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Teacher Perceptions of the Centers for Ocean Sciences Education Excellence: Central Gulf of Mexico Program

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TEACHER PERCEPTIONS OF THE CENTERS FOR

OCEAN SCIENCES EDUCATION EXCELLENCE:

CENTRAL GULF OF MEXICO PROGRAM

By

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The 12 Centers for Ocean Sciences Education Excellence (COSEE) are funded by the National Science Foundation and are designed to promote creative ways of disseminating marine science research and its importance to the public. The focus of this study is the COSEE Central Gulf of Mexico program which encourages active partnerships between research scientists and teachers. In these collaborative partnerships, teachers and scientists work together to create educational products and disseminate best practices in ocean sciences education. The purpose of this study was to determine whether the lesson plans and curricula created through the Centers for Ocean Sciences Education Excellence: Central Gulf of Mexico program (COSEE:CGOM), which are the products of this collaboration, were being used effectively in the classroom. The study addressed issues such as teacher perceptions of collaboration with scientists, effectiveness of COSEE:CGOM curriculum implementation in producing more ocean literate students, and teachers' varying views concerning how to successfully implement new COSEE:CGOM knowledge and concepts into their classrooms in order to improve student scientific understanding. In addition, the study examined frequency of use of COSEE:CGOM lesson plans and identified predictor variables that can produce a model for understanding factors hindering or enhancing lesson plan use. Further, participant perceptions of using peer-teaching as a method for disseminating COSEE:CGOM information in their districts were addressed.

Key words: teacher perceptions, professional development, science education, and teacher and scientist partnerships

DEDICATION

William Blake once said, “No bird soars too high if he soars with his own wings.” The same can be said for the writing of this dissertation. There are many who have seen me toil over this study and who have offered support emotionally and spiritually. Without their unfailing love and sacrifice, I would not have been able to complete this document. Therefore, I would like to dedicate this research to those special people who have been instrumental in sustaining me throughout the process:

My husband, Steve Sempier

My daughter, Savannah Sempier

My parents, Bart and Carroll Tingle

In honor of my grandparents Jim and Doris Tingle who have been supportive in all aspects of my education. In Loving Memory of my grandparents Mike and Mint Meaney, who did not live to see me complete this milestone.

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CHAPTER I

INTRODUCTION

The 12 Centers for Ocean Sciences Education Excellence (COSEE; 2007) are funded by the National Science Foundation (NSF) and are designed "to promote partnerships between research scientists and educators, disseminate best practices in ocean sciences education, and encourage ocean education as a charismatic, interdisciplinary vehicle for creating a more scientifically literate workforce and citizenry" (2007, ¶1). According to the COSEE National (2007) Web site, Centers work to establish partnerships between people and organizations who are conducting ocean sciences research. In addition, Centers work to link groups who provide educational leadership or outreach between diverse communities. They also "provide expertise and guidance for research scientists involved in education, such as conducting workshops to encourage scientists to develop collaborative grant proposals with educators and to experiment with various education and teaching strategies" (About COSEE section, ¶3). Furthermore, the programs "provide incentives and assistance for school districts and teachers to integrate ocean sciences into their curricula" (About COSEE section, ¶3). COSEE also work to integrate the most current scientific research into educational materials which can be used by educators in both formal and informal settings. The Centers work to develop and disseminate these materials both regionally and nationally. COSEE nationwide include COSEE California (COSEE CA), COSEE Central Gulf of

Mexico (COSEE:CGOM), COSEE Coastal Trends, COSEE Networked Ocean World (COSEE NOW), COSEE Great Lakes (COSEE-GL), COSEE Pacific Partnerships, COSEE Ocean Learning Communities (COSEE-OLC), COSEE Ocean Systems (COSEE-OS), COSEE Southeast (COSEE-SE), COSEE West, COSEE Alaska, and COSEE New England (COSEE-NE).

The COSEE:CGOM is a collaboration between The University of Southern Mississippi (USM and the J.L. Scott Marine Education Center), Mississippi State University (MSU and its Computer Technology Center), Loyola University in New Orleans, the University of Florida (UF and its Natural History Museum), Florida Sea Grant College Program, and Dauphin Island Sea Lab (DISL and its Estuarium: a consortium of universities in Alabama) [COSEE:CGOM, 2007, Information section, ¶1]. The mission of COSEE:CGOM is to "bridge the gap" between ocean and coastal sciences research and the relevance of those data to a broad range of audiences via informal centers (museums, aquariums, and science centers) and the formal classroom through teacher training (Information section, ¶2).

Purpose of Study

The purpose of this study was to determine whether the lesson plans and curricula created through the COSEE:CGOM program (which are the products of collaboration between research scientists and teachers) were being used effectively in the classroom. The study addressed issues such as teacher perceptions of collaboration with scientists, effectiveness of COSEE:CGOM curriculum implementation in producing more ocean literate students, and teachers' varying views concerning how to successfully implement new COSEE:CGOM knowledge and concepts into their classrooms in order to improve student scientific understanding. In addition, the study examined frequency of use of COSEE:CGOM lesson plans and whether there were predictor variables that could produce a model for understanding factors hindering or enhancing lesson plan use. Further, participant perceptions of using peer-teaching as a method for disseminating COSEE:CGOM information in their districts were addressed.

