect my "warm up" to my lesson for that day, as it really does get the "juices flowing", as well as you have something immediate to refer the lesson to.

I'd better wait until the others "show up", so all for now.

Take care you all in Louisiana!

(Michael)
Dilemma Facilitator

Subject: Signature

Hi all. Thank you for including Name, Subject/Grades taught, and location (city, state) in your "signatures" at the end of every message. It truly does help everyone that reads your messages (as some learn from what you write, even though they might not be the sole or primary recipient.)

One more big favor: please also include whether you are a MENTEE or a MENTOR. I and many others will truly appreciate your efforts with this.

Thank you sincerely, and keep working as hard as you are!

(Michael)
Dilemma Facilitator

These types of "guiding" messages from Michael were quite common and relatively frequent early in the program year. It was early that Michael began to establish the expectations and routine, typical of a "systematic" facilitator, that would lead to the predictability and efficiency of the discussions in his area. During the second semester, Michael's discussion groups had pretty much settled into a routine where Michael would start the dilemma (always including the "posting rules") and then post a "steering"

message about halfway through the dilemma cycle. This message was usually a single post that included an acknowledgement of what others in the group had already said, an encouragement to continue discussions, and sometimes a question intended to get participants to dig deeper and take the conversation to a higher level. He then would post a wrap-up summary that included quotes from participant messages throughout the dilemma and served as a quick reference for ideas pertaining to the particular topic. Consistently, Michael encouraged participants to print the summaries (another effort at creating an efficient routine) so that they would have quick access to the ideas generated during the dilemma cycle. Though the comfortable routine certainly developed partly due to the evolution of the program structure for the dilemmas (1st week mentees respond, 2nd week mentors and mentees respond, 3rd week wrap-up), the safe and secure environment where participants knew what to expect was also due to Michael's early guidance and establishment of a routine. The following post is a good example of Michael's mid-dilemma direction.

Subject: Re: Holiday Malaise Dilemma

It seems a common theme that it may be a "best practic" idea to throw a little spice into things, one way or another (or multiple ways), after the holidays to make things interesting and exciting once again in our classrooms.

On the other hand, at least one person has expressed that students just want school to be what it was before the Christmas break, school being the only consistent thing in their lives.

Is there a balance that can be reached, maybe depending upon the clientele of the individual teacher?

I challenge you all to seek out any research relating to this issue of "what to do upon return from the long Christmas break." If you find a website or some other source, please cite it in a reply e-mail, along with any comments on the question I posed.

(Michael)
Dilemma Facilitator

Facilitating the transition between roles was Michael's realization that "though you want to get in there and do a lot of assisting as you did as a mentor", his new job as a facilitator was to "prod and guide and get people to do their own thing".

> I go in and throw in some extension or prodding things to keep them thinking in a broader sense and making more connections, but if you didn't do anything with them (at this point) they'd sure do a good job – those mentors jump in there eventually and keep it going.

Michael really gives a lot of credit to the participants in his area and in order to let them determine the direction of the conversation according to their interests and needs, he always uses their cues to steer the discussions.

Subject: Enabling Extension

Howdy folks. Many of us have hinted at the concept of not "enabling" a student by taking late work. Please comment on this. And if anybody knows of any research resources on this concept, please refer others to a website or some other retrievable source. And I do mean legitimate research.

Another thing we may want to contemplate is this: If research says something about a group of students, is it right for all students?

(Michael)
Dilemma Facilitator

PS--keep up the good work!

Michael credits the eMSS online training institute for helping him to learn the responsibilities of his role as a program facilitator. *Facilitating Online Learning* (Collison, et al., 2000), the textbook used in the training, and the activities throughout the institute helped him to focus on the dialogue and how to make it effective.

> When I went through the eMSS advanced institute in the summer … a lot of that definitely just helped me reflect on a lot of things as a person, whether it be a teacher or a mentor or a dilemma facilitator. But it

> definitely opened my eyes to some things, some techniques - how to word things and how to approach situations when maybe people aren't online and they need to be - how to approach that - and how do you word things so initially it tries to get people motivated and get them going - and then how do you come in later and word things in a way that will flush out some more construct from people.

Though Michael feels that he has improved as a facilitator over the year, he stresses that he learned quite a bit during the summer facilitator training institute and felt fairly comfortable as he began his facilitating job.

> I tried to get it right from the get go – feedback from (program staff) indicated that I was doing a good job – so I guess I felt like I was doing okay. That training - you go back to the training and that's where you hopefully make your growth so you're ready to do it right away …

Quite obvious to Michael is the importance of dialogue in the program. He is quick to point out that the "di" in dialogue means

> …you need at least two people going back and forth a little bit. If there's just one person in there and you're not talking back to them or offering anything back or trying to prod something or flush something out of them, it can turn into a monologue.

Seeing that as a mentor (the conversation becoming a monologue), Michael is continuously aware of where the conversation is going in his area and intervenes when it needs direction or encouragement. However, he really feels that it hasn't been too much of a problem. He says that he has very regular mentors and mentees that "keep coming back" and that there really aren't "that many that aren't there very much".

Of great importance to Michael in his work as a facilitator is that the conversation is "constructive and positive". He takes care in wording his posts so that they initiate constructive and positive discussions. He, in fact, suggests that all participants be thoughtful and take their time when posting messages. He suggests that they write their messages in a word document, save them, read them, and edit before sending them to the discussion area. A constructive message that addresses the topic, but is not too wordy, is important for Michael. Three other characteristics that he is sure to include in his responses are a positive tone, a professional approach, and a consideration of timeliness. Below is an example of a message posted by Michael that demonstrates his use of these important characteristics. Here he also uses the quote feature to make it clear to participants the situation to which he is referring.

Subject: Re: Bad Substitute

(Ben), I love this idea. It appears to be a concept that works well for a situation that needed some creativity.

Does anybody else have a success story, from beginning to end, on how can you assure that learning & meaningful student work will take place in your absence?

(Michael)
Dilemma Facilitator

In message(Ben) writes: *>This is a tough one because my school only has five subs who will come. The pay is one reason and our rural location is the other. Like Erica I have had to request that a sub not be "let" back into my room. I guess that I have always tried to plan on not being able to assure the "quality" of my sub.I have come to accept the fact that sub quality is outside of my sphere of influence, but my classes' behavior is not.*
>
> I have taken a new approach to this. I have utilized the idea of making students accountable. I have worked to make my 9th graders accept the fact that at a job their boss would expect them to produce quality work or their best effort every day. Right now school is their proverbial 9-5. Now that doesn't mean that 100% of my class has "bought

>in" to my job idea, but most have. I leave work taht is managable and I make sure that all my kids know that any sub work is expected, in a complete form, on my return. I collect it and grade it like any other assignment.
>
>I once had a bad sub who stated to the principal. "The kids just worked away and I don't know why?" (Insert a big smile here.)

Michael's concern in preparing and posting messages is shown in the quote below.

> … but one of the big things for me is its got to be constructive and positive. When I read it myself, I just pretend I'm that other person … or pretend I'm a mentee or something, and if I'm not alarmed or I don't have a red flag go up, I usually feel pretty good about it. I do know some of the things that messages are supposed to contain as far as just the style and format of how people are supposed to respond - you know high quality and so forth - but sometimes as a facilitator I don't want to squelch what they're doing because what there doing is pretty darn good.

Here, Michael reiterates what a good job he thinks the mentees and mentors are doing in the program as far as the quality of discussions. He, like Carolyn, has seen how much even the mentees contribute to the conversation and feels that even as a facilitator, he has learned a lot from the discussions of the participants in his area.

> I just think reading what other people are writing, even though I'm the facilitator, I learn a lot from what these people are saying. I see a lot of 'hey that's how I feel also' or 'I've also done that and it works' - gives you a confirmation or affirmation of those things that you've done – 'okay, I'm not alone in this' - that feels good.

In Michael's opinion, the dialogue has improved over the three years that the program has been active. This year he worked with first year participants – mentors and mentees – from five different states. When asked about changes in program dialogue, Michael indicates that he has seen great improvement.

> The five states I'm currently working with - if I was to compare what they're doing now compared to what the MT people did the first year I'd say, yea, we've made great strides, great improvement in both volume and quality of responses. People are doing what they're supposed to do.

As far as his thoughts on how mentees and their students are benefiting from the program, Michael says it best in his own words:

> Every mentee I have ever seen – the ones that stick with it for three years – they're starting to turn into the leaders. My mentee – the biggest thing I left her with is that 'you're a leader'.
>
> When I was a mentor, we did a lot of things with my mentee. She'd definitely practice and then reflect and come back to me and talk about results. I said it right there, a reflective practice, that's what teaching needs to be. And yes – she does that and the more we were able to work together, the more she did that. It may have been self-initiated eventually anyway, but the eMSS program probably pulled her along more quickly in that growth than she would have been able to do before. And I've seen that with other mentees that have stuck with it for a while. There's no doubt that they're evolving. As far as the students - that's directly related to, 'yea, I'm way better with my students - and here are the reasons why - the scores are higher and it was obvious through the assessment that they learned more' … plenty of evidence on students.

Summary of Michael's Practice. Michael has shown, through his actions in his practice as a facilitator and through his personal comments, that he is very sensitive to and respectful of the time constraints of his participants, especially first year mentees. This awareness seems to guide his "systematic" facilitator style. Michael is much more structural in his approach, actually facilitating the development of a system or routine, where expectations are clear and consistent, that tends to lead to discussions that are productive yet considerate of time. More structured that the other facilitators, Michael

seems somewhat insistent that participants follow certain procedures or processes in their responses. Though very positive in his approach, he will consistently remind people to use these procedures. As seen earlier, for example, he reminded people in his group throughout the program year to use a particular format for the sign off. Though there was a program-wide effort to get participants to use a sign off that identified their role in the program and their teaching placement, Michael was most consistent in encouraging his group members to follow the procedure. This, along with other established routines, seemed to lead to more clarity, less confusion, and greater efficiency in his areas. Constructive (leading to growth in teaching practice) and efficient (respecting time constraints) discussions are not the only goals for Michael in his facilitator practice. He also strives to make the conversations as positive as possible. He is gentle in his guidance toward routine, and is cautious not to "squelch" others' attempts at discussion, even though they may not post what might be considered "quality" messages. He is observed, also, not to interject his personal agenda and opinions on those in his discussion group. He, much like Gina, would like to work himself out of a job by "weaning" his participants and witnessing the development of their self-sufficiency.

Cynthia. Having taught for 35 years, Cynthia has been retired for about five years. Approximately 20 years ago after teaching experience at the 5th and 6th grade levels, she was given the responsibility of developing and maintaining a science lab in her school to which teachers brought their students to learn science. She has been involved in the teaching of science ever since. After retirement and training, Cynthia worked as a salaried coach for new teachers in another mentoring program, and had up to

eighteen new teachers under her direction at any one time. She feels that her experiences with these new teachers greatly affect her work as a facilitator in the eMSS program. Regarding those experiences and their relationship to facilitating, she says,

> I know I reflect on those actions/reactions when I'm facilitating … I have thought through "how is that person thinking" when I facilitate – "what thoughts are going on" and then I revert back and think of how I had interacted with the new teachers in the classroom.

Her only experience in distance education, Cynthia has been involved in the eMSS program as a mentor and/or content area facilitator basically since its inception. She describes her time with the program as "really stimulating". In addition to helping her grow in her knowledge of science, Cynthia benefits from the exposure to new ideas and other teachers' points of view. She really appreciates the opportunity that her work in eMSS provides in "keeping me with my hand in the science world … abreast of the times". She truly enjoys (and sees as a large part of her job as a facilitator) searching for, verifying accuracy, and providing science resources for beginning teachers who just don't have the time and/or don't have the access. Several of these types of messages can be seen below.

Subject: Resources from NSTA to Help Students Understand Hurricanes

Online Resources from NSTA to Help Students Understand Hurricanes

Science teachers around the country are helping students understand the background causes of the enormous tragedy of Hurricane Katrina by leading class discussions and exploring lessons about how and why hurricanes occur. To support teachers in this endeavor, NSTA is making the following online resources available free for the next several weeks. We hope you find them of value as you help your students understand natural disasters.

NSTA's Severe Weather SciGuide will provide online resources for you and your students to explore severe weather phenomena such as hurricanes, thunderstorms, and tornadoes. The Severe Weather SciGuide contains a rich library of web-based resources that cover the fundamentals of these events, as well as lesson plans that explore how hurricanes form, what factors contribute to their gaining or losing strength, and what locations in a hurricane—in relation to the eye—typically cause the most damage. To access the Severe Weather SciGuide, and for more information on other SciGuides, go to http://sciguides.nsta.org. SciLinks is NSTA's premier internet service that links educators to the most targeted, age-appropriate science resources on the internet. We've created a number of free links on the topics of storms and hurricanes—all sorted by grade range—to help expand your classroom lessons:
Grades K-4
Storms:
http://www.scilinks.org/retrieve_outside.asp?sl=566356104410551033

Grades 5-8
Hurricanes:
http://www.scilinks.org/retrieve_outside.asp?sl=4735895674333355
$741922112222$55557766

Grades 9-12
Hurricane Fundamentals:
http://www.scilinks.org/retrieve_outside.asp?sl=818144108888
Hurricane Preparation:
http://www.scilinks.org/retrieve_outside.asp?sl=818144109910

Subject: Re: What areas are you starting the school year with

includes attachment

Hi (Diane),
Your may be interested in the attached solar oven directions. The size is a box that holds duplicating paper (approx. 12"/18" height 10''). If you have trouble reading or figuring out the directions let me know.

One part that seems to be missing is where to place the wire pieces. These go on the sides fo the lids and the box to hold up the mylar lid that reflects the sun light into the oven.
(Cynthia) facilitator

Subject: Re: Weather

Hi (John),
You may have already checked out the following source for weather lesson information. I looked at it again after plugging in the word "weather" and found some good suggestions.

http://www.dlese.org/dds/index.jsp

(Cynthia) facilitator

Subject: Re: Earth Science Week

What a great resource! Thanks for posting this Rick.

http://www.earthweek.com/Earthweek.pdf

(Cynthia)

Now and then Cynthia gently guides participants into finding their own resources, always giving clear directions and suggestions and offers to help. This is most often associated with "SciLinks", a NSTA content service provided to program participants. As seen in the example below, she appears to promote SciLinks usefulness for content-oriented classroom resources.

Subject: Re: Hands On Con. Drift/Plate Tec. Activities for High School?

Hi (Thomas),
I have been searching for sources for you to access and my current idea is for you to go to SciLinks and request the topics you mentioned: Plate Tectonics and continental drift then plug in the high school grade level 9-12. You probably will find suggestions that will give you the needed information. When I tried it I was accessing DLESE and USGS areas as well as others. Please let me know when you need more ideas.</p>

(Cynthia), facilitator

By far, the messages that Cynthia posts in the discussion area in which she facilitates are either an offering of content resources, internet or otherwise, and/or a verification/validation of a resource that someone else has mentioned. Cynthia feels that growth in content knowledge is of great importance for participants in the program. She feels that participants are benefiting from a greater interaction with content experts and hopes to see the exploration of content in the content discussion areas expand in ways that make it more understandable and applicable to its use in the classroom. Thus, the establishment of a "system" for providing these resources is a priority to Cynthia.

During her first couple of years in the program, Cynthia served as a mentor. During the 2005/2006 program year, she formally facilitated in one of the content areas. This is the same area with which she has been involved as teacher-leader for several years. For medical reasons, she decided not to mentor while she was facilitating. She also facilitated one of the 2005 summer mentor training institutes. She indicates that her facilitator training during the 3-week online institute in the summer of 2004 was instrumental in helping her develop as a facilitator.

> A lot of it was spelled out to some extent initially – (program staff) and discussion of – way back when – when we talked about facilitating. That's what made me feel comfortable, too, having some direction.

Cynthia sees her various responsibilities as a facilitator basically fitting into one of three areas: 1) keeping the lines of communication open and promoting more efficient communication, 2) keeping everybody actively participating, and 3) providing teachers with resources and verifying to make sure that resources provided in the discussion area

are current and valid. The manner in which Cynthia provides/verifies resources can be seen in the message samples above. Below are examples of ways that Cynthia works to promote communication and encourage participation.

Subject: Re: Plate Tectonics Projects

Thanks (Margaret), for your reference to the State Farm earthquake awareness video. I imagine other CA teachers have suggestions for how they handle this topic. Perhaps we can compile a list of ideas and projects related to earthquake awareness.
(Cynthia) facilitator

Subject: Re: Plate Tectonics Projects

Hi (Ginger),
Thank you for the information about Alan L. Jones and the Seismic Eruptions Program. However, I was unable to open the seismicEruptionStup.exe. Is the address correct? Also, would you please share how you used the information in your classroom and at what grade level. What were some of the concepts that students were able to perceive through their study?
(Cynthia) facilitator

Subject: Re: Great Little Interactives Site

Thanks (Margaret) for the suggestion. I wasn't able to go directly to the interactive site but was able to use http:/www.classzone.com
Is there another way you got to the part you liked?
(Cynthia) facilitator

Subject: Re: Weather

Hi (Mathew),
As (mentor) suggests it would be great if you could let us know what grade level you are teaching as well as what you want them to learn (Standard [s]). Are you interested in having them monitor weather patterns locally or worldwide; seasonal changes; what factors create special and significant weather activities [i.e.. hurricanes/ tornadoes...]; etc. There are quite a few people in our Web group that can give content advice and ideas to get those concepts across. Please share your thoughts about what you plan to teach.
(Cynthia) facilitator

In her efforts to fulfill the responsibilities of her job, Cynthia explains that sometimes she has to overcome her own feelings and concentrate on efforts to re-establish communication and provide success for her participants.

> When I was concerned about some of the people I was working with this last summer, how they had not completed certain things, and I had to deal with the disappointment on my part. But then had to work out what I can do to help them get back into the swing of things. And some of them, a couple of times, they just didn't respond and I thought, "well, I guess that's it", and it was. (Then) when someone had stayed up all night trying to meet the deadline, I was amazed … she had been away for a while …

Cynthia explains that she doesn't make a "long spiel" in cases such as these, but offers to help in anyway that she can. After asking the participant to give her an idea of where he/she is, she then breaks down the task into sections and works with them to complete these smaller pieces. Cynthia tries to give immediate and (always) positive feedback (as seen above). She says that a facilitator has to be a good listener, which in this case involves being able to read and interpret what the person is thinking. She feels that her work as a facilitator is very similar to that as a mentor, "drawing on someone else's ideas and getting them to put it down on paper or through the computer". Thus, she realizes the importance of written dialogue in the program and feels that she (and other facilitators) should work to provide more focus for participants in the program.

> The importance of dialogue, of course, is obvious. You have to have give and take. How I do it – well, it would be to add two cents worth and then ask, "what else might be around" or "who else has any other ideas?" And that is something that I would really like to see analyzed. I don't see people responding to "how have other people experienced this?" I don't see responses, it's too broad. So often we'll add … "what else can be added here" or "who else can join in" and "what have you experienced?"

> Nobody answers … it would be well worth investigating … That's the standard routing as a facilitator to give two cents worth and then ask "how do you feel about this" and "how have you experienced this" …

It can be seen in Cynthia's work (examples below) that she tries to ask more specific questions allowing a narrower focus for participants and in her eyes, making the question less general and more answerable, thus encouraging continuing conversation.

Subject: Re: Plate Tectonics Projects

Thanks (Paul), for the reference to the USGS paper model project for the three types of earthquake faults. I am repeating the site hoping that we can access it directly from this message. I had to do a copy and paste before. I, too, have used the paper models. I believe I used light weight tagboard for duplicating the models.

http://www.earthsciweek.org/forteachers/faults_cont.html

Your idea of recording volcanoes and earthquakes on a daily routine is a great. How long have you been able to keep the students interested in researching the activity? Have you found any patterns that might be evidence of seasonal or monthly activity? Has anyone else done a long term classroom observation of global events like (Paul) describes in message 2814?
(Cynthia) facilitator

Subject: Re: plate movement proof - smokers

The smoker site sounds really interesting. Are the fossils able to be identified as to what they were and when they existed?
(Cynthia) facilitator

Cynthia responds relatively infrequently to her discussion areas but always in a timely and productive manner. One rarely sees a public post from Cynthia that would better be handled as a personal reply. She seems to have a clear idea of when to effectively use the private reply feature and gives an example of a typical private response as a thank you to a participant for responding to a discussion, "He was glad to

hear that because he was afraid that he was involving himself too much and sending out too many posts". As can be seen by the sample messages above, Cynthia doesn't post publicly unless she has something to add to the conversation or has a resource to offer. This is true, also, of her participation in the facilitator forum which she says she reads "faithfully". She appreciates the forum for keeping her abreast of program progress and direction and will add something if she sees fit. Not being a person that "can pull stuff out of my hat", she also uses the facilitator forum, which she describes as a "valuable area", for the different ideas and strategies offered by her peers in facilitation. She explains that she takes the ideas and tries to look at them from a personal perspective and has garnered "great ideas from quite a few people" for her facilitator work in the program.

Summary of Cynthia's Practice. Cynthia's style of facilitating seems to really fit the content areas in which she facilitates. Or it may be that her style has evolved and developed due to the nature of the content areas of the program. Much more loosely structured than other areas (for the most part), there tends to be no (or little) designated direction for the discussion. Participants are relatively free, thus, to determine topics of discussion based on their individual and group needs. Cynthia works well with her content team in determining the interests and needs of the participants and building discussions around those interests and providing related resources. Her primary focus in facilitation is to provide support to participants by making them aware of content resources and verifying and validating resources provided by other participants in order to extend and expand on their usefulness in the classroom. It is not the development of a

particular structure (as Michael strives to establish) that classifies Cynthia into this category of facilitators ("systematic"). Rather, it is the intense focus that she has on providing content resources to participants and the development of a system and/or routine to carry out this perceived duty.

Gayle. Primarily a mathematics teacher, Gayle has been in the classroom since 1974. Though her teaching certificate is in secondary mathematics, with a minor in physics and another minor in French, she has some overlap. Prior to her involvement in the eMSS program, Gayle gained experience in distance mentoring as an online mathematics mentor and facilitator in the STEP program, a distance-based support program for early career teachers in the state of Montana. Gayle has served as a mathematics mentor since entering the eMSS program three years ago. She worked as a discussion group leader in the mentor trainings during the summer of 2005 and is quick to describe her experience there as "so much fun". She really enjoyed getting to know people online during that experience and developed a real appreciation of the types of relationships that can be formed in a distance format.

> It was fun getting to meet people online … it doesn't matter to me that I don't have a face to put with them … I see the names come up and I say "okay, yea, I remember that person!"

Gayle participated in the online facilitator training during that summer (2005), having received her initial facilitator training during the online institute in the summer of 2004. During the 2005/2006 program year, Gayle mentored two mathematics teachers, one in 6th grade and the other in high school. She worked as one of two facilitators in a

content area along with the content expert where she claims the three worked together as a "pretty good tag team". Gayle also facilitated a fall inquiry and one of the spring inquiries. As one of the program's most experienced online mentors and facilitators, Gayle is dedicated to helping new teachers succeed and feels strongly that effective support can be delivered through a distance format.

> … my heart has always known that new teachers need someone to talk to, somebody to bounce ideas off of, somebody to listen to problems and help with trouble spots. You don't always find that in the teacher next door. This (the program) does help provide that structure and that support basis which is going to keep new teachers in the classroom.
>
> It's a networking – there's a lot of areas where maybe you have 3 or 4 people that you can chat with about a concern. But in a lot of cases people don't have a colleague that they can discuss issues with or options or 'what do you do' in this case. This gives us probably a network of people that is close to limitless with people that have ideas and are willing to share. Positive ideas - not 'well maybe you can try' but 'I've done this' and 'this is what worked for me' and 'beware of this little pitfall'.

The attitude seen in the above quotes (from Gayle) shows through in the following message that she posted to a content area discussion early in the program year. Here she contributes to the development of the network of people providing ideas, lets the participants know that they are not alone in their experiences, and provides encouragement that they will find a way, given exploration of ideas, to be successful.

Subject: Re: Reaching Proficiency

In message (Alana) writes: *>I have a bit of a dilemma, and I would appreciate any insight you can offer. Obviously, my goal as a math teacher is to help my students become proficient with the Content Standards. I just gave my Math 8 (pre-algebra) students a quiz that covered the following topics: order of operations, writing algebraic expressions, evaluating algebraic expressions, and solving simple equations. A majority of my students are not proficient (even according to a loose definition). The time we have spent on these concepts has involved activities that cater to a variety of learning styles.*
>
I have debated what I should do (but only with myself so maybe that's why I haven't gotten too far). I could require that students make corrections to their quiz. If I do that, however, the students will probably copy the correct answers from another student. Therefore, it would not be the learning experience that I would intend it to be. Also, I do not want to send the message, "You don't really have to work to pass a quiz/test the first time because (the teacher) will just let you correct it later." At the same time, I want my students to be proficient with the concepts so I can't necessarily move on. If they don't understand these basic algebraic concepts, it will be an uphill battle for the remainder of the year.
>
>Any suggestions??
(Alana), Mentee

(Alana), I've been there many times! Sometimes, I've given a worksheet with a review of needed concepts and then a re-quiz after that ... process goes that a maximum score of 80% will be given for the quiz grade (or whatever you choose). Yes, you need the concepts... and I've sometimes told the kids that this is their one shot at improving their grade this quarter... I'm not usually this kind!!!! (Yes, they do believe me!!!)

Be creative - you'll find a way to make this work, both with the reteaching and the quiz. (Gayle)

As can be seen in her response to a mentee above, to Gayle the program is all about the dialogue that occurs among its participants. Gayle sees her main responsibility as a facilitator as "maintaining conversation flow helping to keep things on task and on track". Learning and practicing questioning techniques, "phrasing the questions to elicit responses, trying not to be judgmental in the way I phrase questions or the way I reply, to leave things kind of open so people feel free to respond", was the most valuable aspect of

facilitator training for Gayle. She feels strongly that once "groups get rolling and can discuss things effectively" little intervention is necessary and that this is the best scenario. Gayle sees initial training in dialogue as important to begin with but feels that as people become a part of a group and experience appropriate interactions within that group, they fall into the norms and expectations that have been modeled for them and the resulting improvement follows in their messages.

> … But as things progress and you've got a group of people moving in a direction, if one or two are added, then they're gonna move with you just because the course is pretty much steady … there isn't a whole lot of intervention that should be needed – just maybe a little a guide occasionally … just a validation and maybe a course correction or a question here and there to ask them to think through some things.

It is the focus on modeling that drives Gayle's systematic practice. She is confident that with proper modeling of dialogue expectations and positive interactions, and a little guidance, participants will "fall into" being good contributors to meaningful discussions.

The following messages that Gayle posted to her inquiry areas, show how gently and simply she guides participants in her discussion areas. It should be noted that her posts are relatively few in line with the practices of other "systematic" facilitators. Observations of her work show that she intervenes relatively infrequently, but monitors her discussion areas closely and contributes guiding comments and questions when necessary. In the first message below, Gayle effectively models for participants, early in the program year, how to respond to her welcoming message. In the second and third messages, Gayle succinctly adds positively phrased comments or questions to encourage the continuance of conversations.

Subject: Welcome!

Hi all! We're a small group right now, but let's get things started. I noticed that the inquiries didn't include the message I'd prepared as a new message, but one that I'd already looked at.... so let's begin again!

Would you please introduce yourself, and include what you're teaching (grade/subject) and where you're located, please. Also, if you are a mentee or a mentor.

I know we'd all appreciate knowing something about you as a "real person" also... for example: I'm (Gayle), and I teach pre-calculus, consumer mathematics, and general math at (high school). I'm a mentor as well as the facilitator for this group (and excited to be part of this program). I enjoy sewing, needlework, and puzzles of almost all kinds in my spare time.

Looking forward to meeting all of you!
(Gayle)

Subject: Plan & Practice

As I'm planning Thanksgiving dinner (and "practiced" rolling pie crust this evening), I'm excited to see the great discussion about student behavior in the classroom. Please continue to reflect, and let us know how the "practice" with the changes you've implemented are going.
(Gayle), facilitator

Subject: Step One

In message (Daniel) writes: *>I am starting the circulatory system and would like to do a lab pertaining to the heart, >blood or blood vessels. >Thanks, >(Daniel)*

Sounds great, (Daniel). Do you have any specific ideas yet? Maybe one of our group could help out with a lab they're comfortable with. (Gayle)

In the third message above, it is apparent how Gayle throws the discussion back to the participants in the group, another example of her confidence in the ability of her group to maintain the conversation. In order to facilitate the self-supporting nature of her

discussion groups, Gayle puts great thought and care into phrasing her questions and timing her responses. She says of strategies used to improve dialogue in her areas:

> Phrasing the question so that people feel like responding – sometimes that's hard. Sometimes it's a hot button issue that everybody has an opinion about. At that point you've got to be careful that people don't go in overboard. There have been times when I've seen something and I try to just kind of sit back and maybe wait until the next day to post something, especially if it's something that I think I can phrase properly to avoid hot issues – and usually 24 hours isn't a big deal.
>
> I think maybe my timing has gotten better. I try to increase my wait time before I jump in see if the participants will take care of the issue and maybe help phrase questions a little bit better.
>
> One of my personal snags is people that end their statement with three different questions and then nobody ever responds to any of them because they're rhetorical questions. Why even bother?

The following messages are great examples of Gayle's skill in posing timely questions and wording them is such a way that participants feel comfortable in responding. It should be noted here that these are characteristics of an expert facilitator and may be evidence of Gayle's evolution into the "expert" facilitator category. There is no one right answer and participants are encouraged to respond with their thoughts given their individual situations. Both of these posts (one to a content dilemma, one to an inquiry) occurred toward the end of the particular discussion/activity when things were winding down. The timing of the questions helped to keep participants active and engaged.

Subject: Re: MATH DILEMMA #1
<MATH DILEMMA #1 How much time should I invest with my students in reviewing/practicing paper and pencil calculations with decimals? The textbook I use in consumer math is quite dependent on decimals and assumes that students know how to perform operations on decimals. However, I have about three or four kids that just don't "do" decimals. I don't want to hold 25 kids back from learning for the sake of three or four who aren't prepared. How much remediation is expected?

>Something to consider: after a week or two of reviewing paper and pencil skills, we'll be going to "calculator friendly" status. Do I stop everyone for a couple days' review of decimal operations? Do I spend extra time or assign extra work to the few who need it? (By the way, these are juniors.) Or do I ignore the lack of skills and let the calculators solve the problem?

Some great suggestions so far, people! Your messages show your concern and empathy for the students, which is what makes this profession so rewarding yet stressful. Let me add another tidbit as we head into the weekend. If you knew that the students who were not successful with decimals were students with an Individual Educational Plan (Special Ed) would that make a difference in how you dealt with the situation?
(Gayle), facilitator

Subject: Safety Issues
While the inquiry is in progress, I thought we might take a bit of time and discuss safety issues. What is your favorite safety tip for a lab situation? I'm thinking of something practical that new teachers (or some of us well-seasoned ones) could incoporporate into our labs. I know we all like to ensure students are well disciplined and know what their task is for the lab, but do you have a quick tip that makes the lab run smoothly and safely?

The Effective Labs inquiry has some great tips from (staff), but I'm sure we can add to those!
(Gayle), facilitator

Gayle has seen improvement in program dialogue. She feels that it has been more productive and that there are fewer postings that say "me too" and "good job" with nothing else added. She has seen an improvement in the richness of the dialogue, "the posts are well worth reading in 95% of the cases". She attributes this improvement to the training and experience of the participants – not just the facilitators but the mentors and

returning mentees. Here, again, Gayle feels that a modeling of appropriate etiquette, format, and effective message content will carry over to participants who may not know what or how to post.

> … it's the crowd where you've got a few other people joining in. If you see a quality post, you're apt to make a quality post yourself. If you see one or two people jumping with a 'thanks Bob' and somebody says 'yea, thanks Bob', you feel like you've got to jump in with your own "thanks Bob' … When we get a first year mentee, they sometimes don't quite know what to say or do, but when you've got mentors and 2nd and 3rd year mentees involved, they get the flavor from the posts they read – what's appropriate.

And, Gayle has seen positive effects of the increasing quality of the dialogue in the program. She commonly sees references to the growth of mentees, generally posted by mentors, in different areas of the program. She sees a positive attitude coming through the messages in her discussion areas regarding what new teachers are doing in their classrooms and the achievement of their students.

> I don't see teachers saying 'I can't do this'. I see teachers saying, 'I'm aligning my content and standards, the students are learning it and yea, there's a few holes still, but were making progress and we're gonna do okay'.

Another very important aspect of the dialogue that Gayle feels contributes to the self-supporting nature of groups that she works with is a positive attitude. Validating positive situations and comments and validating feelings is one of the top priorities when Gayle creates a message for posting. Her positive attitude can be seen clearly, but simply in the message below.

Subject: Re: No hat policy

In message (John) writes: *>Anyone raising a child can agree you can tell them over and over and they ignore you or 'forget.' You need to do something outrageous to get them to remember.*

>A possible hat solution - Get a student you know and trust. Get them to wear an old hat you provide or they do not want. Get the hat from the student. chop it up with a papercutter, cut it apart with scissors or light it on fire (you will need a metal can to drop the burning hat into), soak it in water and bend the brim back.

>Warn them your policy from hear on out is to repeat the process or to keep the hat until the end of the year (have an aquarium or big glass jar to stuff them into - write the name on the inside of the hat - to display for all to see.

>You have to have a flair for the strange sometimes to get attention and make it stick. This will not work unless you plan it out and enforce it for everyone.

What a great visual, (John)!!! I laughed and passed it on to my adminiistrators... great idea!! (Gayle), facilitator,

Gayle believes that a positive attitude is one of the most important qualities for a facilitator to have. She says of her contributions to the program:

> Well, I hope my posts have been positive and I hope I've helped people see the positive side of things. Sometimes it's just a matter of looking at the other side of the picture. It's easy to look at the little thing that went wrong instead of the big parts that are going well.

It seems that the personal gains that Gayle has reaped from the program have contributed to her growth in ways that enhance her ability to lead and guide within the discussion areas of the program, as well as within her school and classroom roles. She has seen an increase in her confidence and credibility because of the national perspective of education that she has developed as a result of her interactions in the program.

> You know, it all rolls together so nicely. Each part of that makes the other parts stronger. As far as what's happening online with mentors/mentees/facilitator stuff rolling into the classroom … I've been involved and have tried to stay involved as a leader in our math curriculum for many, many years and so its maybe made me a little more effective …. I think it's again helped build a little confidence and a little strategic answering of comments that were posted … What I do in the classroom helps me relate to other classrooms when I'm working with other people as a facilitator or as a mentor. I say "yea, I understand that. I've been there myself."
>
> I've got a whole network of friends across the country. I think I've got a nice understanding of where education is headed across the country. It helps me to keep a positive attitude about our nation and our kids and education as a whole – 'cause we've got a whole lot of wonderful people out there that are giving every ounce of effort they can to make education a worthwhile experience for students.

As a result of the program trainings and extensive experience as a facilitator, Gayle has learned how to build and further meaningful relationships in an online environment which has helped her to facilitate the development of relatively self-directing, self-supporting online discussion groups. These communication skills have also helped her to participate in and benefit from supportive discussions with the other facilitators in the facilitator forum. She highly values these interactions with her peers in facilitation.

> It's been nice because when we've got questions or concerns or something that we want to just have somebody answer, or say "yea – you're on the right track" or "what's happening here". It's nice to have other facilitators able to jump in and say "I've seen the same thing" or "I've tried this". (Facilitator) put on something at the beginning that says, "I'm having no activity here, has everybody dropped off the face of the earth?" and several people jumped in and it was spring break for a lot of schools and spring itself is busy and numbers are probably down because people have fulfilled their obligation. And it was just kind of nice to have the discussion.

And … the development of good questioning techniques allows her, not only to create effective questions to guide her participants, but also to form her own questions for posting in the facilitator forum, and get them answered effectively in a timely manner. Interestingly, Gayle reports that just asking questions and having them answered is one of the most important learning and development strategies in her responsibilities and growth as a facilitator.

> … Mostly just ask questions. (Program staff) has been very great about providing a basic scenario of what you think is expected and when I have a question I just ask.

Summary of Gayle's Practice. Though apparently timely and effective in her posts to the program, among other facilitators, Gayle is one of the least frequent "posters" as seen in the observations of her practice in the program. She is definitely attentive to what is happening in her areas but relies on her confidence that training and experience among participants will produce an environment where the modeling of quality dialogue by experienced participants will lead to the accelerated proficiency in posting by newcomers. She believes that intervention by facilitators should be kept to a minimum and that with gentle and minimal guidance, appropriate modeling of dialogue, and well-worded and timed questioning techniques, program discussions will be fruitful. Developing skills in these areas during the facilitator training has been of most value to Gayle in her development as a facilitator.

Gayle tends not to bring a personal agenda to her facilitation work but allows the participants to guide the direction of the discussions. She will, however, contribute to

problem solutions based on personal experiences and practice when appropriate to promote productive dialogue. Her opinion/experience in the following message posted in a content area was in response to the need for timely and diverse solutions to a problem. She was one of the first to contribute to this discussion, which may have contributed to the timely and varied responses from others that soon followed.

Subject: Re: Partial Credit Query

In message 3414 (content expert) writes: *>Hi, everyone! >I'm teaching secondary methods this semester, and we're launching a two-week unit on assessment. One of the issues my students want to discuss is how to award partial credit on test problems. I got to thinking what a wonderful resource it would be to ask all of you how you handle partial credit. So please, fire away! Do you insist on correct final answers? Do you insist on showing work? What do you consider a 1-point error? Half credit? No credit? Any examples, ideas, or "systems" you can share would be great! I'd like to talk about this next week, so please reply by Halloween if possible.*
>Thanks! (content expert)

I think the partial credit varies... if I'm teaching fraction simplification to my general math students, there may not be much of a partial credit (Ok, maybe if they miss a multiplication fact, but show what they intended to multiply by, for example). With my upper level students, most test questions are not simple answer or one-step problems. I try to decide ahead of time what is most important - the process, for example. If the process is followed in a problem I've decided is worth 5 points, but a minor arithmetic mistake is made, I'll deduct one point. If, for example, the answer requires both pos and neg roots of a value and the student gives me only one... it may cost much more than one point (again, this depends on what is being taught/tested at the time.) Like Verne and Carol, the work is critical! Even for low-level students, if the work isn't available, I can't peel their scalps back to check brain cells!!!! I need to see what they're doing to have some insight into their thought process.<p>The partial credit is really something that takes time for new teachers to develop to be something comfortable for them and their students. (Gayle)

Gayle's focus is on providing a consistently positive environment in which she monitors discussions and steers conversations in directions aligned with program goals with well-timed, thought-provoking and inviting comments and questions. It is this

focus, along with the established routine of modeling dialogue and providing positive interactions, that classifies her into the "systematic" facilitator category. It should be noted, however, that Gayle's practice tends to possess many of the characteristics common with an "expert" facilitator's practice. This may be an indicator of a developmental nature to the styles of facilitators and provide evidence that Gayle's practice is moving in a new direction.

Category 4 – The Nurturing Facilitator

The "nurturing facilitator" is focused on making personal connections with each and every participant in the discussion area in an attempt to make them feel comfortable and welcome and to encourage frequent participation. The nurturing facilitator works as a host or hostess, making sure that each guest (participant) is welcomed, commonalities are discovered and voiced, and personal connections are made. The tone of the discussion area is very social mainly as a result of the messages posted by the facilitator. This type of facilitator commonly posts responses to each (or most) message posted, frequently uses friendly emoticons and/or punctuation, and commonly signs off with a friendly greeting such as "have a wonderful day". This doesn't mean that the discussions in the area are without merit. Rather, the establishment of a welcome and comfortable environment can lead to very fruitful and meaningful discussions. Barbara's case, described below, illustrates this point. Though, it also helps to point out that cautions should be taken with this type of approach.

Barbara. Barbara is in her tenth year in the classroom and has always taught in relatively remote geographical areas. In her first teaching assignment, she was the only teacher in her discipline in her school. As a result of being in remote locations, and her quest for professional support and development, Barbara has sought out and taken advantage of many different opportunities for distance education and professional development. Contributing to her extensive experience in distance education are distance courses as a part of a master's program, distance professional development courses, and involvement as a mentee in Montana State University's STEP program, a distance-based support program for early career teachers in the state of Montana (Thoreson, 1997). These opportunities have allowed her, despite the isolation in remote areas, to create "quite a pool of resources of teachers – building a big circle of support and peers" throughout her career. That these experiences were successful in building support for her, Barbara has confidence that the eMSS program can and is providing support for other beginning teachers.

Barbara was a mentor during her first two years in the program, mentoring a different beginning teacher each of those years. She describes those experiences as "frustrating" and "tiring", explaining that neither one were "real good experiences" for her. She had a hard time getting both mentees to be involved in the program, something she felt, from personal experience, could really help them. Because of the lack of their involvement, she didn't feel as productive as she hoped she could be. As a result, Barbara considered not serving in the program after her second year until she learned of the opportunity to become a facilitator. Having completed the online facilitator training

and the face-to-face dialogue training during the summer of 2004, Barbara first facilitated for the program during the mentor trainings in the summer of 2005. She describes that experience as "very fulfilling" and "exciting", though she adds she didn't get as much participation as she would have liked. During the 2005/2006 program year, Barbara served as a facilitator in two different inquiries, one during the fall semester and one during the spring semester. It was while she was facilitating these inquiries that she realized her disappointing experiences as a mentor were of great value in her work as a facilitator. She was better able to understand the frustrations of the mentors in her group, the hesitations of the mentees in her group, and better able to appreciate the active participation and quality conversations that she saw in her work as a facilitator. Her understanding of these frustrations leads Barbara to put forth a lot of effort to make participants feel welcome and comfortable in the discussion areas, a driving force in her work as a "nurturing" facilitator. Below is an example of the type of reply that she frequently posts to participants in her area, especially during the welcome and introduction phase of the inquiry. Through observation it becomes clear that Barbara attempts to make a personal connection to each of her participants.

Subject: Re: Welcome to (inquiry)!

<In message (Kevin) writes: <>1. Give a brief introduction of yourself including what you teach and where. <>I'm a chemistry teacher in Chippewa Falls, Wisconsin. I have five sections of the same class. I like having oneprep but I can get bored easily. Fortunately, each class has their own personality. I finally achieved national board certification this year.<>2. Share with the group why you chose Looking at Student Understanding as your inquiry for this semester.<>Since I'm a mentor, this is easy. My mentee chose this one. I'm pleased with the choice because this is an area in which I want to become more accomplished. (Kevin), mentor

Congratulations on the National Board Cert. and welcome (Kevin)! I know what you mean about having 5 of the same class. I have 2 of one, and 3 of another, so I make my mistakes in the first of each set and gradually get better as the day goes on;-) It is great to hear that a teacher with a NBC wants to become more accomplished. That should really humble the rest of us. I look forward to our intereaction with you and your mentee!

Glad to have you aboard! (Barbara): Facilitator

Barbara credits her persistence in trying to get people online and to communicate frequently in her discussion areas to her successful experiences as a "distance" mentee as well as to her disappointing experiences when she was mentoring for eMSS. She wants beginning teachers to benefit from the mentoring experience and from the development of a network of support as she did when she began teaching. The lack of involvement of her former mentees created experiences that now help her to better understand and help mentors who are experiencing similar frustrations.

> … working with the mentors as a facilitator, I think that experience came in really handy when they were concerned if they should pressure their mentees because it was a stressful time. Through my own experience and some of the things that I went through with my mentees, I think the stressful times are when you need to pressure more because that's when the mentee really needs to do more reflective work. Just letting them alone and letting them have their space when it's a busy time is not a good thing because I think it also takes away from them feeling supported. I think in that respect it's helped me a lot.

She also credits skills with using "the right language" in her growth as a facilitator that were learned, practiced, and role-played in the facilitator training sessions, especially in ways that encourage participants to stay active.

> It makes you think about every word that you say. I really appreciate being able to sit and look back at what I've written and compare it to what

> the mentor or mentee is saying before I post it. Those things are very, very helpful, at least having it on my mind that I have to watch what my tone is when I'm writing. It keeps it very foremost in my mind when I'm answering or trying to get them to post more.

However, Barbara is quick to point out that practical experiences in her roles as a mentee, a mentor, a facilitator, and as a teacher probably have most affected her personal growth and development as a facilitator. Regarding the inter-connections of her various roles and her work in the program, she says:

> …When a student is frustrated, that's not when I want to leave them alone - because if the student is frustrated and you leave them alone then they don't know what to do next. Or maybe a little bit of pressure or a little bit of nudge is going to help them see were I want them to go or where they need to go to with a problem. But to leave them alone is not a good thing … I know I'm very, very glad I had someone to talk to in stressful situations and that's exactly when I needed my mentor. Even though the mentee might feel overwhelmed, I think it's really important that the mentor keep pestering and let that mentee know well, I'm here. I don't care if you're stressed out … that's when you need me - not when everything's calm and let's make up a lesson plan – that's not the best time. The different roles that we all play – even though they're separate titles, I think we're all using them very much in the same way …

In her work, she commonly admits making mistakes (as can be seen in the message below) and knows that she continues to learn as she practices.