Justification of the Study

There are many stakeholders in the COSEE:CGOM program. Scientists stand to gain additional mechanisms to disseminate their research findings to the general public through educators. Educators stand to gain cutting-edge science research findings they can use to enhance their lesson plans and help them meet national and state science standards. Nationally, the project hopes to promote an ocean literate citizenry and help teach conservation of natural resources. In addition, the Gulf of Mexico region is still recovering from the devastation of *Hurricane Katrina*. If COSEE:CGOM Institutes and Workshops can result in an increased awareness of ocean issues and how humans must live in a delicate balance with nature, perhaps better preparation for natural disasters would take place.

Related Literature

The following literature review details the dynamic nature of science knowledge, the general state of science teaching, and the need for improved science instruction at all levels. In addition, this examination comments on the benefits of blending informal education practices with formal education practices to enhance student learning. This review determined the need for science curriculum that is current, integrative, and relevant. Also addressed is how to implement science curricula, as well as the benefits of collaborative efforts between scientists and teachers. Peer-teaching as a mechanism for disseminating new scientific information is also discussed.

As Anderson (1993) noted some 15 years ago, "the need for pre-college science instruction that incorporates the most up-to-date knowledge in science has never been greater" (p. 44). As our knowledge in science continues to increase at a rapid rate, it becomes increasingly difficult for individuals to stay abreast of the most recent research and inevitably impossible for science teachers to keep their curriculum current. The need for improved science education at all levels of schooling has been a common theme for many recent U.S. commissions, reports, and proposals. Anderson also argued that the future of our country is dependent upon our success in attracting capable young people to higher education science programs, as well as developing a scientifically literate citizenry who can make informed decisions about policy and conservation. He suggested the responsibility for this great task falls on the shoulders of science teachers because they are the direct link between science curriculum and its implementation. One of the goals of the COSEE:CGOM program is to disseminate the most current scientific research findings to teachers for use in the classroom (National COSEE, ¶1).

Other literature suggested "future research in science education should focus on how to effectively blend informal and formal learning experiences in order to significantly enhance the learning of science" (Hofstein & Rosenfeld, 1996, p.107). The

COSEE:CGOM program provides an example of taking ideas used in informal education and blending them with formal teaching methods (T. M. Wells, personal communication, September 7, 2007). When middle-school teachers enroll in the COSEE:CGOM Summer Institutes (online and face-to-face), Two-Day Workshops, or Sea Scholars Programs, they are experiencing first-hand the value of an onsite, research experience in an informal setting and can convey that same enthusiasm to students when they report on data they actually collected. Sullenger (2006) argued that science education is much more than science as knowledge, which is the way information is presented to students in the formal classroom. She insisted that it also includes public awareness of the impact of science on the economy and social well-being of citizens. Again, this relates to the mission of the COSEE:CGOM program in attempting to help the broader population become more ocean literate (National COSEE, ¶1).

Dierking and Falk (1994) suggested that knowledge concerning short-term, informal education experiences impact on long-term knowledge acquisition should be the aim of future research in informal science settings. Based on the review of research in informal educational settings, the researchers proposed some generalizations about family museum behavior. First, Dierking and Falk suggested that social mediation and motivation play a role in learning in the informal setting. Dierking and Falk also proposed that mothers are less likely to choose what exhibits to view; mothers interact at a higher cognitive level with boys than with girls, and that family learning appears to be socially mediated. These generalizations could be used to inform research in the formal classroom.

Other researchers have found that enriched informal activities outside of the classroom correspond to higher scientific reasoning abilities among students. Gerber, Cavallo, and Marek (2001) used a sample of 1,178 students in seventh, eighth, and ninth grade science classes. In addition, there were 16 science teachers with experience ranging from two to 26 years who participated. The Informal Learning Opportunities Assay (ILOA) was administered to measure student informal learning experiences. The Classroom Test of Scientific Reasoning (CTSR) was used to determine students' scientific reasoning abilities. Teachers were interviewed to determine if their teaching style was more inquiry or not inquiry in nature. Gerber et. al. (2001) reported that students who are in inquiry-based classrooms have higher scientific reasoning abilities. They speculated that it may be possible to compensate for an impoverished informal learning environment via inquiry-teaching in the formal learning environment. One of the purposes of COSEE:CGOM is to develop inquiry-based ocean sciences lesson plans for middle school teachers (COSEE:CGOM, 2007, Information section, ¶2). Knowing that students spend more time outside of the classroom than they do in it, provides a compelling argument for including informal education research as part of the review of literature to inform future research. Little is known about the impact of student experiences in informal settings as it relates to science learning and/or skill development. We do know that experiences that may produce cognitive conflict and social discourse help develop children's reasoning abilities (students can gain through classroom teaching procedures or enriched informal learning experiences). Gerber et. al. (2001) suggested that students with impoverished informal learning experiences may have less well-developed schemata with which to relate formal science experiences compared to those with enriched informal experiences.