Subject: Re: LookBack reflections SORRY (Nicolas)!

In message 7333 (Nicolas) writes: *>So last week I gave my weekly quiz and I realized I did not teach well nor did the kids understand very well the concept of isotopes. So today, I told them I needed to reteach the concept and spent a good 15 minutes having them take notes and draw various isotopes and as we did this, I explored many more atomic concepts like, what are the 4 forces in nature and how many are involved in the atomic structure and then onto the role of istotopes, how the atomic bomb could not be built with U238 but U235 and abit about C 14 and radiometric dating. So I probably taught more effectiv*

science today as a review and reteach and kids were intune at a more focused level as they knewy I would use today's discussion on the quiz for this week. Before I did the lesson, I asked how many students really understood isotopes and since only 2 hands went up, that was the cue for them listen more intently. This is not a new technique but it sure works.>

I appologize (Nicolas). I got too ambitious reading and answering posts that I forgot you are a mentor. Please don't take offense to my first post. This is one reason why I need folks to use a signature at the end of their posts;)

Please for give me! (Barbara): Facilitator

She stresses, "You really don't understand, it really doesn't make any sense until you're really using it – when you're talking to somebody that you don't know".

According to Barbara, experiences in her facilitation role have really helped her to improve her practice. She learned the hard way relatively late in the 2005/2006 program year about public replies to welcome responses in her inquiry area when the number of messages in the discussion area quickly became overwhelming. In order to make participants feel welcome and encourage them to continue to participate, a dominant characteristic of her facilitator practice, Barbara responded publicly to each participant's introduction. Not having experienced the exciting numbers of participant responses in her earlier facilitated areas, she did not anticipate the consequences of her actions. Quickly, the number of messages in the area became overwhelming. Not wanting to leave folks out, she continued the public replies until all participants had introduced themselves. Approximately one third of the messages in that inquiry area were either introductions or Barbara's responses to the introductions. She was observed, early in her facilitator work in an effort to make connections and encourage participants to post more, to similarly respond to almost every post from each participant. After this experience,

and later in this very inquiry, the number of her responses decreased dramatically. Participation by the mentors and mentees, however, remained strong. She now understands, in order to keep discussion areas uncluttered and manageable for participants, that those types of replies are better handled privately and that a private reply will accomplish the same purpose – to thank and acknowledge participation, relay a personal interest, and encourage further participation in the discussions. The following two messages posted by Barbara during the introduction phase of her winter inquiry are typical of her public welcome replies. One can understand, as Barbara now does, how these types of messages (as well as others seen above) could certainly be private yet still serve the desired purposes.

Subject: Re: Welcome to (inquiry)!

In message (Nicolas) writes: >In message (Barbara) writes:*>>Happy February Everyone!*
>>1. Give a brief introduction of yourself including what you >>teach and where. I am (Nicolas) and a mentor for Nathan who teaches in Juneau and has chosen this inquiry. >>2. Share with the group why you chose (inquiry) as your inquiry for this semester. I will be responding to my mentees situation as he outlines it in this inquiry. (Nicolas), Mentor

Welcome (Nicolas)! I hope you will share some of your practices and ideas with all the pairs in this discussion as you work with your mentee. We learn so much from listening to what others are doing. I am happy that you are in (inquiry) with your mentee. I hope it will be a valuable experience for you both!

Glad to have you aboard! (Barbara): Facilitator

Subject: Re: Welcome to (inquiry) David!

In message (David) writes: >Hi everyone: Sorry I'm late with this as I have a father in Belgium who had major heart surgery, so have been out of circulation for awhile. I teach physics/engineering/biochemistry/calculus in Tucson at a public charter highschool I helped found (previously at university level as well), and aso run an appropriate tech transfer company for my family (www.ttthg.com). Have been married for 28 years, and have 9 children (6 adopted) with our youngest graduating from our school this spring. Also have 16 grandchildren thus far, who make life a true joy. Student understanding is THE key to keeping sstudents and us motivated, and to making sure that we seek to interrelate all the math/sciences to real world application and global issues as much as possible, which fascinates my students. Blessings. (David), Mentor

Welcome (David)! I'm truley sorry to hear about your father. I hope he is recooperating well! Were you signed up by your mentee? If so, has your mentee been posting yet? I know there are a lot of posts to sort through; the most important ones are my direction posts. If your mentee is just getting on, you might want to steer him/her toward those since the end of the inquiry is the 10th of March. I am happy that you have joined us. I hope you are enjoying reading all the wonderful ideas and comments!

Glad to have you aboard! (Barbara): Facilitator

Barbara feels that being active in the facilitator support forum throughout the year has also contributed to her growth as a facilitator. She says that she depends upon the forum for a couple of reasons. First, she feels that it's a great place to throw out ideas and to bring up and collectively solve problems that are being seen in the program. Second, she values having a place to ask questions regarding her work as a facilitator. She says that she even learns from the questions that other facilitators have.

> Its been real comfort for me to know I can go in there and if I have a question or a problem I get an answer right away either from another facilitator or from (program staff) – right away – within a half a day. So that's a big comfort to me and the directors have been excellent when I have a problem from a mentor that I don't understand … I sure wouldn't want to be doing the facilitating without the facilitator forum.

Barbara personally benefits from her work as a facilitator in the program. She is thankful of her responsibility to closely follow discussions where, as she says, there are "high level conversations going on that really blow me away sometimes".

> Being a facilitator I got the unique opportunity to really have to read all the posts and the different ideas that both mentors and mentees came up with – the mentees were always fresh ideas, the mentors were always pretty much (tested) ideas - something that's gone well for them they want to share. Those kinds of things I could carry into my classroom – the ones that were fresh ideas I could try and the ones that were (tested) … I needed that interaction as much as they did … we're all testing each others ideas and trying things that worked for somebody else.

It's this appreciation for what she feels beginning teachers can get out of the program that urges her to really concentrate on using appropriate and constructive dialogue in her discussion areas.

> … biggest thing is the wording phrases and sitting back and looking what you write back to a participant or to a mentee – carefully look at what were saying to them so that we're not putting them off … not critical … not overbearing … We've had some real vivacious mentors go in there and they've got nothing but just the best intentions, and they word their stuff where if I was a brand new mentee, I'd probably shrivel up and die. It just sounds so way out there from where I'm at.

Also important to Barbara, in her work as a "nurturing" facilitator, is to be active and very visible in the discussion areas. In agreement with the efforts of the program, she sees the importance of keeping folks on track, "directing where the conversation is going and taking them to the next step", and then summarizing the conversation for participants. Though she finds this difficult and encourages more modeling and practice on summarizing in training sessions, she feels it important for participants to have a

summary of discussions to prevent them from having to "dig" through everything to find a topic of interest. Barbara's efforts to direct (steer) and summarize discussions in her areas are seen below.

Subject: Where Are You???

Hey folks,

We are completing week 3 of the UDC inquiry; Where are you??? There are quite a few pairs registered in here, but only a few mentees have been sharing their finds. You should be loggin in and telling us about your choice of data set and what some of your ideas are on implementing the data into one or more lessons. Mentees, if you don't have your data set chosen, try to work on that over the weekend, so you can share your ideas next week.

Let's here about your choices real soon folks.
Have a great weekend!
(Barbara), Facilitator

Subject: Re: How are you progressing?

In message (Megan) writes: *>Hi, Sorry for the delayed response - the holidays got the better of me. I introduced an article on lobster catch to my students, and we talked about analyzing a graph from the article based on what information it gave, and then what inferences we could make. It was interesting to guide students between making inferences and just reading the graph. I presented the crab catch data to them, provided a graph, and got them started on plotting the data on the graph. As I told my mentor, I was surprised by how focused my students were on creating their graphs. It was a really good exercise in practicing graph construction. We had a quick discussion about inferences in the data and a comparison of the lobster catch data. It was a good combination, a good quick study.*
(Megan), mentee

Wonderful (Megan)!

It sounds like you are progressing through the steps well, and you've had a successful lesson. Did some of your students' inferences relate they had taken the data to a higher level of understanding? It would be great if you would share some of their responses with us.

Have a wonderful day!
(Barbara), Facilitator

Subject: We're off to a GREAT START!

Happy Friday (inquiry) Group!

We've got a couple of great leads into the discussion about discussing methods of assessment you currently use to tell you where your students are in their understanding. We've heard from folks who use "mini" white boards for instant feedback during discussions or activities. We've heard about setting up stations at white boards where students work in pairs to problem solve. We've also heard about a wrap-up question that students take home to mull over then turn in as a warm-up or SPONGE-type problem at the beginning of class the next day. How about the rest of you? What are some of the tools you use day-to-day to tell you how your students are understanding the material? Remember to give a brief explanation, then respond to at least one other post, or post a clarifying question to carry the discussion further.

I look forward to your posts!
Have a wonderful weekend!
(Barbara): Facilitator

Barbara feels that her efforts toward directing and summarizing discussions are helping to contribute to the positive growth that she observes in mentees' practices which she describes below.

> Comments on every idea that comes out of a mentor – especially somebody that's not their mentor – really helping them look at what they're doing in their classroom. They're using it and they're seeing that it makes a difference. They were so surprised when they did one of the mini-evaluations and found that their students didn't hear anything that they said …

Summary of Barbara's Practice. Barbara believes that positive persistence is her contribution to the positive effects that she sees the program having on mentees' practices. Through intentional efforts at positively phrasing multiple attempts to engage participants and keep them active, she feels that she is contributing, both directly and indirectly, to the continuance and growth of beginning teachers in the program. Her

experiences in the past compel her to shape and balance her practice driven by a very personal dilemma:

> You can't push them or you're pushing them away. If you don't push them we're going to lose them because they're gonna think they're not supported.

This dilemma, realized through personal experience with her own mentees, directs Barbara's "nurturing" style in her facilitator work – posting and responding often, striving to develop personal connections, encouraging frequent and continuous participation, and promoting constant communication between mentors and mentees. Barbara is very visible in her discussion areas. In an effort to encourage participation and build personal connections, she has been observed to respond to every participant post at times. She has learned through her experiences in facilitation that these responses are often handled better privately in order to keep discussion areas manageable and not overwhelming. It appears that by reducing the overwhelming number of personal posts, it opens up time and space that results in full and fruitful discussions made more meaningful to the participants who then determine the direction of the conversation. Barbara's experiences drive her practice more than anything and it is clear from observations in her most recent inquiry, that she is now beginning to credit her participants with the experiences and motivation that stimulate meaningful discourse even as she steps back and becomes less visible in her discussion areas.

Cross-Case Analysis of Facilitator Practices

Looking across the results of these seven case studies, several sets of data begin to address the questions of this study:

How does the facilitation training affect the practice of program facilitators?

How does the facilitation training affect the practice of program mentors?

What components of the training are facilitating change in practice?

What changes are seen in the overall quality of dialogue in the program?

What components of the training are facilitating change in dialogue quality?

What preliminary evidence is there that change in program participants' online practice is effecting change in the classroom practice of beginning teachers?

First, a set of themes emerged that identified how the facilitators carry out their work. These seven case studies revealed five broad purposes held by facilitators, each with associated strategies, through which they accomplish their responsibilities. Secondly, various areas of facilitator growth became evident as cases were being conducted. A third set of themes was discovered that addresses factors that affect the development, growth, and focus of facilitators' practices. And fourth, there is some evidence regarding how the strategies used by these facilitators are affecting program dialogue, and how the dialogue, in turn, is beginning to affect the growth and development of program participants. Below is a detailed description of each area of this cross-case analysis.

How Facilitators Work. Through the interviews of facilitators, the observations of relative discussion areas in the eMSS program, and an analysis of the dialogue, the practices that were studied revealed five basic purposes for the actions that facilitators take in their work. These five purposes (encouraging participation, aligning conversation with program goals, promoting meaningful and productive dialogue, promoting networks of support, and solving problems), discussed in more detail below, can be seen in Table 15 along with the various strategies used by facilitators to accomplish these tasks.

Table 15. Purposes of Action and Strategies Used by Facilitators in Their Work.

Purpose of Action	Strategies Used
Encouraging Participation	Private replies Structuring discussion areas Questioning Steering/Furthering Participating from personal agenda/experiences
Aligning Conversation with Program Goals	Steering/Directing Directed questioning Providing resources Promoting connections of content with pedagogy
Promoting Meaningful and Productive Dialogue	Reflective questioning Probing Modeling Use of private replies Providing focus Preventing clutter in discussion areas Summarizing
Promoting Network of Support/ Community of Learning/Practice	Promoting connections among participants Validating and valuing contributions of participants Recognition of group's ability to start and maintain valuable discussions Using the group's knowledge and experience to further discussions

Table 15 – Continued.

Purpose of Action	Strategies Used
Troubleshooting/ Navigating	Providing connections with support staff Answering questions/Finding answers Maintaining a positive approach Providing guidance/advice Facilitator Forum

Encouraging Participation. Facilitators generally feel strongly about encouraging participation among the mentees and mentors in their discussion areas. Facilitators use various strategies in order to encourage participants to log on, read discussions messages, and contribute to the discussions. The belief that the program can truly help to retain and support beginning teachers and improve their practices motivates many facilitators in this purpose. For others that motivation results from past experiences in the program in which former mentees or discussion area participants were relatively absent.

Some facilitators, like Madeline and Gina, report using private replies to welcome participants and thank them for posting (for instance, a particularly good message) to the discussion area in an effort to make them feel comfortable and welcome and encourage them to continue to contribute. Some facilitators put these replies into the general discussion area, though it can be seen from Barbara's experience that care should be taken so that the discussion area does not become cluttered and overwhelming.

Other facilitators, such as Michael, highly structure their discussion areas in order to allow participants to more efficiently use their time in the program. Feeling that time is one of the biggest factors affecting participation in the program, Michael feels that if he can make time use more efficient, participants will be more likely to use the program.

Most of the facilitators use questioning to keep participants responding – and most question in such a manner that participants are encouraged to answer from their own experiences and perspectives. Enabling participants to make personal connections and encouraging them to establish relevancy increases the motivation to continue to dialogue.

And finally, facilitators like Carolyn, in a non-overbearing way, will add opinions and queries from personal agendas in an effort to stimulate conversations and keep people coming back to the area to contribute to the discussions.

Aligning Conversation with Program Goals. The philosophy of the eMSS program and its goals were a focus during the facilitator and advanced training institutes. In addition, program philosophy, goals, and direction were frequently discussed with facilitators in the ongoing facilitator forum. Facilitators, thus, had opportunity to learn about and internalize what the program desires to accomplish. In examining interview responses, discussion message posts, and interactions in the facilitator forum of these seven facilitators, it became evident that facilitators were familiar with and working toward the goals of the program. Careful examination of all of these facilitators' discussion areas revealed their efforts not just to provide emotional support and empathy, but to guide and steer participants toward being reflective, responsive practitioners. It was clear that they were working to align the conversation in their areas with specific goals of the program.

For example, one of the program's objectives is to empower beginning teachers to recognize individual challenges and to improve teaching and learning through reflection on classroom practice. Carolyn talked of her prior need or perceived responsibility to

always have the answers and solutions for her mentees. As a result of the training she received, she now realizes that she is there to guide participants into finding their own solutions based on individual situations. Instead of trying to answer every question and solve every problem, she now throws these back to the group to promote healthy discussions on important issues.

Another important program goal is to assist beginning and experienced teachers in their knowledge of science and mathematics content and how best to teach content in the classroom. Case facilitators, like Cynthia, worked strongly to align conversation with this goal by providing subject area resources, promoting discussions regarding their uses in the classroom, and starting and steering conversations on assessing student understanding and modifying instruction accordingly. In fact, all of the facilitators were observed to use questioning techniques that helped to steer conversations in directions that made connections to participants' teaching assignments and placements.

Promoting Meaningful and Productive Dialogue. All seven facilitators regarded quality program dialogue as essential in promoting the growth of participants. As a result of the focus on dialogue in training institutes, and as a result of their experiences facilitating in various discussion areas, facilitators seem to have a strong understanding of the kind of dialogue that supports participation in the program and promotes personal and professional growth for eMSS participants. Most of the facilitators talked of how, as a result of training, modeling, and experience, participants are getting better at managing and composing their posts. They are seeing less of the vague "good idea" and "I agree"

kinds of messages that don't greatly further the discussion, perhaps in part because these facilitators now gently probe participants for more information.

Facilitators are using the private reply feature with greater frequency to pass on information or to respond to a comment or question when the response doesn't necessarily contribute to the conversation at hand. They are likewise encouraging participants to use the private reply feature. Facilitators feel that this is helping to unclutter the discussion areas and make time for participants to read more important and relevant messages.

All facilitators talked of the importance of composing messages that are clear and complete, yet concise and to the point. They take great care and time in composing the messages that they post to the program and feel, as Gayle does, that their messages provide a model for other participants as they respond to discussion areas. Though each facilitator certainly has their own style in posting, common features are seen in the composition of their posts. In most cases, facilitators use the edited quote feature so that the message has a reference, a focus. The facilitator may then validate what has been said, agree or disagree, add and/or elaborate on the topic, and then ask a question to promote deeper thought, personal application, and/or reflection on practice among participants. Participants then seem to pick up on and follow these general steps in message posting leading to clearer messages that deepen and further the conversations.

Promoting Network of Support/Community of Learning and Practice. In line with the goals of the eMSS program, facilitators truly feel that the development of a network of support is vital for beginning teachers in the program. In supportive communities of

practice “people share their experiences and knowledge in free-flowing, creative ways that foster new approaches to problems” (Wenger & Snyder, 2000, p. 140). Facilitators commented on how much they had learned in the program from their interactions in the discussion areas with both the mentors and the mentees. Several facilitators like Madeline, Gina, and Cynthia expressed their gratitude in being involved in a program from which they feel they have grown even more than other participants. They truly value the knowledge, experience, and ideas that are contributed by the mentors and mentees in the program and appreciate the learning community that has been formed across the nation through the eMSS program. It is the benefits that these facilitators realize from the program that urge them to strive to offer the same benefits for program participants. They do this by validating discussion area contributions, recognizing expertise and creative ideas, and by acknowledging the limitations of their own knowledge and experience. They encourage the participants to use their combined interests and experiences to start and further discussions according to the shared goals of the group. And they work to promote connections among participants, matching expertise and desire to learn when appropriate. These efforts are in line with what is known about the behaviors of teachers who are members of learning communities (Fulton et al., 2005).

Troubleshooting/Navigating. Much of the work that facilitators do is in helping participants to be comfortable “moving around” in the program, working with the technology, and helping participants to discover places and ways that the program can be of individual benefit. In addition to providing answers to questions relating to the

program and how it functions, facilitators will connect participants with support staff when appropriate. Facilitators will provide guidance and advice on issues such as top priority program areas and activities and time management, and will connect with mentor/mentee pairs when guidance or advice is needed. Facilitators commonly use the facilitator forum to get help in these areas – answers from program staff, ideas from other facilitators, or to share ways that problems have been solved in their areas of the program.

Table 15 presents no hierarchy of the purposes of action that are seen in facilitator work. It appears that each facilitator has developed a unique set of priorities regarding these five purposes in the way that they are used to implement practice. Based on a combination of training and present and past experiences, one or more purposes of action may take priority over the others in a given facilitator's practice. For instance, Barbara, due to her successful experiences as an online mentee, and due to the disappointing absences of her own mentees, places priority in her areas on encouraging participation. She feels that getting participants online and into discussions is the first step in benefiting from the program and makes it her priority to make participants feel comfortable so that they get online, contribute to the conversation, and keep coming back. Carolyn also places priority on encouraging participation along with promoting productive dialogue. She craves responses that are of high frequency and high quality – deep, meaningful dialogue in her discussion areas. Cynthia, on the other hand, places priority on aligning conversation with program goals, especially to help participants grow in content knowledge. In this effort, she makes it her primary mission to provide content resources

to participants and to assist in discovering applicability of these resources to the classroom. Due to his concern and appreciation of the time management issues that new teachers face, Michael's priority is to make participation easier and more efficient – encouraging participation along with troubleshooting and simple guidance. And, Madeline and Gina, experts in facilitation, tend to balance these five purposes of action more than the other facilitators, seemingly with a focus on promoting meaningful dialogue aligned with program goals within a professional community. It seems important to note here, that it appears that no one set of priorities is necessarily the best. All of these facilitators have been successful in facilitating relatively high quality conversations in their respective discussion areas.

Table 16. Areas of Facilitator Growth.

Area of Growth	Dispositions/Skills
Program Dialogue	Awareness of the importance of program dialogue Skills in composing effective program messages Skills in sustaining and deepening program dialogue
Community Building	Awareness of the importance in promoting participant growth Skills to promote the development of a sense of community
Program Goals	Awareness and appreciation of eMSS program goals Skills for steering conversations to align with program goals
Content Connection	Awareness of the importance of connecting content to pedagogy Appreciation of effort to develop participants' content knowledge Skills for providing content resources Skills for promoting connection of content discussions to the classroom

Facilitator Growth. A second set of themes that emerged from the study of facilitator practices were areas in which facilitators grew throughout the implementation of the intervention, including the summer training institutes and the 2005/2006 program year. Table 16 lists various general areas of facilitator growth that became evident throughout the construction of the case study narratives.

Program Dialogue. Growth in this area was evident in the studies of all seven facilitators. All showed evidence of growth in their awareness of dialogue, its importance, and skills in sustaining dialogue and promoting more meaningful conversations. Facilitators developed improved skills in composing effective program messages and, in fact, report making great effort and taking great time in composing their messages to be positive and concise. In her practice as a "participant" facilitator, Carolyn's personal contributions evolved from conversation stoppers (seemingly from an expert status) to messages that tended to promote further discussion. Through experience in practice, she learned to add questions or comments for the purpose of eliciting responses, opinions, and/or alternate ways of looking at things. In her effort to make the most of her messages, Gina went so far as to design a checklist, of sorts, which she uses to make sure that she has composed a complete post. This has led to her being somewhat of an expert in message composition, not only a set of skills that other facilitators desire to emulate, but also a great model for effective message posting for other participants in the program. And Barbara, along with other facilitators, has learned that management involves keeping discussion areas uncluttered, specifically in her case, free of messages that would better be handled in private replies.