When examined collectively, the literature clearly suggests that scientific literacy among students is essential, that informal learning experiences can help students reach higher scientific reasoning abilities, and that it is possible that teaching through scientific inquiry can help to compensate for impoverished informal experiences. This supports the need for science curriculum that is accurate, current, inquiry-based, and easily implemented and disseminated. The COSEE:CGOM program provides such a platform for executing these tasks.

Curriculum Implementation

Once curricula are created, they are dependent upon proper implementation to ensure their success and ultimate effectiveness. Studies show that curriculum can be positively or negatively influenced by the environment of the classroom in which it is implemented. Suarez, Pias, Membiela, and Dapia (1998) conducted a study in which they analyzed the teachers' and students' perceptions of a new science curriculum for high school students. Participants were 191 secondary students (aged 14-15 years) and two science teachers. Data were collected through observations and interviews. Suarez, et. al. (1998) found that the teachers and the spatial organization of the room were of great importance to the success of curriculum implementation.

Most teachers who have attended the COSEE:CGOM program are highly motivated and interested in the subject area, which makes a substantial difference in the implementation of the lessons they create as part of the program. In addition, most teachers who participate in the COSEE:CGOM program during the summer are able to implement the lesson plans they create shortly following the Institute. This immediate implementation is an advantage because they are able to experiment with various class formats and are able to plan for differences as the school year begins. As new teachers prepare to enter the field and as veteran teachers look to stay abreast with changes in technology, the virtual classroom has been used as an avenue for instruction and curriculum implementation.

The COSEE:CGOM format has components that are administered online and therefore completed in a virtual classroom. There is some question as to the use of, effectiveness of, and ability to learn inquiry via an online format. Harlen and Doubler (2004) conducted a study in which they compared participants in a face-to-face versus an online environment for the delivery of a professional development science course called *Try Science*. The 13-week, on-campus course was held at Lesley University in Massachusetts and had 18 participants. The online version of the course had 15 participants and ran the semester prior to the on-campus version of the course. After conducting pre- and posttests, they found that online participants on average spent more hours per week on the courses than their on-campus counterparts. Both groups of students successfully completed scientific investigations using inquiry skills. The main difference between the two groups was that the online group spent more time reflecting and commenting on their learning and on the process of inquiry than the on-campus group. They found the online participants' confidence in teaching science using inquiry methods significantly increased more than the on-campus group. This provides support for the online implementation of some components of the COSEE:CGOM program.

Collaboration

Collaboration between scientists and educators helps bridge the gap between research and dissemination. The idea of linking science teachers with research scientists is well documented in the literature. Morrison and Estes (2007) found that middle-school science teachers gained beneficial knowledge during a four-day, professional development workshop where they received instruction from research scientists and participated in real-world experiments. The participants for this study were 47 middle school science teachers, all having different backgrounds in science. The professional development program was held during the summer months, and teachers were paid a daily stipend and given in-service credits for attending. Data were collected from teachers through interviews, surveys, and observations. Teachers reported they had grown in content knowledge and process skills at the end of the professional development workshop. The teachers were “invigorated” by the new learning experience (p. 178). Teachers also voiced their concerns about this collaborative effort commenting that scientists used unfamiliar vocabulary and high-level of content that caused them to ask for clarification. Researchers contributed this to a lack of pedagogical content knowledge on the part of the scientists and to the teachers’ weak content understanding at the beginning of the study.

Varelas, House, and Wenzel (2005) evaluated immersion of beginning teachers’ science identities as they are shaped by “active participation” through apprenticeships in science research settings (p. 493). In their study they focused on three preservice teachers who had been awarded fellowships to work in the laboratory during a summer. These fellows were allowed to choose projects on which they wanted to work in the laboratory and were paid a stipend for their summer research, as well as given housing and/or travel stipends. Two themes emerged from the data: (a) science as a practice and (b) science as a community of practice. Varelas, et. al. (2005) found that expert mentors "play both a facilitating, scaffolding role and an authoritative, appropriating role" (p. 507) in developing teachers' science identities. In addition, this interaction between science experts and novices allowed beginning science teachers to "build bridges between experiences and cultural practices at the lab and in the classroom" (p. 514).

Yet another example of how collaboration has linked researchers with science teachers is through the program SCI-LINK, headquartered at North Carolina State University. Among the many goals of the program, two were directly related to developing collaborative efforts between teachers and researchers including: (a) provide experiences for teachers that would help them to better understand scientific research and (b) assist these teachers in developing materials for their classrooms that include recent research findings. This study surveyed 67 teachers as a follow-up to their experience in a two-week SCI-LINK institute which focused on topics such as global climate change and ocean pollution. During these institutes, research scientists made presentations of their work and aided participating teachers in developing activities for the classroom. Anderson (1993) reported that not only was the program successful in disseminating research findings to teachers, it also equipped teachers with instructional materials they could use in their classrooms. To make the project more efficient, assistance was given to scientists in making their presentations to the teachers more relevant with practical applications teachers could use in their classrooms. In addition, help was given to teachers to increase their writing and library skills and participating teachers' attention was focused on how to evaluate and disseminate information to their students.

A study by Costa, Marques, and Kempa (2000) revealed that science teachers' knowledge of education research findings is generally limited. They conducted a study in Portugal involving 42 practicing science teachers who had between two to 12 years of experience teaching in the formal classroom. All participants had recently enrolled in a Master's degree program in science education. Participants completed a questionnaire containing 12 items pertaining to commonly accepted pedagogical wisdom and asked if they endorsed the statements. After the teachers completed the questionnaire, they were asked to indicate what basis they used to provide their answers. The findings suggest that teachers need to be more aware of the value of professional knowledge gleaned from research findings. Costa et. al. (2000) also commented that this gap between science education research and the practice of science education is unlikely to be narrowed unless research findings are more readily accessible to teachers. Although the questionnaire focused on awareness of educational research, it can be inferred that if teachers are unaware of research findings in their own profession, they are likely unaware of recent research outside their field. This reiterates the need of bringing current research findings to the classroom and supports the mission of the COSEE:CGOM program in bringing scientists and teachers together to ultimately plan for the facilitation of learning of students (About COSEE, section 3).

Hawkins and Battle (1996) used the term “mutual cognitive relationship” to describe the teacher-scientist partnership (p. 2). This term refers to the teacher and scientist both playing roles of novice and expert interchangeably. In their investigation, they developed case studies that focused on expert/novice roles during the development of a multi-media classroom resource as well as collaboration strategies used to transmit the scientific and technical material to a format that non-experts could use (via the Internet and World Wide Web). They hypothesized that “the transition of scientific data and research results from the workplace to the classroom can be facilitated by the joint creation of curriculum materials by teams of cognitive experts, subject-matter experts, and teachers” (p. 2). Teacher and scientist alternated in their expert roles as this mutual apprenticeship allowed them to tackle a complex task. Hawkins and Battle (1996) believed this model provides the scientific community with a mechanism for sharing research results to a broader audience.

Although collaborations between teachers and scientists are thought to be important in restructuring effective science education, it is not always evident what makes these relationships productive. A more recent study of teacher-scientist collaboration attempts to uncover how successful partnerships are formed. Drayton and Falk (2006) presented three case studies where teams of four teachers were placed in a 12-month partnership with an ecologist through the Teacher Enhancement in Pedagogy and Ecology (TEPE) project. Teachers were encouraged to “take on” research projects (collaboratively with the scientists) where they would learn for their own sake rather than create lesson plans or curricula that would be used in their classroom.

Through qualitative methods, Drayton and Falk (2006) documented two successful partnerships and one less beneficial partnership. They found negotiations around five dimensions which they deemed important: (a) Whose question is being investigated?, (b) Is the focus primarily on data collection or on data analyses?, (c) Is the research based on the ecologist's area of expertise, or the teachers' interest?, (d) Is the primary focus on the teachers' learning or on their students' classroom learning?, and (e) Is the research intended for an external audience or primarily for the teachers' own benefit? (p. 755)

Findings highlighted the difficulties with scientists and teachers attempting to bridge the gap and bring recent scientific research into the classroom.

Drayton and Falk (2006) noted cultural differences exist between the laboratory and the classroom and that specifically defined areas of scientific knowledge can seem disconnected with students' and teachers' interests and understanding. Without careful scaffolding, this can be a barrier to dissemination of information. In addition, Drayton and Falk (2006) noted science and science education take place in very different settings under various constraints. For example, the amount of autonomy experienced by a teacher differs from that of a scientist. In addition, the available resources differ, the daily schedule differs, peer relationships are different in nature, and scientists lack pedagogical knowledge of classroom management and discourse. Teachers may have differing levels of preparation than the scientists expect which must be addressed by negotiation. Drayton and Falk (2006) also mentioned the perceived differences in power and status reported in teacher-scientist partnerships. This could affect the teachers' willingness to articulate ideas to the more "powerful" scientists. Despite the above mentioned problems with collaborations, Drayton and Falk (2006) found that teacher-scientist partnerships "when structured appropriately, can deepen teachers' sense of professional competence, and enrich their ability to support inquiry enacted in the science classroom" (p. 759).

Peer-teaching

Part of the COSEE:CGOM program requires participating teachers to return to their schools and share the information they have learned in the Summer Institutes (both the face-to-face and the online components) (S. H. Walker, personal communication, September 7, 2007). This model can best be described as peer-teaching. Studies have documented the benefits of peer-teaching and peer-review of teaching. Hutchins (1994) suggested three main purposes for peer-review of teaching including to (a) encourage collaboration and the sharing of ideas among academic staff; (b) ensure professional development sessions are implemented by professional teachers and not outside agencies; and (c) supplement student evaluations of teaching and provide multiple data sources.

In one case-study, Miller and Quealy-Berge (2006) reported a statistically significant increase in organization, dialogue, and critical thinking for the teachers after participation in a peer-review community on teaching. According to Kilic and Cakan (2006), peer assessment of teaching performance can help new teachers assess their own teaching performance objectively. Other literature suggests that teaching with a peer prepares novice teachers for the roles and responsibilities of their chosen profession

(Birrell and Bullough, 2005). The idea of collaboration among peers is especially encouraged in the COSEE:CGOM program (T.M. Wells, personal communication, September 7, 2007).