Community Building. Evidence from case studies indicated that facilitators grew in their ability to create environments within their discussion areas capable of promoting a sense of community. The growth in the positive approaches to their message composition, their appreciation and acceptance of the expertise of contributors, and the appreciation of the necessity to sustain and promote meaningful dialogue all helped facilitators to develop discussion areas in which participants felt comfortable and willing to contribute their thoughts and ideas. Several facilitators indicated that they take considerable effort to pose higher level questions that will stimulate thought and encourage participants to post from various perspectives. Carolyn, specifically, talked about the growth in her questioning skills through trial and error in practice. Gina, Madeline, and Gayle mentioned, over and over, how the conversations in the program had helped them grow in their own teaching practice and were observed to acknowledge that fact in program discussion areas. And, Michael and Gayle, along with others, with their directed, but gentle guidance, have seen the development of self-supporting discussion groups with the ability to sustain high level conversations with little interference.

Program Goals. Facilitators have grown in their awareness of program goals and, as a result, in their ability to align their practices with these goals. They have become aware of the program's focus on providing support beyond new teacher survival and promoting the growth of new teachers' classroom practices. Michael works to "wean" his participants, much like he worked to "wean" his mentee from dependence upon him when he was mentoring, as he has learned to blend skills learned in both roles. Carolyn

now realizes that her role is not to provide all the answers for participants, but rather to create environments in which participants can explore ideas and can discover solutions specific their own situations. And, facilitators are becoming aware of the importance of helping participants make sense of program conversations and are beginning to help them connect what they "hear" in discussions to their classrooms and their students. Facilitators displayed increased awareness of the need to steer conversations toward program goals, and growing skill in this area. They reported that these changes mainly resulted from the focus on program goals in the summer training institutes.

Content Connection. Facilitators are also developing a greater awareness of the desires of the program to connect science and mathematics content with its pedagogy. All facilitators are more actively helping participants connect content discussions to their applicability to the classroom. Facilitators report that participants are more frequently discussing best methods for teaching mathematics and science content and making efforts to provide resources for teaching science and mathematics content in the classroom.

Factors That Affect Facilitator Practice. A third set of themes that emerged from the study of facilitator practices were the factors that appear to affect how the practices of facilitators develop, and how these practices are implemented within the program. Table 17 gives an overview of multiple factors or experiences that were identified across the case studies that affect how a facilitator develops in practice, the source of each factor and/or experience, and the result that the experience has on the way that the facilitator works and thinks.

Table 17. Factors Affecting the Development of Facilitators' Practices.

Source	Factor/Experience	Result in Practice
Personal Characteristics	Skills in listening Skills in reading Effective communicator Responsible Reflective	Ability to glean meaning from written messages Follows "rules" in writing and posting messages Timely, meaningful communication Responsive to the needs of individuals and the group Evolution of practice
Past Experiences (Personal and Professional)	Experience as mentee Experience in mentoring/coaching Classroom/teaching experiences	A deeper understanding and/or empathy for participants and their situations A focus that tends to drive practice
eMSS Training Institute	Focus on quality dialogue Focus on online dialogue Awareness of program goals Modeling/feedback by staff Questioning techniques Steering/directing techniques	Alignment of practice with program goals Understanding and appreciation of the importance of dialogue especially in an online program Understanding and appreciation of the characteristics of online dialogue Development of online listening skills Effective dialogue modeling using best practices of composing online messages Understanding of expectations of program facilitators Effective use of questioning to encourage participation and promote deeper and more fruitful discussions
Facilitator Forum	Venue for delivering program guidance Venue for discussion of current issues, reinforcement of practice, sharing experiences and ideas Venue for getting questions answered/ receiving feedback on practice Venue for soliciting feedback from facilitators on program direction	Support and encouragement for facilitators in practice Keep facilitators abreast of upcoming schedule, events, and expectations for practice Community of Practice in which facilitators continue to learn and grow in practice Empowerment of facilitators as they are included in program planning and evaluation
Actual Practice	Feedback and support from staff via facilitator forum and private reply Learning in context through trial and error and reflection of practice Ability to view work of other facilitators	Evolving practice Learning and growing in practice from practical experience and from observing others Adapting practice to particular area/purpose Intentional improvements in practice

Personal Characteristics. It would be expected that personal characteristics would influence the work of a facilitator just as they influence behavior in any role. In this study of facilitators' practices, however, several specific personal characteristics were either observed often or were mentioned by facilitators as being important in fulfilling their jobs. Being good listeners certainly affects the practices and interactions of facilitators in the program. Uniquely, in the distance learning environment of eMSS, listening skills are very dependent upon reading skills since interaction in the program is written. Good skills in reading and listening give facilitators the ability to glean meaning from participants' written messages, something that is not as easy to do in a distance environment where many of the clues of communication (facial expression, voice intonation, hand gestures, etc.) are absent (Collison et al., 2000). Successful facilitators, thus, need to have an understanding and appreciation of the differences of face-to-face discussions and communication by asynchronous computer-mediated communication. This knowledge, along with good reading skills, helps facilitators to better "listen" to the written messages in the program discussion areas.

Effective facilitators tend to be effective communicators. In addition to having good listening and online composition skills, effective facilitators respond in a timely and appropriate manner. Specific to the program, effective communicators follow certain norms in composing and posting their messages. Gina composed a checklist of rules that she uses (p. 169) when composing her messages and posting them to discussion areas. Other facilitators copy the example that Gina sets in the format and timing of her posts

claiming that they have found the method to be most effective in responding to requests and questions and in steering conversations.

Successful facilitators are responsible in their duties. Case study facilitators specifically mentioned the responsibility to log on frequently and to spend an appropriate amount of time in guidance within their discussion areas. Facilitators must be self-motivated, a characteristic common among those successful in other distance learning and communication programs. They especially must have the drive, time, and organization to initiate contact by logging onto the program frequently. Thus, skill in time management is another characteristic of good facilitators mentioned by those who were interviewed.

And good facilitators, much like good teachers, tend to be reflective practitioners. They frequently reflect on their practice and modify methods and strategies to be responsive to the needs of the participants in their discussion areas as well as the direction of the program. Reflection appears to lead to a constantly evolving and more flexible facilitator practice.

Past Experiences. Facilitators indicate that past experiences, in a variety of areas, have contributed to the way they implement their practices. Experiences as a mentee, a mentor, and/or a teacher, for instance, tend to lead to a better understanding of the difficulties and challenges that participants face both in their classrooms and within the program. This understanding seems to contribute to the empathy that facilitators develop for participants and their individual situations, and seems to give facilitators a particular focus which drives their practices.

An example of past experiences driving the practice of a facilitator can be seen in Michael's case. His experiences as a teacher help him to understand the time demands on all teachers, especially those just beginning their careers. He has developed a real sensitivity to the difficulties and challenges that these demands place on teachers. As a result, a primary focus for Michael's practice is to organize his discussion areas to be predictable and routine so as to minimize the time required by participants to get the most out of his areas of the program.

Another good example of the influence of past experiences is presented by Barbara. For Barbara, the influences of a combination of past experiences are evident in her practice as a facilitator. First, positive experiences as a mentee in the STEP program have given her an understanding of how a mentoring program can benefit a beginning teacher. Second, her disappointing experiences as a mentor have helped her to understand the frustrations that mentors in the program may be experiencing in encouraging the activity of their mentees. And third, the isolation that she experiences as a result of her teaching placement has encouraged her to seek a distance community of fellow teachers who have provided her with a reliable support system. As a result, a primary focus for Barbara is to find ways of making participants feel welcome and comfortable, and encouraging beginning teachers, as well as mentors, to visit the site frequently and contribute to the discussions at hand.

For Cynthia, the experiences she had when coaching beginning teachers have influenced the way she practices. In anticipation of teachers' needs and in appreciation of beginning teachers' time constraints she considers it a primary responsibility, as a

facilitator, to provide teachers with resources that will help them in their practices. Thus, much of her focus is in providing these resources, especially in the content area.

Lastly, each case facilitator indicated in the interview that experiences in the classroom have contributed to how his or her practice has developed. It was common during the interviews for facilitators to describe the ways that their various roles overlap, especially those of being a teacher and a facilitator. The questioning skills that lead to higher level discussions that Carolyn has developed in the classroom have helped her to promote better quality discussions in the program. Techniques for helping frustrated students have provided guidance for Barbara in helping to eliminate frustration in her eMSS discussion areas. And, classroom practice in keeping a positive tone to discussions and interactions have helped Gina to create comfortable and active communities of learning in her program discussion areas.

eMSS Training Institute. Case study facilitators indicated that the eMSS training institute played an important role in the growth and development of their practices. According to the data gained from the interviews, several areas of the program were of particular importance in contributing to the growth and development of these facilitators.

First, it was important for facilitators to become aware of the goals of the program and learn more about program philosophy. Once this awareness and understanding was accomplished, it seems that in the eyes of the facilitators, the responsibilities and expectations of their roles became much clearer. An important focus of the training was on the program direction of 1) "starting" the discussion/conversation with a prompt or question, 2) "steering" the discussion/conversation to align with program goals and

particular needs of participants, and 3) "summarizing" the discussion/conversation to promote relevancy, investigation of alternatives, and personal and professional reflection. This focus gave facilitators a common framework from which to work as they embarked on their duties to encourage and promote high quality dialogue "leading to teacher growth, accompanied by changes in classroom practice and student learning gains" (Appendix 2 – eMSS Guideline Principles, Table 6). Carolyn, in particular, commented on how the training helped her realize that she wasn't there to provide all the answers – that she couldn't provide all the answers for participants. Rather it was her role to guide participants into exploring the options and discovering what worked best for them, their situation, and their students. Gina, Gayle, and Madeline all talked about making it clear to participants that they weren't the experts. They described "throwing" questions back to the group to encourage discussion and exploration of alternatives. Or they might "sit" on a question for a bit in order to encourage others to respond in an effort to "promote reflection, conceptual growth and change, and improvements in professional practice through rich online dialogue" (Appendix 2 – eMSS Guideline Principles, Table 6), a primary goal of the program.

A second area of importance was the focus on written dialogue in an online program. Realization that written dialogue that relies on electronic messaging for communication is the basis for learning and growth helped the facilitators concentrate on the importance of and ways to facilitate the improvement of dialogue. Two components of the dialogue training seemed to have a lasting effect. First, developing an awareness and understanding of how face-to-face dialogue and online written dialogue are different

encouraged facilitators to take great care in writing and posting their messages. Most of the facilitators, during interviews, stressed the importance of composing messages so that they neither offend participants nor discourage their participation. Work with questioning techniques and the realization of the importance of composing messages to elicit responses from others for the purpose of furthering and deepening conversations became important to facilitators. This focus also helped facilitators better understand and respond to messages posted by their participants. It seemed to help them become better online listeners, which, as Cynthia points out, in this environment also means a focus on reading skills.

A second focus in dialogue training, defining quality dialogue in terms of the program, was also important to participants. Work with actual snippets of dialogue taken from prior years of the program allowed facilitators to categorize, critique, and identify missing components of the dialogue seen in discussion areas. This work prompted the identification of important components of program dialogue and strategies for improving dialogue among participants in discussion areas. Several of the facilitators, such as Gayle, Michael, and Carolyn mentioned their thoughts on the importance of modeling effective online dialogue for participants. The training in dialogue quality prompted Gina to actually create a set of "posting rules" which she follows in creating her posts.

> Is it short, but complete? …
> Does it show thought and use of language?
> Does it use the quote feature – the edited quote feature?
> Does it use humor carefully?
> Does it show reflection where that is appropriate?
> Does it ask a question to encourage additional participation?
> Does it contain the sign-off?

The thought and care that has gone into her message composition has led to messages that other facilitators view as exemplary and has promoted high quality discussions in her program areas.

A third component of the training institute which facilitators felt of great value was the modeling provided by training staff as they facilitated the institute. Along with modeling effective message composition, response rate and presence, public and private feedback, and an encouraging and positive attitude were among characteristics that facilitators felt important. Madeline, Carolyn, and Cynthia, especially, appreciated and learned from the private feedback provided by training staff. As a result, they commonly use the private reply feature to send messages of acknowledgement, encouragement, and thanks to their participants. Facilitators also appreciated and learned from the modeling of prompt and appropriate response to their questions, interactions, and tasks. All of the case study facilitators were observed to be attentive and responsive to the happenings in their respective discussion areas. In addition, encouraging attitudes and a willingness to help work out problems were important lessons learned from the modeling of facilitator practice provided by the staff in the training institute.

Facilitator Forum. Yet another source of factors that affect the development of facilitator practice is the ongoing facilitator forum. This forum, which was seen as informative and supportive by the case facilitators, is provided in a distance format through the program in the WebCT platform. Facilitators and staff have access to the discussion areas of this forum throughout the program year. Its design was meant to provide ongoing support and training for program facilitators.

Case study facilitators consider this forum to be useful in several ways. First, the forum has provided an effective venue for distributing program information to facilitators, such as important dates or issues with WebCT. Facilitators, like Gina and Cynthia, report that having this information helped them to manage the questions and problems that they field from participants.

Second, program staff members provide guidance and direction on next steps in program processes. Facilitators are given guidance on items like important timelines for inquiries and dilemmas or suggestions for discussion prompts and providing direction in their discussion areas. Facilitators report that this guidance is valuable in giving them an idea of where everyone should be and where to head next. It also helps to remind them of program expectations for facilitators. As Gina says, this type of guidance helps to "keep you on your toes".

Third, the facilitator forum has provided a venue for discussion of current issues in the program, and a way for facilitators to share experiences, ideas, and good things that they see happening in the program. Several facilitators (Cynthia, Madeline, Gina, Gayle, and Barbara) indicated that discussions with peer facilitators in the facilitator forum have led to effective problem-solving and modification of practice in their program discussion areas. They benefit from the different ideas and strategies received from discussions with their peers. The facilitator forum is also a place where facilitators can get questions answered by staff or fellow facilitators, one of the most important results of the interactions in the forum according to facilitators. Especially for facilitators like Gayle and Barbara who depend upon the opportunity to ask questions to guide them in practice,

but also for experts in facilitation like Gina and Madeline, this aspect of the forum has proved invaluable. The opportunity to interact with peers, provided by the facilitator forum, has helped in the development of a supportive community where facilitators continue to learn and grow in practice. Several facilitators report that they have made changes in their practice as a result of discussions in the facilitator forum. They feel, as Barbara says, that because of the valuable interactions taking place there, they "wouldn't want to be doing the facilitating without the facilitator forum".

Fourth, the facilitator forum has provided a place for facilitators to receive feedback and reinforcement on their practices from program staff, a practice that Carolyn and Madeline have especially found helpful. Facilitators are sensitive to the difficulty of providing frequent individual feedback in the eMSS program because of the large volume of messages. However, they report that the group feedback received from staff through the forum has provided reinforcement that they are meeting expectations, and has been a real help in guiding their practices.

And last, the forum has provided a venue for soliciting feedback and ideas from facilitators on changes, modifications, and future direction of the program. Facilitators report that they appreciate being valued enough to have their opinions matter and they have been pleased to have seen program changes made because of their input. Aside from the empowerment that this experience offers for facilitators, they also feel that just exploring possible future directions is useful. They gain insight into the interplay between program philosophy and how the program is implemented.

Actual Practice. A last group of factors and experiences that have contributed to the growth and development of facilitators' practices comes from actually doing the job. Learning, in the context of practice, through trial and error, example, and feedback has been a valuable experience for many of the facilitators who were interviewed. As Gina puts it, "practice makes perfect – the more you do it, the easier it becomes". Several facilitators noted that reflection on one's experiences as a facilitator led to changes in practice. For instance, Barbara's experience with frequent public replies resulted in a modification of her posting habits. And, Madeline's experience in posting a reply that was taken offensively resulted in the great care she takes in composing her "expert" messages.

Facilitators feel it is especially valuable to be able to view the work of their peers. Early in the program year, several facilitators requested that they be allowed to view discussion areas other than their own. This request was granted to all facilitators who wanted the option (all of them). Not only have they learned new science and/or mathematics content, new teaching strategies, and new classroom management techniques, but they have learned new facilitation strategies and techniques for use in their own areas of the program. Several of the facilitators interviewed mentioned that they pattern the composition of their messages after the model messages that Gina and Madeline provide. Others use the ability to view the practices of their peers as more of a verification that they're doing the right things at the right time. And yet other facilitators will actually borrow parts of the content of discussions in another area and use them for clarification or enhancement of discussions in their own areas.

And last, along with the factors mentioned above, facilitators use the feedback from program staff and peers, along with the flexibility provided to program facilitators, to adapt suggestions to the content and structure of their particular areas. Though Cynthia doesn't often post to the facilitator forum, she says that she frequently takes ideas from the discussions and adapts them for use in her area. Facilitators seem to be in agreement that constructive feedback from both staff and peers contributes to a practice that is continuously evolving as they intentionally make adaptations to improve their facilitation skills in the context of their particular discussion areas.

Evidence and Direction of Dialogue and Participant Growth. The case studies present evidence of growth in dialogue as well as preliminary evidence that participants are benefiting from the program and growing in practice.

Dialogue Growth. Each of the case study facilitators felt, without a doubt, that dialogue in the program has improved since each has been involved. There were a variety of reasons that the facilitators gave for this perceived improvement, such as mentor/mentee training and participants having more experience and a higher comfort level in the program. However, facilitators felt that the main reason for the improvement was the increased focus on modeling of improved dialogue by the facilitators and advanced mentors in the program. In Gayle's words, "If you see a quality post, you're apt to make a quality post yourself. If you see one or two people jumping in with a 'thanks Bob' and somebody says 'yea, thanks Bob', you feel like you've got to jump in with your own 'thanks Bob'". Facilitators indicated that they are seeing less and less of

the vague “I agree” or “good ideas” types of responses and more that make reference to a previous post and elaborate thoughtfully on the topic at hand. People are sharing their classroom experiences at a higher level, seemingly listening to the ideas and thoughts of others, and taking ideas to the classroom in an attempt to improve student understanding. Facilitators also report, and it is seen in the preserved program dialogue, that people are coming back to the discussion areas with reflections on how a new strategy or lesson worked, and soliciting feedback from other group members. Gayle, along with most of the other case study facilitators, expressed how deep and stimulating the discussions have become, making a real contribution to her own professional growth as a mathematics educator. Gayle claims that at least 95% of the posts are well worth reading.

In addition to messages that contain more “meat”, the program is seeing more concise messages, messages that get to the point and don’t ramble on endlessly. Frequently seen are messages that contain the components, created by Gina and modeled by most facilitators, for a quality post – short and complete, thoughtful, reference to another post, reflection, and solicits responses from others. Facilitators have encouraged this type of format to produce concise messages in an effort to maximize the efficiency of the discussion area. Concise, yet complete messages reduce unnecessary reading for discussion area participants and maximize the time and usefulness of solicited responses. If people know all the circumstances surrounding a request for ideas or information, they can respond with their expertise more efficiently.

In an effort to un-clutter the discussion areas, most facilitators report using the private reply feature when appropriate. They also mention that they encourage the use of

private reply among their participants. Though still in development stages, facilitators are seeing less personal replies in public places. Also in contribution to this un-cluttering effort, most of the case study facilitators report that they don't post messages unless they can truly add to the discussion. Playing a part in reducing the number of meaningless posts has been an important focus for them.

Participant Growth. Preliminary evidence from facilitator interviews indicates that participants are realizing benefits from the discussions within the program. Most of the case study facilitators pointed out how much they had learned this year from their interactions in the program. Cynthia has been able to keep abreast of mathematics and science education in her retirement. Gina and Madeline feel that they have grown professionally more than anyone in the program. Not only have participants given them new and fresh ideas to try in the classroom, but they now have a national perspective of mathematics and science education. Both feel that they are a part of a network of support and learning from across the country. Michael, Gayle, and Carolyn, along with the others, are impressed with the contributions of the program's beginning teachers, and feel that the mentors share a wealth of experience from which all have gained.

The case studies begin to provide a picture of how the mentees in the program are growing in practice. With improved dialogue, discussion areas are now promoting what facilitators believe is an increase in participation, which results in changes and growth in the classroom practice of participants. Discussions are designed to promote reflection on practice. Facilitators report that they have seen evidence both in their mentoring experiences and within their discussions areas of the development of personal and

professional reflection among participants. In the areas they facilitate, they have seen evidence that participants, especially mentees, are modifying lessons, methods, and strategies that they use in the classroom based on the needs and achievement of their students. In the advice that mentees are asking for, and the advice that is being given by discussion area participants, facilitators are seeing that mentees are field-testing, reflecting on, and modifying their lessons. They are trying new things and reporting that some of them don't work as they had anticipated. The program is promoting the use of formative assessment methods as a means of monitoring student achievement and directing instruction. Several facilitators indicate that participants report trying alternative assessment methods when traditional methods of assessment have proved problematic. Facilitators perceive that the program (especially through its mentors) is helping beginning teachers to align content with the standards that they must teach. And, facilitators have noticed that mentees are becoming more confident in their practices. Gayle says that she doesn't see teachers saying "I can't do this", but continually working to make things work. And last, facilitators report that they are seeing mentees, especially second and third year mentees, becoming leaders in their fields. They are becoming more involved, both in their schools and in the program, initiating discussions, providing their opinions based on their experiences, concentrating on student needs and achievement, and becoming stable and competent in their teaching practices.

Summary of Case Study Results

These studies of facilitator practices provided evidence in several areas of how the intervention of this study, training and support for eMSS program facilitators, is having an effect on its participants. As the case studies developed, various themes emerged that began to describe 1) the characteristics of facilitator practices and 2) factors that had an effect on the development and growth of facilitator practices. Based on these characteristics and factors, several categories of facilitators were identified and the case study facilitators were classified into these categories for reporting. The case studies revealed evidence that many of the actions that facilitators take in the program are for the purpose of improving the dialogue that occurs in the discussion areas, the basis for growth in the program. Evidence emerged from the case studies that dialogue quality in the program is improving in ways that encourage the participation of mentors and mentees, and appear to improve participants' classroom practices, as well as increase their confidence and leadership skills.

Analysis of Program Dialogue

This section includes the presentation and discussion of the results from the analysis of the quality of program dialogue as assessed by the use of a conversation rubric (Figure 6) adapted from the eMSS Conversation Rubric (Appendix I) developed by HRI (Ford, 2005) specifically for the evaluation of dialogue in the eMSS program. Program dialogue from the 2004/2005 program year, prior to the intervention, was compared to program dialogue from the 2005/2006 program year, after the intervention.

The results from the dialogue analysis helped to answer the following study questions (see Table 6):

> *How does the training affect the practice (including dialogue quality) of program facilitators?*
>
> *How does the training affect the practice (including dialogue quality) of program mentors?*
>
> *What changes are seen in the overall quality of dialogue in the program?*

As discussed in the data analysis section of Chapter 3, program dialogue from the 2004/2005 program year included the November content and module areas (see Table 3 and Figure 7). Program dialogue from the 2005/2006 program year included the November and March content, inquiry, and dilemma areas (see Table 3 and Figure 4). Because the inquiry and dilemma areas of the 2005/2006 program year were both structured, facilitated areas, they were categorized as "modules" for the purposes of this dialogue comparison.