Hoadley (2000) found that students can learn science from online, peer discussions. He examined eighth graders' understanding of the nature of color using the SpeakEasy discussion tool. This topic was taught solely as an online discussion. Teachers, like students, can benefit from knowledge integration which is supported by this type of collaboration either online or face-to-face. The COSEE:CGOM program has an online component where teachers prepare additional lesson plans online and receive feedback from scientists via e-mail communication and peer-review (S. H. Walker, personal communication, September 7, 2007).

The proposed outcome of peer-teaching would be to continue to disseminate knowledge to a broader population and spread the learning throughout a community which would continue to educate students and the general population. Oliva (1992) described a culturally literate person as one who possesses a broad general knowledge which "enables a person to read with understanding, to communicate their thoughts to others within our society, to contribute to the development of our society, and to open doors that lead to success in American society" (p. 539). The COSEE embrace this idea and attempt to expand the definition to include an ocean literate citizenry. Citizens knowledgeable in ocean sciences can strengthen contributions to the development of sustainable ecosystems for the planet. Peer-teaching is one avenue in which to attempt to produce such ocean literate citizens.

Summary of Gaps in Previous Research

Taken together, these lines of research identify several gaps which are worthy of attention. First, science is a dynamic subject and its diverse fields are growing. As a result, teachers cannot stay abreast with the most current research to enhance their classroom science curricula. By the time a book is adopted by the school district, the facts may be dated. Therefore, teachers need assistance with current content knowledge to help them interpret scientific findings and create lesson plans that can disseminate more recent information to their students. Lessening this gap can be accomplished through successful professional development opportunities such as those provided through the COSEE program. These lesson plans should be inquiry- and standards-based and should incorporate ideas originating from the teachers' informal learning experiences. The literature supports the idea of using online components to reinforce what was learned in the Summer Institutes. However, it is not known if the teachers who participate in the COSEE:CGOM program actually use the lesson plans they created or if the online plans that are downloaded are incorporated within the classroom. Further, it is not known over time the manner in which teachers perceive their experience in the COSEE:CGOM program and how that translates to their teaching in the classroom.

Second, the literature supports the idea of collaboration between research scientists and teachers. Studies have documented that teachers generally do not have a wealth of knowledge pertaining to recent scientific discoveries. In addition, scientists do not have expertise in pedagogical content knowledge. Therefore, a gap exists that can be bridged if both teacher and scientist work together toward the ultimate goal of science literacy for all citizens. Along this line of research, this doctoral study proposes to determine if participation in COSEE:CGOM Institutes and collaboration with scientists alters teachers' perceptions concerning "how" they conduct science in their classrooms. The goal is to identify what the COSEE:CGOM experience means to the teachers.

Third, the literature supports the belief that peer-teaching and peer-assessment of teaching can be beneficial and enhance teacher performance. As part of the COSEE:CGOM program, teachers commit to disseminating the materials and knowledge they have with other teachers in their school, district, and community. In addition, teachers are encouraged to report on their successes with the COSEE lesson plans at state and national teacher conferences. This type of peer-teaching is intended to broaden the scope of the audiences who can benefit from this distribution of information. Teacher perceptions of peer-teaching as a mechanism of sharing information are important to address in order to determine if this is an effective means by which to disseminate new scientific knowledge.

Although several studies have been conducted that address the growing need for improved science instruction, none have focused on marine science as a theme by which to propagate science knowledge to students. In addition, few studies have addressed teacher perceptions of working collaboratively with scientists and how this affects teacher perceptions of their own science knowledge. Current studies have not focused on frequency of use of lesson plans and how this may interact with teacher and school demographics, opportunities for use, and available resources to implement curricula.

Finally, teacher perceptions of dissemination of new knowledge via peer-teaching have not been studied. With this in mind, the following research questions were formulated.

Research Questions

Three research questions were developed for this study. These research questions are as follows.

1. How do teachers perceive and use COSEE:CGOM lesson plans and/or online teaching resources and how frequently do they use them?
2. How do teachers value their participation in the COSEE:CGOM Institutes where they actively collaborate with research scientists, and in what ways do teachers incorporate into the science curricula knowledge gained from this partnership?
3. How do teachers perceive their peer-teaching experience, and what do they believe each party gains from the experience?

Answering the above questions also opens the door to various implications for teacher education programs. This study adds to the existing empirical studies because it focuses on new and potential directions for science curriculum implementation including: (a) using an ocean theme; (b) determining teacher perceptions of what a collaborative experience with scientists means to them; and (c) exploring the perceived effectiveness that participating teachers have about the lessons they are implementing in the classroom and in turn, presenting this enhanced content knowledge and augmented teaching strategies to their peers.

Further, the current study identifies factors that may influence the usage or non-usage of COSEE lesson plans in the classroom. In 2004, the U.S. Commission on Ocean Policy released its final report detailing the need for new, coordinated and comprehensive national ocean policy (U.S. Commission on Ocean Policy, 2007). This report described the importance of having ocean literate citizens who: (a) should understand the essential principles and fundamental concepts of ocean processes, (b) communicate about the ocean in a meaningful way, and (c) make informed and responsible decisions regarding the ocean and its resources. Where other studies have been conducted that address curriculum implementation and program effectiveness, this study seeks to go beyond isolated findings and documents a unique application of such findings as it relates to recent ocean policy change. This study reveals a direct avenue for the effective dissemination of such information from scientist to teacher, and from teacher to students.

CHAPTER II

METHODOLOGY

Participants

Participants were selected based upon their participation in the COSEE:CGOM program from the years 2003-2007 (see Table 2.1). All participants from this five-year period were contacted using the e-mail addresses they provided during the Institute. It should be noted that recruitment of minorities has been a challenge for the duration of the COSEE:CGOM program (see Table 2.2).

Participants were contacted to update their current information and teaching status. A database was created of all teachers attending between 2003-2007, which includes their demographic information, e-mail address to send the survey, and consent to participate in the study. Existing teacher contact information was obtained from the COSEE:CGOM Principal Investigator (PI) with consent to use existing data from the consortium of universities and marine education centers that are involved in the COSEE:CGOM network.

Table 2.1. Participants by State for a Five-Year Period

	2003	2004	2005	2006*	2007*
Alabama	Teachers: 13 Scientists: 7	Teachers: 12 Scientists: 8	Teachers: 9 Scientists: 7	Teachers: n/a Scientists: n/a	Teachers: 10 Scientists: 6
Florida	Teachers: 10 Scientists: 11	Teachers: 11 Scientists: 8	Teachers: 9 Scientists: 7	Teachers: 11 Scientists: 4	Teachers: n/a Scientists: n/a
Louisiana	Teachers: 12 Scientists: 5	Teachers: 14 Scientists: 10	Teachers: 11 Scientists: 4	Teachers: n/a Scientists: n/a	Teachers: 11 Scientists: 4
Mississippi	Teachers: 11 Scientists: 11	Teachers: 10 Scientists: 13	Teachers: 6 Scientists: 5	Teachers: 12 Scientists:4	Teachers: n/a Scientists: n/a
Texas	Teachers: 9 Scientists: 4	Teachers: 7 Scientists: 3	Teachers: 7 Scientists: 3	Teachers: n/a Scientists: n/a	Teachers: n/a Scientists: n/a
Total Participants	Teachers: 55 Scientists: 38	Teachers: 54 Scientists: 42	Teachers: 42 Scientists: 26	Teachers: 22 Scientists: 8	Teachers: 21 Scientists: 10

*In 2006 and 2007 under the new award funding, the Institutes were rotated between two hosting states. In 2006, Florida and Mississippi implemented the Institute and in 2007, Louisiana and Alabama implemented the Institute. Texas was not part of the new award funding for these years.

Table 2.2. Ethnicity and Gender of Participating Teachers

	2003	2004	2005	2006	2007*
Ethnicity					
Caucasian	88%	84%	88%	86%	N/A
African American	8%	7%	6%	7%	
Hispanic	4%	7%	6%	6%	
Asian	0%	2%	0%	1%	
Gender					
Male	15%	19%	33%	22%	N/A
Female	85%	81%	67%	78%	

*This information was not collected for the 2007 Institutes.

Instrument

A survey instrument for this study was created. A current instrument that addressed the specific questions and concerns of the COSEE:CGOM program could not be identified. Some questions for this survey were adapted from a survey created by Morrison and Estes (2007) which addressed research in a similar area. There were 77 questions developed for the survey (see Appendix A). Some of the survey questions were on a Likert-Scale with four choices: Strongly Disagree, Disagree, Agree and Strongly Agree. The other survey questions were either forced response (yes/no) or short-answer responses where the participant was free to make comments. The demographic questions had yes/no or categorical response options.

Procedure

Procedure for Survey Data Collection

The survey was created in Survey Monkey (SM) which allowed the researcher to enter e-mail addresses. The SM kept track of when the participants received the invitation to participate in the survey and ensured that any database(s) of addresses that were entered did not send duplicate e-mails to the same address. To increase the response rate, SM allowed the researcher to send "follow-up" and reminder e-mails to each participant. The SM allowed the researcher to use skip logic to control the flow of the survey. In addition, it allowed the researcher to randomize answer choices to eliminate answer bias. The SM allowed the researcher to download the raw data and to create reports as the results of the survey were submitted by each participant. A survey participant was able to "opt-out" of the survey and therefore did not receive future SM surveys. When this occurred, it was noted in the analysis section.

After the survey was created, a database was obtained from the COSEE:CGOM program for the five-year period spanning 2003-2007. The database contained the most recent contact information for the teachers who participated during these years. Using this database as a starting point, a teacher perceptions survey was sent to 241 e-mail addresses in November 2007. All 241 e-mail addresses were entered into one group called a "collector group." This first round of e-mail invitations was named "Final Participants Invitation" and was the first list to which the survey was distributed. This was the most comprehensive list of participants. The e-mail consisted of a brief introduction to the research that was being conducted and created a unique link to the survey for each participant. This allowed the participants to click on the link and go directly to their individual survey without having to "log on or sign in." Participants were asked not to share this link with others as it was created exclusively for their response. The message participants received through the SM site can be found in Appendix B. In this first round of e-mail invitations, some e-mail addresses "bounced back" and some were identified as being scientists instead of teachers. For this reason, additional e-mail invitations were distributed as described in detail in the following paragraphs.