As a reminder to the reader, the rubric used to assess the quality of the dialogue included four areas: 1) the content of the conversation, 2) the conversation's direction, 3) its capacity to build community, and 4) the reflective nature of the conversation (see rubric on p. 124). Each area was rated across a scale with a minimum score of one and a maximum score of five. In order to obtain an overall score for each conversation thread, the scores for each of the four areas were added together. Thus, the overall minimum score for a thread of conversation was 4 and the overall maximum score was 20.

One Way Analysis of Variance (ANOVA) tests were conducted to compare the dialogue quality (as assessed by the conversation rubric shown in Figure 6) of the

structured, facilitated conversations posted in November 2004, November 2005, and March 2006. The comparisons were conducted to determine if the intervention of this study had any effect on the quality of dialogue in the program in three areas, the content discussions, the module discussions, and the content and module discussions combined. The independent variable for each ANOVA consisted of three groups and indicated the level of training for participants in leadership positions such as facilitators, advanced mentors, and content experts: 1) 2004 – minimal or no training, 2) 2005 – training in the summer institute, and 3) 2006 – training in the summer institute plus continued support and training while practicing in the program leadership positions. (The reader is reminded that with the exception of the content experts, all participants placed in leadership positions, such as facilitators and advanced mentors, were required to successfully complete the summer institute training. It was highly recommended that content experts complete the training too. During the program year, facilitators, content experts, and advanced mentors either participated directly in the facilitator forum, or experienced interaction with the trained facilitators throughout the discussion areas and the mentor forums of the program, both extended components of the designed intervention.) The dependent variable was the quality of dialogue seen in the discussion areas of the program.

The ANOVA for the content areas was significant F (2, 63) = 9.757, p = .000, indicating that the level of intervention had an effect on the quality of dialogue in the content areas of the program. The strength of this relationship was strong, as assessed by Eta Squared (.24). The ANOVA for the module areas was significant, F (2, 84) = 38.672,

p = .000, indicating the level of intervention also had an effect on the quality of dialogue in the module areas of the program. The strength of the relationship between the level of intervention and the quality of dialogue in the module areas was also strong (Eta Squared = .48). Additionally, the ANOVA for all areas was significant, F (2, 150) = 37.542, p = .000, indicating, as expected from the previous two results, that the level of intervention had an effect on overall dialogue quality (Eta Squared = .33). In all three comparisons, dialogue quality significantly increased.

Means and standard deviations from this comparison are reported in Table 18.

Table 18. Comparison of Dialogue Quality among Participants in eMSS Content and Module Forums for November 2004, November 2005, and March 2006.

Year	Forum	N	Mean	Standard Deviation	2004	2005	2006
Nov 2004	Content	25	10.0000	2.21736		*	*
Nov 2005	Content	22	13.000	3.49149	*		NS
Mar 2006	Content	19	13.7368	3.36389	*	NS	
Nov 2004	Module	38	11.5526	1.94099		*	*
Nov 2005	Module	17	13.5882	3.92203	*		*
Mar 2006	Module	29	16.6563	1.85975	*	*	
Nov 2004	All	63	10.9365	2.17666		*	*
Nov 2005	All	39	13.2564	3.64705	*		*
Mar 2006	All	51	15.5686	2.87232	*	*	

Note. NS = nonsignificant differences between pairs, an asterisk (*) = significance using the Tukey HSD procedure, p = .000.

Means and standard deviations are shown for just the content area comparisons, just the module area comparisons (included inquiry and dilemma areas for 2005 and 2006), and "all", indicating that the analysis included all of the content areas, the module areas, and the dilemma areas. The Tukey HSD post hoc test procedure was conducted for pair-wise comparisons among the three group means in each area. The results of these tests are shown in Table 18 along with the means and standard deviations for the three years. Significant group differences were found in all comparisons with the exception of the 2005 to 2006 content areas.

Summary of Program Dialogue Analysis

Comparison of dialogue quality across different "levels" of this study's intervention revealed statistically significant increases. Dialogue quality from conversations in the structured, facilitated areas of the program (content areas and module areas) increased significantly as the intensity and length of intervention increased. The November 2004 conversations, prior to the intervention, were rated lowest. The November 2005 conversations, after the summer training institute, were significantly higher then the 2004 conversations in both the content areas and the module areas. The March 2006 conversations, after the summer training institute and six month of online training and support while practicing in leadership positions in the program, were significantly higher overall with a significant increase in the module areas alone. The March content areas taken alone, however, did not see a significant increase in dialogue quality.

Summary - Connecting Study Results

The following discussion provides a summary of the results presented in this chapter by connecting results from each of the study's data collection and analysis areas with the study's research questions. For each of the research questions, evidence from across the various areas is summarized to help provide answers. The three areas from which evidence is provided are 1) the participant survey, 2) the case studies of facilitator practices, and 3) the quantitative analysis of program dialogue.

How does the facilitation training affect the practice (including dialogue quality) of program facilitators and/or program mentors?

Indications of how the intervention affects participant practice comes from three areas of the data collected. The results of the analyses of the participant survey, the case studies of facilitator practices, and the analysis of dialogue all contribute to answering this question.

The participant survey, administered to mentors and facilitators who took the advanced training institute in the summer of 2005, was intended to assess any growth or changes in skills, knowledge, and dispositions regarding the facilitation of high quality dialogue toward the development of supportive communities of learning in the eMSS program as a result of the intervention. Significant differences were found in several areas between the pre-intervention survey and the post-intervention survey indicating changes in facilitation skills and dispositions after the intervention. First, there is evidence that participants developed a greater understanding of the components important to a quality posting in terms of the eMSS program after having received the training. The

analysis showed a 23% increase in those participants who were able to describe the components of a quality post. Second, participants reported (with significant differences across the surveys) that they perceived an overall improvement in dialogue quality contributing to advancing and deepening discussions throughout the program as well as a personal improvement in contributions to program dialogue. In addition, on the post-intervention survey, participants were better able to elaborate on how and what type of dialogue is important in deepening and advancing program discussions. Third, participants' perceived ability to contribute to the advancement of the program's beginning teachers, already relatively strong prior to the intervention, did not significantly change. However, there was a 45% increase in the number of participants who discussed how to provide support to mentees specifically in an online environment. The training, apparently, was effective in promoting specific knowledge and skills for online support and communication. And last, participants report a greater number of responses to their messages in the program and that they put consideration into their message composition in an effort to build an effective online community of support. It appears that participants have become more conscious of the need to encourage others to respond, to respond themselves, and to make a conscious effort to compose posts that are supportive and substantial.

The cases studies of facilitator practice provide evidence of how facilitators' practices grew and developed after having participated in the intervention. Five broad purposes for facilitation were identified that help to make sense of the strategies employed by the facilitators (Table 15). These five areas are 1) to encourage

participation, 2) to align conversation with program goals, 3) to promote meaningful and productive dialogue, 4) to promote a community of learning and support, and 5) to solve problems for beginning teachers both within and out of the program. In particular, the case studies revealed the following growth and/or improvement as results of the training institute: 1) an alignment of practice with program goals, 2) an understanding and appreciation of the importance of dialogue especially in an online program, 3) an understanding and appreciation of the characteristics of online dialogue, 4) the development of online listening skills, 5) increased skill in composing and modeling quality messages, 6) an understanding of the expectations of program facilitators and 7) more effective use of questioning to encourage participation and promote more fruitful discussions (Table 16). The interviews and program observations gave indications of how facilitator practices evolved and grew over the program year. Growth in effective questioning techniques, increase in steering and summarizing skills, improved skills in maintaining a positive, manageable, and productive online discussion area, and the ability to contribute to the growth of a community of learners were major areas of development and improvement as a result of the training and support that facilitators received. Additionally, facilitator perceptions lend support to the occurrence of participant growth. They report growth in the ability of mentors to contribute to quality program discussions and that they have seen that participants are learning from the conversations and applying what they are learning in their classrooms.

And, third, the analysis of program dialogue gives quantitative evidence that overall program dialogue, which includes facilitator and mentor contributions, has

improved since the intervention was implemented. Significant increases were seen in dialogue quality (as defined by the eMSS program) from the 2004 program (prior to the intervention) to the 2005 program (after the training institute). Overall dialogue quality also increased during the 2005/2006 program year as the final intervention was being implemented.

What components of the training are facilitating change in practice?

Case studies of program facilitators revealed evidence that all three components of the intervention had effects on changes in practices. Facilitators reported various components of the advanced summer institute, the ongoing facilitator forum, and the practice opportunities and support that they received that affected their growth and development as facilitators.

The focus on dialogue in the training institute was of great importance to participants in developing, not only skills in dialogue composition, maintenance, and direction, but also in their awareness of its importance in an online program. Learning about the characteristics of online dialogue and how it differs from face-to-face discussion was important to facilitators in recognizing the difficulties in communicating in an online environment and the miscommunication that sometimes results. The modeling of quality dialogue by program staff during the training was of great importance to participants. Especially helpful was the modeling of appropriate use of public versus private messages, and modeling of how to create and maintain threaded discussions focused on a discussion topic. Actual practice with program dialogue was helpful in the development of

facilitators' skills in online dialogue – practice in composition, identification, analysis, and improvement. Discussions on questioning techniques, and the importance of using questioning to elicit responses in an online environment, helped to develop the strategies facilitators use to steer, advance, and deepen discussions. And finally, positive and encouraging feedback provided by program staff during the summer institute, both in messages within the institute and in private response to weekly reflection assignments, caused participants to further reflect on institute content and its application. In addition, it served as a role model of how they might promote this type of reflection in discussion areas of the program.

The facilitator forum, an area of continued training during the program year, provided a venue for continued development as facilitators were guided and supported by program staff in the various areas of their work, provided with program information, asked to contribute to the continued development of the program, and were allowed to pose questions and discuss facilitator issues as they worked in their various discussion areas. Facilitators reported that the guidance and information that they received in the forum was of great value in defining expectations and timelines, and that the reinforcement that they received helped to develop confidence in their work. That facilitators were able to ask questions, both of program staff and of their peers in facilitation, was of extreme importance to them as their skills developed. And, being able to share experiences, both successful and unsuccessful, with other facilitators helped them to learn strategies

for dealing with different situations encountered in their work. The facilitator forum also provided an avenue for the empowerment of facilitators as they worked to develop leadership skills. To nurture this empowerment, program staff frequently solicited feedback from facilitators on program direction. The importance that the staff placed on the feedback from facilitators was appreciated and valued by forum participants and contributed to their confidence and knowledge of program goals and direction.

And last, facilitators stressed the importance of "learning by doing" and credited experiences while practicing facilitation with the growth and refinement of their facilitator skills. Specifically important to facilitators while in practice was the feedback and support from program staff both via the facilitator forum and private replies. They also learned strategies and skills by being able to view the work of other facilitators. Early in the program, facilitators requested that they be given access to all non-confidential discussion areas so that they could look in on and learn from other facilitators. This served as a means of exposure to other facilitation strategies and best practices, and also as a verification that they were on the right track in their own areas.

What changes are seen in the overall quality of dialogue in the program?

Strong evidence of increases in the quality of dialogue in the program is seen in the quantitative analysis of program dialogue. There were significant increases in dialogue quality from the 2004/2005 program year (pre-intervention) to the 2005/2006 program year. These significant increases were seen in the

overall dialogue quality as well as dialogue quality in the separate content and module areas. In addition, increases in dialogue quality during the post-intervention program year from November 2005 to March 2006 were significant for overall dialogue and for the module areas. Though a slight increase was seen in the content areas between November and March for the 2005/2006 program year, the difference was not significant. This can, perhaps, be explained by the lack of formal program structure in the content areas and the fact that the structured module curricula are designed to promote reflection, classroom application, and examination of alternate methods, all important factors of quality dialogue in the eMSS program.

Evidence of an increase in overall dialogue quality can be gleaned from components of the participant survey and from the facilitator perceptions in the case studies. Participants of the post-intervention survey were better able to articulate the features that should be included in a quality eMSS message, perhaps a beginning of an increase in their ability to compose higher quality messages. Survey participants, with significant differences, reported the frequency of quality messages overall to be higher than prior to the intervention. In addition, on the post-intervention survey, participants were better able to elaborate on the kind of dialogue that helps to advance discussions, indicating a developing awareness of what constitutes quality dialogue.

Case study facilitators reported an increase in the quality of dialogue in the program over previous years. Their perceptions are that messages are being

written more effectively, are more pertinent to the topic of the conversation and to science and/or mathematics teaching, and are showing more reflection on discussion topics and their application in the classroom. They consider the conversations to be deeper and more meaningful and admit that they continue to learn from program discussions.

What components of the training are facilitating change in dialogue quality?

Of great importance to any improvement in dialogue quality is the awareness and knowledge by participants of what constitutes dialogue of high quality in terms of the goals and direction of the eMSS program. Survey results and results of the facilitator case studies reveal that this awareness and knowledge was provided in the summer training institute. The survey results indicate that knowledge of important features of quality online messages increased after the intervention and that participants had a better understanding of the kind of dialogue that was important for contributing to the growth in teaching practices. Facilitators unanimously report an increase in the quality of dialogue in the program and acknowledge the improvement in their own personal program messages. Facilitators attribute this improvement to various factors, the most important being the focus on dialogue in the summer training institute. Components of the training, mentioned by facilitators, that have led to an improvement of dialogue are 1) becoming aware of how and why dialogue is important in an online program, 2) learning about differences in face-to-face dialogue and online dialogue, 3) practicing effective message composition, 4)

working with types of dialogue and its analysis, and 5) learning how to align discussions to program goals. In addition, participants have learned from effective dialogue modeling by program staff, other trained facilitators and mentors, and even from experienced second and third year mentees. Several facilitators felt that this continued modeling is providing a "norm" for the type and style of dialogue expected in the program. This type of modeling is also seen as facilitators view the work of their peers within different discussion areas of the program. These components of "learning while in practice" have also contributed to the improvement of dialogue in the program.

What preliminary evidence, if any, is there that change in program participants' online practice is effecting change in the classroom practice of beginning teachers?

The results of this study provide only preliminary evidence that the program is having positive effects on the classroom practice of beginning teachers. This preliminary evidence comes from the facilitator case studies and is based solely on their perceptions of beginning teacher growth. Their perceptions, as a result of their closeness to beginning teachers within their discussion areas, are that many program mentees who post to the discussion areas are benefiting from program discussions and growing in practice. They report that, with improved dialogue and streamlined management, discussion areas seem to be promoting an increase in participation by beginning teachers. Facilitators report that they commonly see (within the discussion areas of the program) beginning teachers writing of examining methods and practices that they use in the classroom, exploring alternate approaches, and looking at various approaches in terms of

student learning and motivation. Through viewing the advice that mentees are seeking from other participants and the discussions that result, facilitators report that mentees are field-testing, reflecting on, and modifying their classroom lessons. They report that mentees seem to be learning to align content with the standards that they must teach. In addition to trying new teaching methods, facilitators report that beginning teachers write about experimenting with alternate assessment methods, especially when they have found that traditional methods are not effective. Facilitators have noticed that mentees are becoming more confident and stable in their practices and, especially in the case of second and third year mentees, are starting to become leaders in both the program and in their schools by becoming more involved, initiating discussions, providing opinions based on experiences, and by modeling and promoting reflection in practice. Though this preliminary evidence is based only on facilitator perceptions, its presence in this study implies directions for future research on beginning teacher growth (to be discussed in the next chapter).

CHAPTER 5

CONCLUSIONS

Chapter five provides a review of the significance and purpose of this study. Implications of the findings of this study are provided for educators, and suggestions are provided on how findings may be used to enhance the effectiveness of online facilitators, especially to improve the quality of online dialogue, and thus to facilitate online learning. Recommendations for further research related to issues raised in this study are given.

Significance and Purpose of the Study

This study was designed in part to examine the effects of an intervention developed to fill a need to improve the quality of online program discussions identified in eMSS program evaluations. But perhaps more importantly, the eMSS program served as a context in which to examine an important and understudied area in online learning research, the role of online facilitators for fostering improved learning. These needs are discussed below after which the research questions for this study are reviewed.

A Void in the Research Literature

A critical need for facilitators or moderators of computer-mediated learning environments has been identified in the professional literature (Garrison et al., 2001; Harris, et al., 1996; Salmon, 2000; Single & Muller, 2001; Single & Single, 2005). In addition to identified benefits of promoting a sense of community among participants in the conference, providing technical and structural support, and increasing contributions

among participants, there are suggestions that facilitators may play important roles in fostering increased construction of knowledge by promoting higher levels of dialogue within online learning programs (Angeli et al., 2003; Garrison et al., 2001; Hara et al., 2000; Hew & Cheung 2003b; Paulus & Roberts, 2006). These researchers suggest that facilitators are essential in modeling critical thinking skills in an online environment. There is evidence that well-trained facilitators can cause participants to think more deeply about subjects by showing them how to justify statements with examples or data, how to ask questions, invite responses, and challenge others' ideas. In fact, Angeli et al. (2003) found that in online discussions of pre-service teachers' field experiences only 1% of instructor postings utilized high level mentoring which involved cognitive task structuring; encouragement to explore, elaborate, and explain; fostering reflection; or encouraging articulation. Little is known regarding the strategies that facilitators might use to foster higher quality dialogue for improved learning and no mention was found in the research literature on how to train facilitators for this responsibility.

A Program Need

eMSS program evaluations (Ford, 2004; Ford 2005) reported that dialogue quality in program discussion areas was not at sufficient levels to effect the desired growth of beginning teachers. As a result of these findings, training was developed for discussion area facilitators, advanced mentors, and content experts, with the purpose of improving the quality of online dialogue necessary to lead to teachers' professional growth. Although these outcomes have not been directly measured by the project, it was hoped that changes in classroom practice and student learning would also occur. It is this

training to enhance online dialogue, and the influence of the training on the professional learning and growth of eMSS participants, that was the focus of this study.

The intervention, whose effects are studied in this program, involved three parts: a) training for online facilitators and advanced mentors, b) facilitation experience in various areas of the program for the facilitators and advanced mentors, and c) ongoing training and support for facilitators within the program's facilitator forum throughout each program year.

The study was designed to answer the following research questions:

1. *How does the facilitation training affect the practice of program facilitators?*
2. *How does the facilitation training affect the practice of program mentors?*
3. *What components of the training are facilitating change in practice?*
4. *What changes are seen in the overall quality of dialogue in the program?*
5. *What components of the training are facilitating change in dialogue quality?*
6. *What preliminary evidence is there, if any, that change in program participants' online practice is effecting change in the classroom practice of beginning teachers?*

Review of Study Context and Purpose

The eMSS program served as a context in which to study the research questions listed above. Designed to provide professional development and mentoring support for beginning science and mathematics teachers, the project's ultimate goal is to increase

student achievement in science and mathematics. The distance-based program matches experienced science and mathematics teachers with beginning teachers who may be physically separated from colleagues by distance or in areas isolated by urban congestion. The project was created with a vision of providing novice teachers with, not only the survival and general pedagogical support characteristic of many mentoring programs, but also support in the advancement of content knowledge and pedagogical content knowledge. Delivered primarily by asynchronous computer-mediated conferencing, the program is made up of many interactive components, including guided threaded discussions, private discussion areas for mentoring pairs, modules for professional development, and content-specific discussion and information areas. Program staff seeks to foster the level of dialogue and reflection necessary to enhance new teacher practice and to promote the professional development of the program's more experienced participants.

Dialogue in the program was analyzed and compared before and after the implementation of training focused on developing facilitators' skills for fostering high quality dialogue among program participants. Facilitators' online practices were examined over time, giving insight into changes in the dialogue and participant growth resulting from the intervention. And third, a survey administered before and after the intervention provided a view of participants' perceptions of their own change and growth.

Findings of the Study

Results of this study imply that the training and support that facilitators received in the eMSS program had various positive effects. Several areas of growth, which included evidence of improvement in dialogue quality, were identified in the practices of facilitators. Improvement in overall dialogue quality after the intervention was indicated in quantitative comparisons. And, there is some preliminary evidence that beginning teachers are benefiting from the improved discussions in the program. Since the study's lengthy findings are fully reported and connected to research questions in Chapter 4, the remainder of this chapter will focus on the implications of this research and on recommendations for further research.

Implications for Educators

Literature supports that facilitators in computer-mediated learning environments can enhance participation, alignment of contributions with project directions, and interaction in online systems by providing activities that build a sense of community, by clarifying program goals and expectations, and by encouraging frequent and appropriate responses to others (Berge, 1994; McGee & Boyd, 2002; Collier & Yoder, 2002; Markel, 2001; Mason, 1991; Stuckey, Hedberg, & Lockyer, 2002). Constructivist learning theory is currently the most accepted epistemological position associated with online learning (Kanuka & Anderson, 1998; Gunawardena et al., 1997; Jonassen et al. 1995; Miller & Miller, 1999). It is implied that in order for knowledge to be constructed in an online environment, participants must be provided with learning opportunities that encourage

the examination of multiple points of view and with activities that help participants become explicit about their own understanding by comparing it with that of other participants. Learning is enhanced in computer-mediated conferences when participants interact with their peers and negotiate meaning by utilizing the shared experiences of all participants. Thus, perhaps the key role for the facilitator in web-based communication is to facilitate the type of dialogue that is likely to foster construction of knowledge.

The findings of this study indicate that facilitators of online conferencing systems can promote improved dialogue with the potential of increasing participants' learning relating to program goals. Further, training provided for facilitators can positively affect their ability to promote a sense of community within the conference, with the likelihood of increasing contributions by participants. In addition, facilitators can model appropriate contributions to discussions (aligned with program goals) thus increasing the likelihood of relevant contributions by program participants. Focusing the dialogue in this way focuses the learning, and provides for a more manageable discussion.

Implications for Facilitators of Online Conferencing

This study provides evidence that there is no one "right" way to facilitate online conferences. However, it is appears that there are recognizable categories of facilitator practices, four of which emerged in this study, each with identifiable characteristics and associated strategies (Table 14, p. 154). These categories differ with respect to the priorities set by the facilitators, and the strategies selected to reach the priorities. With the practices of just seven facilitators examined in this study, it is possible that additional

categories of facilitators would emerge from a wider sample, an interesting focus for further possible research as described later in this chapter.