The SM allowed the tracking of the number of participant responses. A summary of the tracking of the e-mail invitation for this first list of participants is summarized in Table 2.3 below. A summary of the three, follow-up messages sent to this list of participants is located in Table 2.4.

Table 2.3 Final Participants Invitation (E-mail Invitation)

Date	12-5-07	1-17-08	1-22-08	1-31-08	2-19-08
Total*	241	150	145	140	140
Unsent/New	0	0	0	0	0
Sent	240	149	144	139	139
Responded (partial/complete)	38 (11/27)	59 (10/49)	59 (10/49)	62 (10/52)	63 (10/53)
Did not respond	203	91	86	78	77
Opt. Out	1	1	1	1	1

*Totals changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

Table 2.4 Total Messages Sent to Final Participants Collector Group

	Message Subject	Sent Date	# of Messages Sent*
1	Past COSEE Participants Survey	Mailed Thursday 11/8/07 10:18 pm	241
2	Reminder to Past COSEE Participants	Mailed Monday 12/17/07 12:04 pm	169
3	Dissertation Research Survey	Mailed Tuesday 1/15/08 12:09 pm	100

*# of messages sent changed as a result of removing e-mails that were undeliverable as well as e-mails of scientists who were identified.

As mentioned above, the initial invitation to participate in the survey resulted in several e-mails that bounced back or were denoted as undeliverable. Therefore, a new database was created to keep track of the e-mail addresses that worked and those that did not. A list was compiled of all of the e-mail addresses in each state (Alabama, Florida, Louisiana, Mississippi, and Texas) of the teachers whose e-mail addresses were invalid. These lists were distributed at the COSEE:CGOM Management Team Meeting in late November to the key personnel in the COSEE:CGOM program for each state. Any updates that were provided by these key personnel were added to the database and a new invitation to participate was sent to the teachers who did not receive the first e-mail. This required new “collector groups” to be created that contained the names of only the new participants in each state.

The Alabama teachers' collector group was named "AL Updated Addresses 12/13/07" and was first sent disseminated Thursday, December 13, 2007. A summary of this e-mail collector group can be found in Table 2.5 along with the tracking of the two, e-mail messages sent to this group in Table 2.6.

Table 2.5 Alabama Updated Addresses 12/13/07 (E-mail Invitation)

Date	1-17-08	1-23-08	1-31-08	2-19-08
Total*	11	9	9	9
Unsent/New	0	0	0	0
Sent	11	9	9	9
Responded (partial/complete)	3 (0/3)	3 (0/3)	3 (0/3)	4 (0/4)
Did not respond	8	6	6	5
Opt. Out	0	0	0	0

*Totals changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

Table 2.6 Total Messages Sent to Alabama Updated Collector Group

	Message Subject	Sent Date	# Messages Sent*
1	Past COSEE Participants' Survey	Mailed Thursday 12-13-07 4:26 pm	11
2	Dissertation Research Survey	Mailed Tuesday 1-15-08 12:17 pm	9

*# of messages sent changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

For Mississippi and Louisiana, the updated e-mail addresses were placed into one new collector group entitled "MS and LA Updates 1/9/08" because there were few new participant addresses for both states. A summary of the tracking of this collector group is located in Table 2.7 combined with the tracking of the two e-mail messages sent to this collector group in Table 2.8.

Table 2.7 Mississippi and Louisiana Updated Addresses 1/9/08 (E-mail Invitation)

Date	1-17-08	1-23-08	1-31-08	2-19-08
Total*	10	9	9	9
Unsent/New	0	0	0	0
Sent	10	9	9	9
Responded (partial/complete)	4 (0/4)	4 (0/4)	4 (0/4)	4 (0/4)
Did not respond	6	5	5	5
Opt. Out	0	0	0	0

*Totals changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

Table 2.8 Total Messages Sent to Mississippi and Louisiana Updated Collector Group

	Message Subject	Sent Date	# Messages Sent*
1	Past COSEE Participants Survey	Mailed Wednesday 1-9-08 10:36 am	10
2	Dissertation Research Survey	Mailed Tuesday 1-15-08 12:24 pm	7

*# of messages sent changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

There were no updated e-mail addresses received from Texas and updates received from Florida were the same addresses that had bounced back in previous messages sent. Therefore, a final list of any new addresses obtained since the last updates were entered was created and called "Last Updates for all States 1/15/08." A comprehensive compilation of this final collector group can be found in Table 2.9 and the tracking of messages sent to this group is located in Table 2.10.

Table 2.9 Last Updates for All States 1/15/08 (E-mail Invitation)

Date	1-17-08	1-23-08	1-31-08	2-19-08
Total*	20	10	10	10
Unsent/New	0	0	0	0
Sent	20	10	10	10
Responded (partial/complete)	4 (0/4)	5 (0/5)	5 (0/5)	5 (0/5)
Did not respond	16	5	5	5
Opt. Out	0	0	0	0

*Totals changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

Table 2.10 Total Messages Sent to Last Updates for All States Collector Group

	Message Subject	Sent Date	# Messages Sent*
1	Past COSEE Participants Survey	Mailed Tuesday 1-15-08 3:25 pm	20
2	Dissertation Research Survey	Mailed Thursday 1-24-08 12:07 pm	5

*# of messages sent changed as a result of removing e-mails that were undeliverable, as well as e-mails of scientists who were identified.