Despite their differences, facilitators in each category proved effective in promoting high quality online discussions and relatively large numbers of contributions by participants. Also, facilitators in different categories appeared to share a set of five broad purposes for their work, although they selected different strategies to achieve these purposes (Table 15 p.231). This study confirmed reports from the literature (Harris et al., 1997; Single & Muller, 2001; Single & Single, 2005) that purposes for facilitators in computer-mediated conferencing include 1) using strategies that increase contributions by participants; 2) using strategies that promote a sense of community in which participants feel genuinely connected to each other and are able to comfortably share ideas; and 3) using strategies that help to provide guidance and reduce frustration among participants caused by unclear expectations or procedures, technology difficulties, or miscommunication within the program. Additionally, this study identified two further purposes of facilitation that are only hinted at in the literature. These include 4) using strategies to promote and maintain meaningful and productive dialogue capable of increasing the level of learning; and 5) using strategies that help to align conversation and learning with the goals of the program. Thus, beyond the technical and structural support provided in online conferencing is a more professional role for the facilitator. This is a person who, using knowledge of the program, the curriculum, and the characteristics of online interaction, has the skills and the authority to adapt instruction to group needs as participants progress within discussion areas. This facilitator continually uses

information gathered from online discussions to assess the learning directions and needs of participants and then guides the conversations to align with program goals while honoring the interests and needs of the participants.

In this study, the choice of strategies used to carry out each purpose for action varied according to the category into which each facilitator was classified, though a set of effective strategies was identified for each of the five purposes. The results of this study indicate that facilitators tend to develop and practice somewhat uniquely with different components of training, experience, and personal qualities contributing to the development of their practices. It is important, then, for facilitators to collect a variety of strategies from which to choose in order to accomplish the purposes and responsibilities of their practice. This choice allows them to supplement their personal strengths and experiences with newly learned knowledge and skills providing them with the tools needed to provide effective guidance to enhance participants' construction of knowledge while supporting technical needs and encouraging participation.

Though they grew in different ways, all facilitators' practices were positively influenced by the training and support that they received through the intervention. In general, the training assisted them in composing and modeling high quality messages (specifically in terms of the eMSS program). The training helped facilitators to direct discussions, aligning conversations with program goals. Facilitators also gained strategies to promote reflection and sense-making among participants, for example, by using questioning techniques and conversation summaries. All of these areas of growth have the potential to contribute to the improvement of program dialogue, the means by

which the growth and development of beginning teachers is supported in this distance mentoring program.

Implications for Designers of Online Conferencing

Facilitator Training. Findings of this study imply that facilitators of computer-mediated conferencing systems can learn through training to increase the effectiveness of their work in fostering deeper and more meaningful discussions. The results of this study indicate that facilitators develop differently and that personal characteristics and experiences affect their priorities as facilitators, and the selection of specific strategies for use in their practices. However, components of training were identified that assisted facilitators in appreciating and developing a broader range of skills for improving online dialogue and learning among participants. In light of the results of this study, this author recommends that facilitator training should be customized according to the goals of the program and should include the following components:

- An *examination of the goals of the program*. What is the vision of the program and what are the learning goals for its participants? What is it that the program wants to accomplish? This knowledge helps facilitators direct their practices and encourage discussion that aligns with program goals.
- An *examination of what constitutes quality dialogue* specific to program goals and expectations. This examination should include modeling of quality dialogue by program staff and actual practice analyzing past program dialogue using guidelines or a rubric specific to the program.

- An *examination of the nature of computer-mediated communication* – its differences, benefits, and challenges. This should include an awareness of how communication cues differ in distance dialogue (versus face-to-face conversations) and how to build upon those differences in a distance environment to encourage frequent and meaningful contributions by participants.
- An *examination of the nature of constructivist learning* and the importance of meaningful dialogue for constructing knowledge in distance learning systems.
- Provide *ongoing training and support* for learning in context as facilitators begin their practice. It may be wise to provide an internship situation, if possible, where a new facilitator works alongside an experienced facilitator for a time. Berge (2000) discovered that online moderators "learned to moderate online discussion lists by watching others perform those functions – rather like apprentices …" (p. 81). Consistent with his findings, case facilitators in this study really expressed the value of being able to observe the practices of their peers either by working in teams, or by being allowed to observe others' discussion areas. At the very least, opportunity for observation should be provided.
- Provide a *venue for delivering important program information* to facilitators, answering their questions, and for providing group and individual feedback. Facilitators in this study valued the online facilitator forum which not only served to provide information and answer questions, but evolved into an area of growth and learning for facilitators as they sought strategies from peers for working within discussion areas and shared the successes and challenges of their own

facilitation work. The forum also provided a place for staff to provide group feedback and encouragement.

- Provide *training that is specific to facilitators*, rather than designed to serve multiple audiences. Survey respondents (facilitators, advanced mentors, and content experts) indicated that roles and expectations became confused with the mixed audience training that occurred in this intervention. A more focused training would provide information, strategies, and build skills specific to the work of the facilitator or participant to which the training is directed. For instance, one population that became "lost" in this study was that of the content expert. It appears that expectations and responsibilities associated with the role of the content expert were diluted in the mixed audience training that was implemented for this study. As a result, these experts may not have been as influential in facilitating the advancement of content knowledge through dialogue in the program as would have been possible with a more focused training. In order to reach their potential as facilitators of learning in this online environment, they may benefit from clearer and more specific expectations, demonstration of responsibilities, and a clearer definition of their role in the program.
- *Deliver the training using the same online format and platform* that will be used for the program. This provides an opportunity to model appropriate interaction and quality dialogue for future facilitators. Case study facilitators indicated that the modeling by staff during the summer online training institute was one of the most valuable aspects of the intervention.

Curriculum and Structure. The mentoring and induction literature (Bice, 2005; Britton et al., 2003; Lopez et al., 2004; Rhoton & Bowers, 2003) supports the position that development of a curriculum specific to program goals is an important component of supporting new teachers. There are areas of the eMSS program (modules) that involve highly developed curricula, and other areas in which no formal curriculum is followed, although questions are posed and answered pertaining to a broad topic or theme. The content areas of the eMSS program were designed to provide science and mathematics content support through expert facilitation, but with no formal curricula. This may be one reason why a significant increase in dialogue quality was observed in the module areas but was not seen in the content areas across the 2005/2006 program year. That the content areas lacked a formal curriculum upon which expert facilitators could build may have contributed to the lower increase in dialogue quality.

This finding implies that there are multiple components of distance learning environments that can contribute to an increase in the quality of discussions that occur online. The findings of this study indicate that facilitators can play a significant role in increasing the quality of dialogue in a distance learning program. It is also indicated, as discussed above, that the design and implementation of a curriculum may promote the use of higher quality dialogue by participants. Further examination of facilitator practices in this study suggests that a third factor may affect participant dialogue in a distance program. This factor has to do with the way that discussion areas and even topics of discussion are structured and organized. Facilitators indicated that when threads of discussion were kept organized within discussion areas and routines were developed,

participants tended to respond more and with messages of higher quality. In light of these findings and with call for the need for good moderation and structure for sustaining learning in distance systems (Garrison et al., 2001; Harris, et al., 1996; Harris et al., 1997; Owen, 2000; Salmon, 2000; Single & Muller, 2001; Single & Single, 2005), it is recommended that designers of distance learning systems consider the development of a curriculum and appropriate structure along with the development of facilitators in their efforts to promote the kind of dialogue that will foster high level learning.

Recommendations for Further Research

Further Analysis of Program Dialogue

Dialogue analysis in this study examined overall change in dialogue quality from the program's structured, facilitated discussion areas before and after the intervention. Though mean ratings of dialogue quality increased significantly after the intervention, it was clear that there is still room for improvement. This observation is supported by a fourth year evaluation report on the eMSS program (Pasley, Madden, Ford, 2006) in which HRI determined that, in terms of program goals, work still needs to be done on improving the quality of conversations.

Rubric Breakdown. The conversation rubric used in this study rates dialogue in four areas: content accuracy, community building, whether the conversation is on task and moving forward, and the reflective nature of the conversation. A study involving further breakdown of each of these broad categories in the rubric (Figure 7) may provide

information on which aspects of the dialogue are weakest, and how one might go about modifying the facilitator training to remedy this.

Individual Message Analysis. In this study, program dialogue was analyzed in terms of conversations or "threads". These threads of conversation included multiple messages from various program participants (mentors, mentees, facilitators, content experts). This method of analysis was used to get an overall picture of how training affected the dialogue in the program as a whole. It also considered the problematic nature of individual message analysis identified in earlier studies (Bice, 2005; Taylor, 2005), especially the difficulty in determining the meaning of individual messages without looking at them in the context of the entire discussion. However, research that might utilize a rubric for effectively analyzing individual messages may prove fruitful. An individual message analysis technique may allow the program to determine which group(s) might benefit from further training and support in the development of quality dialogue.

Dialogue Analysis by Facilitator Style. A third suggestion for further research on program dialogue is to study dialogue across the program year grouped by facilitator style. In the present study, various categories of facilitator style were identified: the participant facilitator, the expert facilitator, the systematic facilitator, and the nurturing facilitator. Though quality dialogue was observed in the discussion areas of all seven facilitators, it was not clear whether particular categories or styles of practice are most successful in fostering certain desirable aspects of the dialogue, while other styles foster

other aspects. Is there one style or category that fosters higher levels of dialogue? And further, what are the strategies associated with each facilitator category that consistently lead to higher levels of dialogue?

Further Examination of Facilitators' Practices

Further Examination of Facilitator Categories.

Four categories of facilitator practices emerged during this study. Though facilitators appeared to share a set of broad purposes for their work, categories differed with respect to the priorities set for facilitation actions and the selection of strategies used to accomplish their work. With the practices of just seven facilitators examined in this study, it is possible that additional categories of facilitators would emerge from the examination of a larger sample. Research into the practices of a number of online facilitators would allow further identification and definition of the categories of facilitator practices. Are there additional categories of facilitator practice? How are each of these categories defined? How do they fit in with the categories of facilitator practice identified thus far?

Extended Study of Facilitator Practices.

Facilitators' practices in this study were conducted during several months in a single program year. Further research might examine the practices of these same facilitators across several years. Studies of this type may provide evidence on whether facilitators' practices evolve with time and experience. Is there a hierarchy (in terms of facilitator effectiveness) of facilitator development regarding style and category? And if so, is there a way to shorten the journey from what might be classified as a lower level of facilitator practice into a higher level of practice?

If facilitation training positively affects the practices of facilitators in terms of accomplishing program goals as this study indicates, then how might training be improved to more quickly reach higher levels of dialogue in the program, or is this even feasible?

Facilitator Practice by Gender. It was observed in this study that male case study facilitator representation (14%) was similar to male facilitator representation in the eMSS program for the 2005/2006 program year (17%). However, this representation was much less than the male representation (38%) for those participants who successfully completed the summer training institute which was the first stage of the intervention in this study. It would be interesting to determine why more male participants choose not to pursue facilitator duties in the program. And further, do male facilitators practice differently than female facilitators? Would a higher representation of male facilitators be beneficial to the program?

Impact of Training for Content Experts

One group of participants in the eMSS program with the potential ability to facilitate increased knowledge acquisition through improved online dialogue is that of the content expert. As mentioned earlier, during the intervention in this study the content experts, as a group, may not have received the level or focus of training necessary within the mixed-audience institute to build the type of skills capable of fostering improved dialogue in the content areas of the program. Experimentation with training specific to the responsibilities and expectations of the content experts may provide insight regarding

the role and realities of this group of participants. In addition, research on a specific training program for content experts may provide further insight into the results of this study regarding the quality of dialogue within the content areas of the program.

Examination of Mentee Growth and the Growth of Their Students

An area in which little evidence was found of the effects of facilitator training was in the change of the classroom practices of beginning teachers. This study provides only preliminary evidence (based on facilitators' perceptions) that the benefits beginning teachers receive from improved online discussions include growth in classroom practice. Studies that build on this preliminary evidence would be well warranted since it is the practices of these early career teachers that will have a long term impact on the improvement of student achievement in science and mathematics, an ultimate goal of the eMSS program.

Qualitative Analysis of Mentee Contributions. A study of mentee growth utilizing a qualitative study of their program posts might give a better indication of the ways in which mentees are benefiting from the improvement of dialogue. Additionally, classroom observations might give additional information on how mentees are benefiting from the improved discussions in the program and growing in practice. And further, the analysis of mentees messages coupled with classroom observations of practice could inform the program on how well the analysis of beginning teachers' program dialogue represents the actual characteristics of their teaching practices.

Student Achievement. The ultimate goal for training facilitators to promote high quality dialogue in the eMSS program is to provide conditions for an increase in student achievement in science and/or mathematics resulting from the growth in practice of the program's beginning teachers. Therefore, studying the mathematics and science achievement of the students of beginning teachers in programs similar to eMSS may provide such programs with important information on how changes in teachers' classroom practices (resulting from online interactions in the program) may benefit their students. A meaningful comparison of the achievement of students whose teachers were eMSS participants with that of students whose teachers were not in eMSS was not feasible since eMSS teachers were drawn from more than 600 school districts, each with its own curriculum. Nonetheless, under other circumstances there could be great value in comparing the achievement of students of program teachers with that of students whose teachers who are in other mentoring or induction programs or who are not a part of a mentoring or induction program. Studies of this nature could reveal information on the effectiveness of online mentoring delivery as well as the science and mathematics focus that was a key part of this program's vision.

Summary

This study provided evidence that social learning can be facilitated in a distance environment by the intentional design and implementation of training for the development of online program facilitators. Dialogue quality in the eMSS distance

mentoring program for beginning teachers of science and mathematics improved after the delivery of a three part intervention which included facilitator training and support.

Studies of program facilitators' practices revealed various components of training that affected how the facilitators worked and how their practices evolved. A focus on program goals during training sessions provided direction and purpose for facilitators which contributed to the development of their practices. A second focus on the importance of dialogue in computer-mediated conferencing and the nature of learning through dialogue helped facilitators develop and implement strategies for fostering an increase in discussion contributions by participants. Involving facilitators in analysis of program dialogue led to the development of skills in fostering the improvement of communication within this distance program's discussion areas and for deepening the discussions among participants. Finally, a focus on the unique characteristics of computer-mediated communication helped facilitators to model appropriate online message behavior.

This study confirmed the "critical need" in computer-mediated conferencing systems for trained facilitators capable of moving dialogue among participants to higher levels. Further, it provided evidence that facilitator effectiveness for creating appropriate online conferencing environments and for improving the quality of conversations can be enhanced through carefully designed and well-supported training programs.

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APPENDICES

APPENDIX A

ELECTRICITY DISCUSSION – PHYSICS CONTENT AREA

eMSS PROGRAM YEAR 2005/2006

Appendix A

Electricity Discussion – Physics Content Area
eMSS Program Year 2005/2006

Subject: Electricity
We're starting electricity and my collaborator and I are planning on gong through static electricity and electric fields in one and a half weeks. After that we go to circuits. Usually there are a lot of labs available but with the breakneck speed we're planning on I worry I don't have time to do some of the more complicated ones. Does anyone have any short concept based labs to do with electricity?
-Mentee

Subject: Re: Electricity
In message (mentee) writes: We're starting electricity and my collaborater and I are planning on gong through static electricity and electric fields in one and a half weeks. After that we go to circuits. Usually there are a lot of labs available but with the breakneck speed we're planning on I worry I don't have time to do some of the more complicated ones. Does anyone have any short concept based labs to do with electricity?

(Mentee), are you planning to do this for physical science, physics or both? What concepts do you particularly want to stress? What kinds of materials do you have available to use for investigating static electricity and electric fields? If we knew the answers to these questions, I think we would be better able to help you find a couple of meaningful labs. We'll try to be quick in our responses. (Gina), facilitator

Subject: Re: Electricity
excellent questions from (Gina)

but to jump the gun a bit, two excellent sources of concept flow and simple experiments:

Sherwood and Chabay, electric and magnetic interactions, wiley and sons or 7/2/96 article in american journal of physics "a unified treatment of electrostatics and circuits"

The castle project, info available at Pasco web site.
(Mentor 1)

Subject: Re: Electricity
In message (mentee) writes:
>We're starting electricity and my collaborater and I are planning on
>gong through static electricity and electric fields in one and a half
>weeks. After that we go to circuits. Usually there are a lot of labs

>available but with the breakneck speed we're planning on I worry I don't
>have time to do some of the more complicated ones. Does anyone have any
>short concept based labs to do with electricity?

-ScilLiknks is a great resource. You can search by subject and grade range, and is has tons of activity, simulations, and more. We, as eMSS participants, have free access to it. Go to the homepage of eMSS and look in the left tab.
(Content Expert)

Subject: Re: Electricity
I'm planning on doing it with Physics. We have a lot of stuff for circuits but don't want to have lab after lab of building circuits. All the stuff is my collaborator's and I never know what he has until after the fact when he tells me what he did that day. I'm really looking for some labs that I can get some of my own materials for. I'll check out the link you suggested too.
(Mentee)

Subject: Re: Electricity
I attempted to get onto SciLinks and failed :(

The directions say that the code is our school email address - didn't work. Does anyone know who I would contact to clear it up?
(Mentee)

Subject: Re: Electricity
I have the student learn how to solder, then use 200 ohm resistors, an LED, a 9 Volt battery snap soldered together to make a continuity checker.

Students tape it to a stick (craftstick) than use it to determine conductors, insulators and SEMI-Conductors (the LED) and how to identify. Then they use the same continuity checker to take measurements then calculate items using Ohm's law.

I have several stand alone labs for electricity that kids rotate through - how motorsand generators work, using generators to make electricity, seeing how DC current has directions, how LED work versus regular bulbs, electromagnets - number of winds, number of batteries, cutting circuit boards then assembling the continuity checker on that -

the ablity to solder has had several students get internships - kids know about the unit from friends and siblings and look forward to it - visiting students from the past remember it and some even have the continuity checkers.

Electricity is magic to many students and getting a small feel for it makes them powerful.
(Mentor 2)

Subject: Re: Electricity
Considering private universe tape, I would suggest you start current electricity unit by handing students one wire, a battery, and a flashlight bulb, and ask them to light the bulb. You might break the glass on a large light bulb, or provide a microscope so that students can see the inside of a light bulb. Then have them explain. I would also not leave out how a light bulb in a house is wired. I always wanted to take the light switch in class apart and show them how it worked, but then I had to first turn off the electricity, and then there was no light to see the switch, so I would turn the power back on, but then-----well, this could go on for 20 minutes or so, and then the period would end, so I never did get to show them.
(Mentor 1)

The following is an optional story and sure sign you are listening to an old teacher. Teachers are always afraid that students might get electrocuted, and for good reason. I had a student poke a paper clip into an electric socket. Nothing happened, so he poked it in the second hole. Strangely, it didn't kill him, but he flew off his chair, landed on his back and twitched for hours. He went on to become a lawyer. I always felt badly about that, suspecting brain damage from the electrocution. Lesson: Just because they are high school students, doesn't mean they understand those little slots in the wall.

Subject: Re: Electricity
I found a great video with an even better demo that I just can't get to work. The demo is the last few minutes of the video. I have the golf sleeve, I have a glass rod inserted in a stopper and I have some plastic for the loop. The golf sleeve definitely gets charged - you can here it - but I can't get the loop to float in front. I thought maybe the rod isn't long enough or should be wood but either way its an insulator. Suggestions?
(Mentee)

Subject: Re: Electricity
The loop levitation is very sensitive to moisture, so you may have to wait till summer. In the mean time, Ive used loops of christmas tree tinsel and just charged plastic rods. tinsel is much lighter, so easier to levitate.
(Mentor 1)

"gets electric charge from the power plant". Interesting quote in film.

Subject: Re: Electricity
(Mentor 1) has already responded to your problem here and I don't have much to add other than echoing his comment about static electricity and humidity. Even here in Montana where our humidity is considerably lower generally than in California, there are times when the static electricity labs I try just don't work. (Mentor 1)'s suggestion of using tinsel is a great one. That does work much more frequently than other materials. And plastic is usually much easier to charge. If you have a fur rather than wool or silk, it gives a better charge as well. As for the rod being an insulator, you can't charge conductors well. They

automatically transfer the charge away.
Gina, facilitator

In message (mentee) writes:
>I found a great video with an even better demo that I just can't get to work. The demo is the last few minutes of the video. I have the golf sleeve, I have a glass rod inserted in a stopper and I have some plastic for the loop. The golf sleeve definitely gets charged - you can here it - but I can't get the loop to float in front. I thought maybe the rod isn't long enough or should be wood but either way its an insulator. Suggestions?

Subject: Re: Electricity
Hi -
Another idea....try PVC pipe - that generally works even if it is a bit humid. I have attached some electricity ideas that I did at a NSTA workshop a coupel of years ago.
(Mentor 3)

Subject: Re: Electricity
Wonderful ideas! Thank you so much :)

Some I've picked up from the other Teacher:

Small clear plastic tube sealed on each end with small styrofoam beads in it. As you rub the outside of it you can see them move. If you wrap a piece of tape around it that can move along the pipe you can see them change charge by conduction.

Cover a Van de Graaf machine with a paper ball to represent an "unknown charge" and put a pith ball near it to represent the positive test charge. Helps students see how we get E=F/q and the test charge concept.
(Mentee)

Subject: Re: Electricity
Terrific ideas, (mentee). Thank you for sharing. An idea you might consider, make yourself electronic folders and cut and paste ideas you get into them as you receive them. Then when you need an idea(s) next year or at some later date, check out your folders. I keep such and find it takes only a moment longer than reading to cut and paste ideas into the proper folder.

What are some other ways of organizing teaching ideas so they are readily available? Gina, physics facilitator

In message (mentee) writes:
>Wonderful ideas! Thank you so much :)
>
>Some I've picked up from the other Teacher:
>
>Small clear plastic tube sealed on each end with small styrofoam beads
>in it. As you rub the outside of it you can see them move. If you wrap a

>piece of tape around it that can move along the pipe you can see them
>change charge by conduction.
>Cover a Van de Graaf machine with a paper ball to represent an "unknown
>charge" and put a pith ball near it to represent the positive test
>charge. Helps students see how we get E=F/q and the test charge concept.

Subject: Re: Electricity
Traditional treatment of electricity does not connect static and current electricity very well. Sherwood and Chabay, American Jo. of Physics, 7/2/96 propose a unified presentation which is quite useful. They expand it in thier book, Electric and Magnetic interactions, wiley. One great suggestion in the book is a series of electrostatic experiments done with scotch tape. If you tape a strip on the table, then tape another on top of it, then quickly rip the top one off, you can get a very useful static charge. Students can then compare like charges, and using the original strip, unlike charges, along with other static experiments. Works very well, and is VERY cheap.
(Mentor 1)

Subject: Re: Electricity
Living in San Diego and working about 1/4 mile from the beach humidity is always a problem. Use PVC pipe and fur, but better yet an inflated balloon rubbed against clean dry hair works even better. If you make an X on the side charged (rubbed against the hair) you can test the charged side vs the uncharged side on objects (rolling aluminum cans across a table, diverting water streams from the faucet, attracting paper or styrofoam, making a board balanced on an evaporating dish rotate and so on)

The balloons are cheap and easy to use. YOu will find some kids hair works better than others, dry hair, clean hair, and a clean balloon. My hair is coarse and works fine as the model as it sticks up in all directions after being rubbed - the kids love it.
(Mentor 2)

Subject: Re: Electricity
Is great to read about all the ideas, and solutions to experimental problems. This resembles pretty much the real experimental world and as we all see by identifying the problems and finding solutions there is a lot of content knowledge involved. I jus wonder what would be if after your students do the sucessfull version of the experiment, they try with other materials and try to explain their outcome in those cases.(why work in one case and not in the other...).

Have any one try that?
(Content Expert)

Subject: Re: Electricity
I have been gathering ideas like mad. I tend to print what I can, in color if available and the link, and store everything in page

protectors in subject based binders. It seems insane but as a first year teacher I need that kind of variety because otherwise I get one option of how to do everything. So I have a binder for each major subject (Waves, Electricity, Gravity, Kinematics, etc.) This extra research (thanks mostly to all you guys!) allows me to gain experience and ideas for this year and the next twenty. And to that end I've attached my search results for the night(yes just tonight's!) including an awesome one for leyden jars. And some objectives and misc I like.
(Mentee)

Subject: Re: Electricity
In message (mentee) writes: >I have been gathering ideas like mad. I tend to print what I can, in >color if available and the link, and store everything in page >protectors in subject based binders. It seems insane but as a first year teacher I need that kind of variety because otherwise I get one option of how to do everything. So I have a binder for each major subject (Waves, Electricity, Gravity, Kinematics, etc.) This extra research (thanks mostly to all you guys!) allows me to gain experience and ideas for this year and the next twenty.

You might consider using electronic folders on your computer. I keep several in "My Documents" folder and when I see a great idea, I copy and paste it to the appropriate folder, just like I did with your Leyden jar link. The other attachments you included were likewise good. Thank you, (mentee).

And to that end I've attached my search results for the night >(yes just tonight's!) including an awesome one for leyden jars. And >some objectives and misc I like.

I think the sharing that goes on through people in the eMSS program is one of the strengths of the program. As you said, early service teachers need support and the fact that you're involved here shows how it's a two way street. We mentors learn as much from you mentees as you from us. It's always great to get new perspectives. Keep up the good work. (Gina), facilitator

Subject: Re: Electricity
Thank you (mentee) for sharing with us your search!!
(Content Expert)

Subject: Re: Electricity
Hi (Mentee)
Sorry for the (very) delayed response.

One thing I did not see in the group of responses here is the exploration of the third (and very useful) law of electrostatics: neutral objects are attracted to charged objects (by polarization). I like using a wood meterstick resting on an hour glass (or any other curved (but smooth) object you can find. With a charged rod, you can "walk the stick" and can even stop it by quickly moving the rod to the other side of the stick. I usually preface the demo with "whadya think would have happened if I did this a few hundred years ago?". I actaully do

about 10 demos in the first week of school that show students what science does and doesn't do- and this is one of the demos. When I do it again during static electricity, they are still as amazed as they were the first time they saw it.
Cheers, (Mentor 4)

Subject: Re: Electricity
>In message (mentor 4) writes: Hi (mentee) Sorry for the (very) delayed response. One thing I did not see in the group of responses here is the exploration of the third (and very useful) law of electrostatics: neutral objects are attracted to charged objects (by polarization). I like using a wood meterstick resting on an hour glass (or any other curved (but smooth) object you can find. With a charged rod, you can "walk the stick" and can even stop it by quickly moving the rod to the other side of the stick. I usually preface the demo with "whadya think would have happened if I did this a few hundred years ago?". I actaully do about 10 demos in the first week of school that show students what science does and doesn't do- and this is one of the demos. When I do it again during static electricity, they are still as amazed as they were the first time they saw it.

Thanks, (mentor 4), for responding to (mentee)'s question. I've been trying to find some quantitative way to measure the charge on the Leyden jar and haven't been sucessful. I don't know as there is one but thought there might be.Can you give us a bit more info on the set up for your demo? I think I understand what you mean but am not sure. Thanks, (Gina), facilitator

Subject: Re: Electricity
Hi (Gina)

1) Balance a meterstick on a curved surface such as an hour glass facing down. Be sure there are no obstacles around. Then with a charged amber rod or glass (plastic) rod- bring it near but do not touch one end of the stick. The stick will begin to move towards the rod, it will accelerate towards the rod! The best way to stop it is to move the rod to the opposite side- this will slow it and eventually change its direction. You can do this reversal many times. Asking about what would have happened if done 350 years or more ago if performed, and why, provides interesting conversations about what is and what isn't science.

2) I don't know much about finding a quantitative value for these Leyden jars- but when I have charged film-can leyden jars as a demo- I once had a group of students who did the "same thing" with a large plastic container- such as one that can contain 300 or so wafer Vitamin C's, and instead of using a paper clip, they used a large nail, at home. One of the kids came in showing me the blister on his fingers!!!
Cheers (Mentor 4)

Subject: layden charge
how about the deflection of an electroscope?
(Mentor 1)

Subject: Re: layden charge
I think that you could have here a great callibration activity.Built different Leyden jars (by changing the thicknes of the inside/outside foil you could
get different sparks' intensity). Then use the electroscope and by measuring the deflection of the hanging foil leaves you could assign a relative charge to each jar. Will be great to do a graph of deflection vs. thickness of foil jar, and try to explain the results.

How do you integrate the demo of the Lyden jars with the curriculum?
Thanks, (Content Expert)

APPENDIX B

eMSS DESIGN PRINCIPLES

Appendix B

Table 1
eMSS Design Principles

Each eMSS on-line or face-to-face learning experience will be explicitly designed to:

1. Meet one of the "Central Tasks of Learning to Teach" (Feiman-Nemser, 2001) for mentees (preservice or induction level), or mentors (continuing professional development level).[1]

2. Incorporate one or more essential outcomes selected by eMSS from the NSTA Standards for Teachers of Science (adapted from NCATE, INTASC and National Board Certification standards).[2]

3. Build upon relevant research as well as national guidelines or standards in these areas: (a) science and mathematics education; (b) teacher education, especially for early career teachers; and (c) supporting the learning of diverse student populations.

4. Strengthen beginning teachers and mentors' understanding of science and mathematics content and pedagogical content knowledge.

5. Build participants' sense of belonging and actively contributing to a professional learning community of science or mathematics teachers.[3]

6. Foster reflection on *classroom practice* or *mentoring practice* by providing participants with frameworks or models of good practice, along with opportunities to do reflection (individual, pair, small group).

7. Build participants' ability to act intentionally in their *classroom practice* or *mentoring practice*. Examples of strategies include regularly involving participants in examining and adapting their practice in light of research, standards, student work or data.

8. Provide and focus upon one or more shared experiences, for example, a reading, video, student work or data.

9. Promote individual or group growth through dialogue focused on the shared experiences.[4]

10. Elicit and respond to participants' current interests and concerns.

11. Respect participants' time constraints.

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[1] See eMSS Table 2 Central Tasks of Learning to Teach Science and Mathematics
[2] See eMSS Standards for Teachers of Science Matrix as adapted for Year 1-3 teachers at the project's Chicago planning meeting, June, 2003.
[3] See eMSS Table 3 Guidelines for A Professional Learning Community
[4] See eMSS Table 4 Guidelines for Online Learning and Facilitation

eMSS Design Checklist

Design Principles Addressed	**Mentee**	**Mentor**
1. Which Central Tasks of Learning to Teach (Table 2) are addressed?		
2. Which "essential outcomes" from NSTA Standards for Teachers of Science (abridged Chicago version) are addressed?		
3. Describe the foundations for the content or design selected in *(a) the research literature* *(b) national guidelines/standards*		
4. How does the module/activity address *(a) science or math content?* *(b) pedagogical content knowledge?*		
5. How does the module/activity promote the development of a learning community (Table 3)?		
6. How does the design promote *reflection* on classroom or mentoring practice?		
7. How does the design foster *intentional action* with respect to classroom or mentoring practice?		
8. What shared experiences are provided or highlighted?		
9. How is dialogue around shared experiences promoted?		
10. What evidence is there that the content is relevant to participants' current interests and concerns?		
11. Is the design optimal given participants' time constraints?		

Table 2

Central Tasks of Learning to Teach Science and Mathematics

Preservice	Induction	Continuing Professional Development
P1. Examine beliefs critically in relation to vision of good teaching	I1. Learn the context -- students, curriculum, school, community	C1. Extend and deepen subject matter knowledge
P2. Develop subject matter knowledge for teaching	I2. Design responsive instructional program	C2. Extend and refine repertoire in curriculum, instruction and assessment
P3. Develop an under-standing of learners, learning, and issues of diversity	I3. Create a classroom learning community	C3. Strengthen skills and dispositions to study and improve teaching
P4. Develop a beginning repertoire -- instruct. strategies -- curriculum	I4. Enact a beginning repertoire	C4. Expand responsibili-ties and develop leadership skills
P5. Develop the tools and dispositions to study teaching	I5. Develop a profes-sional identity as a science or math teacher	C5. Become an active and contributing member in a professional community or network

Adapted from Feiman-Nemser, S. (2001). From preparation to practice: Designing a continuum to strengthen and sustain teaching, *Teachers College Record, 103,* pp. 1013 – 1055.

Table 3

eMSS Guidelines for A Professional Learning Community

Each eMSS on-line or face-to-face learning experience will be explicitly designed to foster these features of a professional learning community:

1. *Mutual engagement* in working to achieve agreed upon goals. While individual competence and contributions cannot be ignored, the emphasis is on collective competence and action.

2. *Joint enterprise* that is not static but continually negotiated by members of the community, taking into consideration current needs, conditions and available resources. Although this enterprise may be influenced by individual participants, or outside mandates or prescriptions, it may never be fully determined by such forces.

3. *A shared repertoire* including a common vocabulary and ways of interacting that are produced or adopted by the community over time.

4. *Formation of group identity,* including the patterns and norms for interaction that become part of the community's shared repertoire.

5. *Communal responsibility for individual growth,* including recognition by all members that they are key contributor's to one another's professional growth.

Table 4

Guidelines for Online Learning and Facilitation

A central goal of eMSS is to promote reflection, conceptual growth and change, and improvements in professional practice through rich online dialogue. We believe that online learning environments, when carefully designed and moderated by trained facilitators, can be singularly effective places for meaningful dialogue leading to teacher growth, accompanied by changes in classroom practice and student learning gains.

Through systematic design and facilitation, eMSS online experiences will:

1. Promote rich dialogue building on the varied roles and strategies described in *Facilitating Online Learning*,[5] and other relevant literature.

2. Focus this dialogue on the project's core themes, especially growth in knowledge of science and mathematics content, pedagogical content knowledge, and effective strategies for working with diverse learners.

3. Involve designated, trained facilitators, and the participants themselves, in fostering meaningful dialogue. In other words, engage the entire community – mentors, mentees, scientists mathematicians, lead teachers from the disciplines, and project staff – in sustaining and ensuring the quality of the online dialogue.

4. Create a culture of "contributing community members" who model effective participation by logging on frequently and contributing in ways that further other members' knowledge, resources, and professional practice.

5. Institute strategies to promote *conceptual growth and change* in an online environment, making use of relevant literature.[6]

6. Purposefully pilot and monitor principles and strategies for promoting *change in classroom practice* through distance learning, an area in which eMSS can assume a pioneering role for the field.

7. Use dialogue intentionally to further beginning teachers' *progress along a professional continuum* from survival to focused problem solving to critical reflection on teaching practice,[7] another area in which eMSS can play a pioneering role.

8. Foster participants' sense of belonging to an online learning community that adds value to their professional and personal lives, building on the approaches described in *Building Learning Communities in Cyberspace*[8], and other relevant literature.

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[5] Collison, G., Elbaum, B., Haavind, S., & Tinker, R. (2000). *Facilitating online learning: Effective Strategies for Moderators.* Madison, WI: Atwood Publishing.

[6] For example, Gunawardena, C.N., Lowe, C.A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing, *Journal of Educational Computing Research 17*(4), 397-431.

[7] Stansbury, K., & Zimmerman, J. (2002). Lifelines to the classroom: Designing support for beginning teachers. A WestEd Knowledge Brief. San Francisco, CA: WestEd.

9. Systematically elicit information about participants' varying goals, needs, local contexts and constraints, and adapt online offerings – including activities and resources – accordingly.

10. Regularly assess the quality and impact of the online experiences, involving participants and staff in ongoing self evaluation of their contributions.

11. Vary group size, providing opportunities for pair, small group and whole group dialogue.

12. Rotate role assignments. For example, provide mentees with opportunities to assume to role of "experienced expert," as well as chances for mentors, content experts and project staff to assume the role of a learner. Regularly engage participants in helping to facilitate the online dialogue.

13. Provide clear instructions about online expectations and time requirements. Build in feedback mechanisms allowing the project to make adjustments quickly when the demands become too high or inflexible.

14. Design facilitator roles and responsibilities to balance quality with scalability.

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[8] Palloff, R., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the on-line classroom.* San Francisco: Jossey-Bass.

APPENDIX C

SUBJECT CONSENT FORM

Appendix C

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY

Project: An examination of the effect of facilitation training on the development and practice of participants in an online induction program for teachers of science and mathematics.

You are being asked to participate in a research study of the effectiveness of training in facilitation on the development and practice of participants in the eMSS induction program for teachers of science and mathematics. This study will help understand how the social nature of learning can be facilitated in a distance environment by the intentional design and development of online program facilitators. You have been chosen because you have completed the summer 2005 advanced training institute and will participate in the program during the 2005/2006 year as a facilitator and/or advanced mentor.

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 and responses from the pre and post training surveys will be examined for understanding of the importance of social/dialogic learning. We will look at messages and written responses to see what changes in practice, either as a facilitator or as a mentor, result from the online summer institute, practice and experience, and from ongoing training and support throughout the school year.

2. One interview will be conducted by this researcher with you. The interviews will be conducted in spring of 2006. 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 development.

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 and professional development. Participating in this study may also provide you with new ideas about online learning 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 online experiences in the eMSS program.

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:

   Peggy Taylor, 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 – Institutional Review Board Chair, 960 Technology Blvd., Room 127, Bozeman, MT 59717. For information and assistance, call 406-994-6783.

Your signature below indicates your voluntary agreement to participate in this study.

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Participant's Signature _____ Date _____

APPENDIX D

ADVANCED MENTOR INSTITUTE CURRICULUM

Appendix D

Week One of Advanced eMSS Institute

Week One Objectives:

- To gain skills in building online strategies for developing strong online communities
- To gain skills and strategies in leading and advancing online discussions
- To discuss eMSS philosophy
- To review roles of mentors, facilitators, mentees, and content experts
- To plan strategies for advancing mentees practice

1st Posting – Group Members (posted by staff)

(Here we'll want to post group numbers and members along with the group discussion leaders' names.)

Note to discussion leaders: Throughout this institute, we will want to model effective strategies for leading in an online environment. As you know, one of the best ways to encourage participation in online forums is to make the participant feel comfortable. Participants in this institute are experienced in WebCT and already comfortable with the program. However, getting to know one another is a very important part of the initial activity, both in this institute and in the various discussion areas of the program, especially as we continue to grow. The prompt below is a suggestion of an initial activity, not only to help folks get to know one another, but also to get them to reflect on their online experiences so far in the program – feel free to substitute something else you have found to be an effective introduction.

2nd Posting – Welcome (posted by discussion leaders)

Welcome group (one)! We're glad to have you as leaders in this project and we hope to make your roles in the program more effective and enjoyable through participation in this institute. We know that feeling comfortable and safe is extremely important in building a community in which all participants are willing and eager to share their experiences and appreciate and explore others' ideas and experiences. One of the best ways to begin to facilitate this "safety" is by getting to know the members of the discussion group. So with that in mind, let's introduce ourselves. Please tell us your name and where you're from, your past and/or anticipated leadership role in the program (facilitator, facilitator-to-be, advanced mentor, content expert, discussion leader, etc.), one of your most memorable online experiences in the program so far, and one of your greatest online frustrations. Be sure, also, to respond to each other's posts. Remember, by helping to

make our participants comfortable "talking" in the introductory portion of the program, it's much easier to talk later.

Note to Discussion Leaders: At this point you should begin the process by telling about yourself. This provides a model for participants to follow making it much more comfortable for them to jump in. You may also want to respond privately with a personal message to each person in your group – a welcome and a thanks, perhaps, for getting the group going – remember that a private message now and then is a very effective way of motivating participation. This would provide a nice model for these facilitators and advanced mentors.

3rd Posting – Your Role (posted by discussion leaders)

In Facilitating Online Learning, our guiding text in this institute, Collison et al. discuss several key facilitator roles in chapter three (pp. 33 – 75). Which, in your program role, do you most associate with and why? What are some guidelines given that might help you in accomplishing this role?

Note to Discussion Leaders: This starter (and its associated reading assignment) will help participants become aware of the many roles that a facilitator/instructor/leader can play and get them thinking about their responsibilities in these roles. It's likely that participants will see themselves playing a combination of several roles. Their introductions to the guidelines associated with each role will help them begin to develop the "facilitator attitude" – that the various strategies that we use as facilitators can be used to develop an inviting and safe environment in which we can steer participants into essential reflection and learning. In other words, we can play a huge role in the quality and direction of their growth.

4th Posting – Common Goals (posted by discussion leaders)

In this institute, we have a variety of leadership roles (*summarize those from the welcome responses -- content experts, facilitators, advanced mentors, etc.*). While the tasks of our individual roles may be somewhat different, we have some common goals. After looking over the "Principles of Effective Moderating" (pp. 5 – 15) in Facilitating Online Learning and Table 4 from the eMSS Revision Guideline Tools (posted in the resources section), what are your thoughts on what these common goals may be and how they might be accomplished?

Note to Discussion Leaders: We hope in using this prompt that participants discover that our common goal of building an effective online community of support and learning must occur in this program through the social interactions of participant dialogue. Hopefully – and they may need "steering" at this point – they will realize the importance of these social interactions and quality dialogue in this type of environment.

5th Posting – New Challenges (posted by discussion leaders)

In this program, our learning and growth takes place through our written dialogue in a distance environment. As discussion leaders, facilitators, and mentors, this presents new challenges (*discussion leaders may want to summarize some of the frustrations mentioned earlier in the welcome responses here).* Reflecting on your experience as a leader/facilitator in face-to-face environments (i.e. the classroom) and on your experience so far in this program, what are some differences we face that make the role challenging in an online environment? What are some thoughts on how to deal with these challenges?

Note to Discussion Leaders: This experienced group should be able to come up with a nice group of challenges – getting people online, getting them to post, wording questions adequately, building trust without facial expressions, getting the message across without being able to use hand gestures or voice, making writing "friendly", catching misconceptions quickly, etc. etc. etc.

6th Posting – Start–Steer–Summarize (posted by discussion leader)

Throughout our discussions this week, we have modeled our program theme of "Start–Steer–Summarize". What does each word of this theme mean to you? What implications does the theme hold for you as a leader in the program?

Note to Discussion Leaders: Included in our tasks as implementers and facilitators of this institute are to emphasize and model our theme. We have posted several "starts" this week – questions/comments that get the thought processes and conversations going. Generally we don't have too much problem with starts in the program, even among mentees. The steering process should be somewhat self-directive – participants should be posting their own ideas but you may need to keep them on track with the goals and intentions of the discussion thread and the program. At the end of a couple of days, the natural end of a discussion thread, or at other opportune times (as seen throughout this week), the summarizing process will bring together themes, patterns, ideas, and remaining questions into one place for participants to view and reflect upon. This task is the responsibility of the discussion leader, whether the facilitator of a group or the mentor in the Pair Place. One of the goals of the program is to help our mentees develop into reflective and responsive practitioners – the more that we can model this, the better.

Note to the Discussion Leader: The week-end reflections may be too extensive as written for our groups to complete without being overwhelmed. We'll discuss these among ourselves in the discussion leader forum toward the end of each week and decide which might be more important to give to participants considering the week's discussions. We may want to assign a couple of them then give them a choice of others.

Self-Reflection Week One

The self-reflections aren't meant as assignments where the questions have a "right" answer, but rather as a tool to help you to think about the past week's discussions and their implications in your practice as a leader in this program. Please feel free to comment, provide some of your ideas, and ask questions related to the past week's discussions.

1. What do you see as the three strongest factors that facilitators (discussion leaders, advanced mentors, content experts, and module facilitators) can build into their discussions that will help to build strong online communities?

2. Look back through the past week's discussions. Select an example of each of the three parts of our theme "Start–Steer–Summarize". Explain why you chose each example. Which of these three processes do you consider to be the most challenging as a leader in the program? Please explain.

3. Select one of your posts from early in last year's program (or create a good introductory post). Explain in what ways the post is appropriate for the online environment. What strategies did you use to accommodate the post for an online discussion?

4. Select one of the discussion threads from the past week. Practice writing a summary of the discussion that you might post for participant reflection and review if you were the acting facilitator/discussion leader. In summarization, you would want to break out themes and/or patterns under which to list ideas that were discussed. Be sure to identify any questions that remain unanswered.

5. A good book dealing with formative assessment is Angelo & Cross's book, Classroom Assessment Techniques (CATS). The book contains hundreds of quick techniques for assessment of learners, many of which we believe can be adapted for use online. One of them, with which many of you are already familiar, is the muddiest point … a topic or point on which you might not be clear. Some of our goals last week were

   Getting to know each other and involving participants
   Strategies for building online communities
   Responsibilities of leading in an online community
   eMSS Philosophy

Roles of program facilitators, content experts, and advanced mentors

Considering these topics, what is your muddiest point?

Week Two of Advanced eMSS Institute

Week Two Objectives:

- To gain skills in building online strategies for developing strong online communities
- To gain skills and strategies in leading and advancing online discussions
- To gain skills and strategies for introducing, maintaining, and deepening online dialogue
- To discuss eMSS philosophy

1st Posting – Program Changes (posted by discussion leader)

In response to participant feedback, there have been some significant improvements in the program. As a leader (regardless of your role), it will be important for you to be familiar with these changes. You will find a summary of these changes in two different drafts. The first (attached to this message), "WebCT Organizer Pages", is a graphic overview of what you'll see on the site in the coming year. The second (in the resources folder on the homepage), "Welcome to eMSS," is a text description of the various program areas and activities. Take a look at these drafts – what changes do you see for the coming year? What impact on the program do you feel will result from these changes?

Note to Discussion Leader: You'll want to make sure that participants identify two major changes: Dilemmas and Inquiries. While participants should become very familiar with Dilemmas in our practice this week, make sure they are aware of the plan, practice, and reflect components of the process for Inquiries. You may want them to look over the reflection template and even practice with it at some point this week.

We'll probably want to spread out the following two Dilemmas (2nd posting and 3rd posting) across this second week after participants have had a day or two to respond to the 1st posting. This can be done while concurrently running the other topics for the week (4th – 6th postings). Feel free to substitute with a scenario you think might be of particular interest to participants.

2nd Posting – Dilemmas (posted by discussion leader)

One of the changes that you have identified in the program is the use of Dilemmas. These will be geared toward issues important to beginning teachers as can be seen in the "Introduction to Dilemmas Draft" (posted in the resources area). So that we can all get some practice and experience in the use of dilemmas that will help us lead and facilitate

in those areas, let's try working with one or two specific to issues that we may deal with as leaders in various discussion areas.

Here's one:

You have a participant who has been monopolizing the discussion topic by posting several times for each post. She even replies to her own posts. She responds to a question with a wrong answer. In your previous contacts with this individual, you found her to be very defensive and argumentative. Given your role in the program (advanced mentor, content expert, facilitator, or discussion leader) what might your action be?

Note to Discussion Leaders: As you should always encourage participants to respond to each other, which will help to foster true reflection on the issue. After you have received a significant number of responses to this dilemma, you will probably want to summarize their ideas, providing participants not only with a convenient list of strategies for dealing with this situation, but also with a model of how and when to summarize. Though none of these strategies is the "sole" solution, and hopefully they will realize that solutions are specific to the situation, participants will begin to fill their "bag of tricks" for use in practice.

3rd Posting – Another Dilemma

You have a participant with whom you have had a difficult time getting to participate in the content module. He is finally online and posting. He has made a post responding to a content question and in the posting you detect a misconception and lack of understanding of the content material. Given that you don't want to undo all of your good work in getting this person to participate, what might your action be?

Note to discussion leaders: You might take this a step further and ask participants what action they might have taken initially to get the participant involved … as you well know this is a challenge for all of us … the effort would be well spent.

Below is an alternate or additional dilemma that can be used if time and/or interest permits:

As a scientist on the project, you experience a lack of questions or discussions in your area. Many participants offer factual information but there is not a lot of open discussion of theoretical topics. You understand that many first year teachers are overwhelmed and that they are concerned primarily with getting answers to tomorrow's topic and have little time for broader concepts and discussions. As a content expert, how can you better serve the need of the teachers in your discussion area OR as a facilitator

how might we help mentees engage in meaningful dialogue pertaining to content enrichment?

4th Posting – Forms of Dialogue (posted by discussion leaders)

In chapter two (pp. 17 - 32) of Facilitating Online Learning, Collison, et al., identify three forms of dialogue: social dialogue, argumentative dialogue, and pragmatic dialogue. What are your thoughts regarding these forms of dialogue and how they might affect the learning and growth in the eMSS program? Have you observed what might be other types of dialogue through your experience in the program? If so, tell us about them. Let's begin thinking about what might be quality characteristics of dialogue for our eMSS program.

Attached are several online conversations. Determine the type of dialogue (social, argumentative, and pragmatic) for each and the resulting effect on the direction of the discussions. Is it where we might want the conversation to go? Why or why not?

Note to Discussion Leaders: One type of dialogue that we see in the program not included in any of Collison's three forms is "informational" i.e., technical questions, questions/comments about assignments, questions/comments about the site, the program, etc. Though not covered by Collison's three forms, informational dialogue is very important, especially online. If participants don't identify it in their discussion, you may want to steer them there because it is something that we like to manage as facilitators so that it doesn't "clutter up" the discussion areas and become a source of frustration for participants.

5th Posting – Steering Practice (posted by discussion leaders)

Let's use the conversations attached to the previous message (attached again here) to practice a little "steering". After reading and reflecting on chapter six (pp. 127 – 164) of Collison et al., take one of the conversations and identify an alternate "desired" direction. Where (or how) would you have liked the conversation to go other than where (or how) it went? Where might you step in as a leader/facilitator and how might you re-direct the conversation to improve the outcome/learning/growth? Be sure to give your thoughts on others "re-direct" attempts. This is really good, practical practice for your leadership responsibilities in the coming year's program.

6th Posting – From Survival to Reflection (posted by discussion leader)

At the following URL, you will find an article that introduces a continuum of beginning teacher support, which goes from a state of "survival" (we've all been there) through specific task support and into the development of a reflective classroom practitioner.

http://www.wested.org/online_pubs/tchrbrief.pdf

Obviously, one of our goals should be to further the mentees status along this continuum while providing survival and specific task support as needed. Please look over this article (especially pages 4 - 5) and then randomly choose ten messages from last year's program. After considering the location of each message along this continuum, where do you think we are on the average as a program? Are we meeting the "survival" needs of the mentee? Are we meeting specific task needs? Are we fostering the development of a reflective practitioner? Where do our participants tend to be on the average? What can we do as program leaders to foster a greater emphasis on becoming a reflective, responsive practitioner while continuing to meet the needs at the other end of the continuum? Take one of your randomly chosen messages and work to improve it in these terms. Post the original message and the improvement for others to comment on. Now, how might we as facilitators/leaders foster the kind of improvement in dialogue that will lead to the development of reflective, responsive classroom practitioners?

Note to Discussion Leaders: As you can see, there is a lot in this last post. You may want to break it up into parts throughout the week as you see fit, or save it for the end of the week so participants have the weekend to respond and reply. You may want to give an example of a post, determine its status along the continuum, and how the post might be changed to provide support yet further the movement along the continuum.

Note to Discussion Leaders: Before posting the self-reflection for week two, let's be sure to discuss which questions are appropriate considering the week's discussions. We don't want the task to be too overwhelming.

Self-Reflection Week Two

1. In your opinion, what is the most significant improvement in the coming year's program (use the drafts posted in the resource section to review changes). How do you think participants will be affected by this change?

2. Create a dilemma to be used in your area of the program next year (content area, discussion area, inquiry, or even pair place).

3. "Lurker" is an accepted term for a person who reads posts in online programs but fails to post messages. What are your thoughts on:
    a. the importance of increasing lurkers' participation?

b. what action we might take to encourage them to post?

4. Another Classroom Assessment Technique (CAT) – The One Sentence Summary. In one sentence, summarize your idea of quality dialogue. In another sentence, summarize the importance of quality dialogue in the program.

5. Finish the following thought:

   Facilitation is like teaching because …

Week Three of Advanced eMSS Institute

Week Three Objectives:

- To gain skills in building online strategies for developing strong online communities
- To gain skills and strategies in leading and advancing online discussions
- To gain skills and strategies for introducing, maintaining, and deepening online dialogue
- To gain skills and strategies for identifying high quality online dialogue

Note to Discussion Leaders: You will probably want to summarize the characteristics of quality dialogue that participants identified in last weeks discussions. We can build on those to understand the HRI rubric used in the 1st Posting.

1st Posting – Dialogue Analysis (posted by discussion leaders)

This week, we'd like to include some current literature regarding online facilitation of dialogue. First, the attached dialogue rubric comes from Horizon Research Institute. It has been created specifically to look at dialogue in the eMSS program. As you look this over, what characteristics of dialogue quality, identified by this group last week, are incorporated into this rubric? What is included that we didn't think about? Is there anything that you feel is missing in the rubric?

Try taking one discussion thread from one of the first two weeks in this seminar and determine where the discussion is according to the attached HRI rubric. Where would you rate the chosen discussion? Based on your experiences in the eMSS program, what comments or observations do you have regarding this rubric? How might we use the knowledge of this rubric to contribute to the improvement of dialogue in our program?

2nd Posting – Online Chemistry Modules (posted by discussion leaders)

Attached is a PDF file that contains an article from the Journal of Chemical Education titled "Online Chemistry Modules: Interaction and Effective Faculty Facilitation". It's interesting to see how they coded messages and tracked participation, etc. What do you see as major findings in this research that may have implications for us as facilitators/leaders in our program?

Note to Discussion Leaders: Possible responses to this activity might include: maintaining an active online presence by regularly posting messages, monitoring participant progress and acknowledging their achievements, encouraging participants to

track their progress through modules (inquiries, etc.), summarizing previous posts, weaving them together and pointing out discrepancies, challenging participants reasoning, etc.

3rd Posting – Deepening the Dialogue (posted by discussion leaders)

Our Facilitating Online Learning text discusses three critical-thinking strategies that help to push online dialogue to new areas (beginning on p. 140):

Full –spectrum questioning
Making connections
Honoring multiple perspectives

What might be some applications or uses for these strategies in deepening our dialogue in our fall eMSS discussion areas? From your past experiences in on-line facilitation is there one of these that you found more helpful, more applicable, or more challenging?

Note to Discussion Leaders: In bringing the institute to closure, the following post helps participants compile newly learned strategies with new (and existing) changes in the program in order to reflect on what will be beneficial to them in their respective roles in the coming year's program.

4th Posting - Healthy Online Communities (posted by discussion leaders)

In chapter four of Facilitating Online Learning, Collison et al., discuss the characteristics of healthy online communities (pp. 77 – 99). Please think about the features and practices of our eMSS program, especially the changes made for the coming year (review the materials in the resources section). Select several program features and practices that you believe contribute to the development of a healthy online eMSS community. How and why do you believe these features/practices are beneficial? What changes can you make in your practice as a facilitator/leader/mentor to encourage the development of a healthy online community?

Note to Discussion Leaders: Before posting the self-reflection for week three let's be sure to discuss which questions are appropriate considering the week's discussions and for bringing the institute to a closure. We don't want the task to be too overwhelming. Again, we may want to give them a choice.

Self-Reflection Week Three

Note to Discussion Leaders: There are many past conversations in the program that can be used in the following self-reflection. Feel free to substitute any good conversation in

which you feel there are "facilitation" points to be made and/or on which you would like to get feedback.

1. Please look at the following example of program dialogue. What are your thoughts in terms of quality specific to our program? Considering the HRI rubric that we looked at earlier this week, how might you help participants in this conversation improve the level of dialogue?

a. as a participant
b. as a facilitator, **or**
c. as a content expert

Effective Labs Conversation

Posted by Mentor
My Lab memories.

Of course there are very few from elementary and middle school. I remember a project I did on pulleys that my dad helped me with.

High school wasn't much better. I remember we had nice lab facilities at my high school but I don't remember using them much. In biology I remember dissection and in physics I remember many projects we made. Glider, kite, egg drop, etc.

My major lab experiences came from college and it is what I base the experiences in my class on. I remember my assigned lab groups and getting to know them while we worked together. I remember have specific assigned tasks and working together to get them done in the allotted time. For me PCR and electrophoresis were very cool as well as physiology lab where we experimented on ourselves a lot.

It seems like the things I really took ownership with are the things I remember the most. Interesting.

Posted by Mentee
I feel that was what I got out of my reflection too. When I was responsible for myself and my group – or when my students are responsible for their own success and I just stand back and let them learn to apply – then I notice a difference. I can understand why some teachers don't provide experiences like that—because sometimes it takes more work planning for lessons when it is up to the students and not to the teacher.
P.S. I don't subscribe to book work/lectures. But I have heard many teachers say it is just easier to do that than to put so much time into planning activities that they don't have as much control over the outcome. What I have learned is that if students (myself included) don't have a chance to "own it" then they don't really remember.

Posted by Mentor
Wow, what a great reflection and observation! It kills me ho hear about the other teacher's philosophies. You really have the right attitude for teaching. I would rather spend time planning for a lab, or researching a new lab than assigning and correcting bookwork. Grading is my last priority, I do it because we have to for grades but the experience of learning in the classroom is much more powerful and the more I enrich that the better for my students. From the things that you have mentioned I can tell that you also feel the same

and put that effort into your classes. I continue to think that an enthusiastic "new" teacher is much more valuable than a stuck in a rut "experienced" teacher.

End of Thread

2. Considering our dialogue on deepening discussion posts and improving dialogue quality, what are the three most important ideas in terms of your future facilitation/leadership work?

3. Another Classroom Assessment Technique – Invented Dialogue. By inventing dialogue, students synthesize their knowledge of issues, personalities, and historical periods into the form of a carefully structured, illustrative conversation. Invent a dialogue for the following scenario:

You are placed in charge of facilitating a module. Of your group of 8 pairs, you have four pairs who log in and contribute to the discussions regularly. There are 3 other mentors online but everyone else hasn't "appeared". You check with program staff and find out that these folks have been "lurking" in the module but not posting. Write a message to post to the group that would encourage the invisible participants to contribute to the discussions.

4. What are your three biggest aha moments from your participation in this program? What do you think will be your biggest challenge as a leader in the coming year's program?

5. Considering all that you've been exposed to in this institute over the past three weeks, your experience with the program so far, and your interests and talents, please explain which leadership role (leader of a small group, discussion leader for a larger group, leader in a content area, content are facilitator, inquiry facilitator, etc.) you would feel best prepared for in the coming year's program?

APPENDIX E

PARTICIPANT SURVEY

eMSS ADVANCED SUMMER INSTITUTE

Appendix E

Participant Survey
eMSS Advanced Summer Institute

1. Is this your first, second, third, or fourth year in the eMSS program? (circle one)

First Second Third Fourth

2. What was your role in the 2004/2005 eMSS program? (circle one or more)

Mentor Discussion Leader/Facilitator Content Specialist None

3. How many complete years have you taught? (circle one)

3-5 5-10 10-15 15 +

4. How many complete years have you taught science or math? (circle one)

3-5 5-10 10-15 15 +

5. Are you currently teaching science or math? (circle one or both)

Science Math Neither

6. Have you ever mentored beginning teachers in a face-to-face environment?(circle one)

Yes (how many mentees? ____) No

7. Did you participate in the eMSS August 2004 online facilitator training? (circle one)

Yes No

8. Did you participate in the fall 2004/spring 2005 ongoing eMSS facilitator discussion forum? (circle one)

Yes No

9. My background and experience in online educational work is (circle one)

Inexperienced Moderate Experienced

For 10 – 21 please circle the number that best represents your agreement with each of the following statements.

Strongly disagree (1) Disagree (2) Neutral (3) Agree (4) Strongly agree (5)

10. I can contribute to the growth of beginning teachers through online dialogue in the eMSS program.

strongly disagree strongly agree

1 2 3 4 5

11. A focus on improving dialogue quality is important for the eMSS program.

strongly disagree strongly agree

1 2 3 4 5

12. I understand what it means to post a "quality" message online.

strongly disagree strongly agree

1 2 3 4 5

13. I make an effort to compose posts that are "quality".

strongly disagree strongly agree

1 2 3 4 5

14. I find myself posting messages of higher quality more frequently than when I began the eMSS program.

strongly disagree strongly agree

1 2 3 4 5

15. I compose message posts in such a way that others are encouraged to respond.

strongly disagree strongly agree

1 2 3 4 5

16. I get more responses to my messages now than when I began the program.

strongly disagree				strongly agree
1	2	3	4	5

17. When I compose a message I think about the effect it will have on others in the eMSS program.

strongly disagree				strongly agree
1	2	3	4	5

18. I believe the quality of my messages has improved since beginning the eMSS program.

strongly disagree				strongly agree
1	2	3	4	5

19. I have noticed an improvement in message quality on the eMSS site during the time of my involvement.

strongly disagree				strongly agree
1	2	3	4	5

20. Building participants' science or math content knowledge is an important theme for program messages.

strongly disagree				strongly agree
1	2	3	4	5

21. Developing science or math teaching skills is an important theme in program messages.

strongly disagree				strongly agree
1	2	3	4	5

Please respond to the following four open ended questions.

22. What features should be included in a quality eMSS message? (please rate your choices in order of importance)

23. What is your opinion of the importance of dialogue in the online environment?

24. What can you do as a participant in this program's online environment to improve the growth and development of beginning teachers?

25. What can you do as a participant in this program's online environment to foster a learning community of new and experienced professionals?

APPENDIX F

PARTICIPANT SURVEY

eMSS FALL 2004 INSTITUTE

Appendix F

Participant Survey
Facilitating the Improvement of Dialogue by Participants
eMSS Fall 2004 Institute

1. What is your role in the eMss program? (circle one or more)

Mentor Mentee Content Specialist Facilitator

2. How many complete years have you been teaching? (circle one)

0-2 3-5 5-10 10-15 15 +

3. How many complete years have you been teaching science or math? (circle one)

0-2 3-5 5-10 10-15 15 +

4. Are you currently teaching science or math? (circle one or both)

Science Math

5. Did you attend the summer 2004 eMSS institute in Billings? (circle one)

Yes, all sessions Yes, some sessions No

6. Did you participate in the eMSS August 2004 online facilitator training? (circle one)

Yes No

7. Are you currently participating in the ongoing eMSS facilitator discussion forum?

Yes No

8. Is this your first or second year in the eMSS program? (circle one)

First Second

For 9 – 15 please circle the number that best represents your agreement with each of the following statements.

9. I understand what it means to post a "quality" message online.

strongly disagree				strongly agree
1	2	3	4	5

10. I am careful to compose posts that are considered "quality".

strongly disagree				strongly agree
1	2	3	4	5

11. I spend time thinking about writing my messages.

strongly disagree				strongly agree
1	2	3	4	5

12. I find myself posting messages of higher quality more frequently.

strongly disagree				strongly agree
1	2	3	4	5

13. I compose message posts in such a way that others are encouraged to respond.

strongly disagree				strongly agree
1	2	3	4	5

14. I believe the quality of my messages has improved since beginning the program.

strongly disagree				strongly agree
1	2	3	4	5

15. I notice more messages of higher quality in the past several months.

strongly disagree				strongly agree
1	2	3	4	5

16. Please briefly describe the components of what you would consider a quality message for the purposes of the eMSS program.

APPENDIX G

SURVEY ITEM MATRIX

Appendix G

Item Matrix
Participant survey
eMSS Advanced Summer Institute

Objective of Training	Associated Survey Questions	Associated Survey Questions
Gain skills and strategies in developing online communities.	11. A focus on improving dialogue quality is important for the eMSS program. 15. I compose message posts in such a way that others are encouraged to respond. 16. I get more responses to my messages now than when I began the program. 17. When I compose a message I think about the effect it will have on others in the program.	25. What can you do as a participant in this program's online environment to foster a learning community of new and experienced professionals?
Gain skills and strategies in introducing, maintaining, advancing, and deepening online dialogues.	14. I find myself posting messages of higher quality more frequently than when I began the program. 15. I compose message posts in such a way that others are encouraged to respond. 18. I believe the quality of my messages has improved since beginning the program. 19. I have noticed an improvement in message quality on the eMSS site during the time of my involvement.	23. What is your opinion of the importance of dialogue in the online environment?
Gain skills and strategies in analyzing and identifying high quality online dialogue.	12. I understand what it means to post a "quality" message online. 13. I make an effort to compose posts that are "quality". 18. I believe the quality of my messages has improved since beginning the program.	22 What features should be included in a quality eMSS message?

Disposition that they can help to advance the professional practice of beginning teachers of science and mathematics.	10. I can contribute to the growth of beginning teachers through online dialogue in the eMSS program. 20. Building participants' science or math content knowledge is an important theme for program messages. 21. Developing science or math teaching skills is an important theme in program messages.	24. What can you do as a participant in this programs' online environment to improve the growth and development of beginning teachers?

APPENDIX H

INTERVIEW QUESTIONS

Appendix H

Interview Questions

1. Can you tell me a little bit about your involvement in education? What is your background in using the computer to deliver content information? Can you tell me about your experiences with any distance education/communication of which you have been a part?

2. Describe your role(s) in the eMSS program.
   How do you view the responsibilities of each role? How did you find out about these responsibilities? How do you view the similarities and differences of each role?

3. What parts of your work as a facilitator have carried over into your work as a mentor?
   What parts of your work as a mentor have carried over into your work as a facilitator?
   What parts of your work as a program participant have carried over into your work as a teacher?
   What parts of your work as a teacher have carried over into your work as a program participant?

   (Probe for examples of the above)
   Which of the above would you say is most valuable to you and why?

4. How do you feel you have grown in your practice as a facilitator?
   Which components of training have been most beneficial in improving your practice as a facilitator?
   Least beneficial?
   Describe how the summer training affected your practice as a facilitator. Can you give me a specific example that you remember from that training 9 months ago that you found very beneficial?
   Describe how the facilitator forum affected your practice as a facilitator.
   Describe how your experience facilitating has affected your practice as a facilitator.
   (Probe for specific examples.)

5. What are your views on the importance of dialogue in the eMSS program?
   What are some techniques that might be used to improve dialogue in the e-mentoring environment?

6. During the time that you have been involved in the program, what changes have you seen in program dialogue?
   Volume?
   Quality?
   What do you attribute these changes to?

7. Let's say you are asked to create a checklist for new participants to use when composing posts to discussion areas. What would you include in the checklist? In other words, what steps do you take, what things do you think about when composing a post?

8. What benefits have you realized as a result of your work as a facilitator? What evidence have you seen that the program is having positive effects on mentees' practice?
   How do you feel that you have contributed to this change?

9. If you were picking good online facilitators, what qualities would you look for? What about good online mentors and mentees?

10. Is there anything else you'd like to tell me about your work and training as a facilitator in the eMSS program? What should I have asked that I have not?

APPENDIX I

eMSS CONVERSATION RUBRIC (HRI)

Appendix I

eMSS Conversation Rubric
HRI (2005)

To what extent is the dialogue likely to enhance the capacity of the participant to provide high quality mathematics/science instruction or to be an effective mentor and/or facilitator charged with helping move mentees forward in their practice?

OR

To what extent does the dialogue provide evidence of the above?

Not at all		**To some extent**		**To a great extent**
1	**2**	**3**	**4**	**5**

To help guide the overall rating, the following considerations were taken into account:

- The purpose of the conversation is clear and participants are addressing the specific question or discussion item.
- The content within the conversation is accurate or made accurate through the discussion.
- There is a positive culture within the conversation (participants willing to share; evidence of trust; collegial relationships; sensitive to the needs of participants).
- There is evidence of participants reflecting on their practice.
- The topics/issues are perceived as relevant by participants (e.g., mentees' questions are answered; common pitfalls are addressed).
- The topics/discussions are important for classroom practice.
- The topics/discussions are made relevant to classroom practice and explicitly discussed.
- There is sense making within the conversation (someone pulls the common ideas out – summarizes – fits these ideas within a larger context of teaching, etc.).
- The conversation is taken to a higher level (generalized to larger themes/why the practice is important in promoting student learning).