It should be noted that only one of the e-mail addresses in the "Last Updates for all States" collector was a new teacher. The other nine e-mails were a secondary e-mail address the teacher had listed in contact information. Each response was checked at the final download of the survey to ensure that no participant completed the survey twice (i.e. were sent separate invitations to their different e-mail addresses and responded to both). It should also be noted as indicated above, that a reminder e-mail was sent to all of the collector groups and each individual participant in those groups was given at least one month to respond. A final download of all survey responses was completed on Tuesday, February 19, 2008. A total of 80 recipients started the survey and 66 completed it for a completion percentage of 82.5%. Table 2.11 below delineates summary information on the survey.

Table 2.11 Summary Information on Survey

Collector Name	**Last Response**	**Number of Responses**
Last Updates for all states	1/24/08 11:57 am	5
MS and AL updates	1/20/08 3:42 pm	4
AL updates	2/3/08 10:54 am	4
Final participant list	2/15/08 2:34 pm	67
TOTAL		**80**

It was determined 159 e-mail addresses were valid and thus the overall response rate for the survey was 41.5%. It was also ascertained that some scientists were included in the original database and had to be excluded from further e-mails. This situation occurred because the database was not consistent in denoting the distinction between teachers who participated and scientists who participated. Therefore, the entire database had to be thoroughly checked. All scientists were denoted in the updated database and removed from further e-mail invitations or reminders to participate. In addition, the responses that were already entered in the survey were checked and the scientist responses, as identified by their e-mail addresses, were removed from the final spreadsheet of responses before analyses were determined. Further, other recipients who returned e-mails denoting their change of e-mail address, change of teaching status, retirement, or title change to scientist or COSEE:CGOM instructor were updated and were either sent new invitations to participate or were removed from the participant database accordingly.

In the survey, teachers were asked if they use the lesson plans they created or others have created. They were asked how they use these plans. In addition, they were asked other specifics concerning their thoughts on how the lesson plans helped to increase student learning (if at all). The answers to these questions gave insight into teachers' perceptions of lesson plan effectiveness.

Procedure for Interview Data Collection

Selection of Interview Participants

After the online survey was completed, five teachers were selected to participate in a follow-up interview to help explain the survey results and to share their perceptions concerning the COSEE:CGOM Institute without being limited to options on the survey. Participants were selected based upon the following criteria: (a) completion of the online survey, (b) year in which they attended the COSEE:CGOM Institute, (c) state in which they attended the COSEE:CGOM Institute, (d) years of teaching experience, (e) current grade level taught, (f) response to an invitation to participate in the interview, and (g) willingness to participate. Five teachers were selected in an attempt to capture the differences among the five states in the COSEE:CGOM program, as well as the five years in which the participants participated.

To determine how the time elapsed since attending the COSEE:CGOM Institute could affect the implementation of curricula, an effort was made to select teachers who had participated in different years. Similarly, teachers were selected from each of five states, as they attended different Institutes and their experiences would vary. An attempt was made to select teachers with a range of teaching experience and varying teaching assignments (elementary, middle, and high school) to represent the diversity of participant backgrounds. Although there are too few case studies to make generalizations about overall participant perceptions of the COSEE:CGOM program, these individual cases were able to provide insight concerning how some teachers perceive their experience and use (or do not use) what they learned from the Institutes in their classrooms.

Transcription of Interviews

Each interview was recorded both in analog and digital formats. After the interviews were completed, the tapes were transcribed verbatim into five separate Microsoft Word documents, one for each interview. During the interviews, detailed notes were kept identifying common themes mentioned by interviewees. These themes were used to begin the analyses of the transcripts. Beginning with the first interview, each line of transcription was read and then summarized under the appropriate theme(s) which were previously identified. When appropriate, direct quotes from the interviewee were included in the analyses. The same format and interview protocol was used for the five interviews. If a new theme emerged during the reading of the transcription, it was added in a logical place in the analyses.

This information added to the depth of interpretation of the survey findings and provided insight into individual teachers' responses. The interviews were useful in determining how teachers are presenting the lessons to students, the level of integration of COSEE:CGOM concepts in the teachers' curricula, and how teachers perceive their

COSEE:CGOM experience as it relates to their own professional development. The objective was to determine if teachers can use the information they learn, relate it to their students, and integrate new content knowledge into their curricula. The results from the surveys, interviews, and archival data were combined to determine the effectiveness of the COSEE:CGOM program in creating more scientifically literate teachers and students.

Instrument Validity

In order to assess whether the survey measured what it was designed to measure, a panel of experts consisting of both educators on the Gulf coast and professors at Mississippi State University (MSU) and the University of Southern Mississippi (USM) were asked to review the survey for content validity to determine if any follow-up questions should be added or if any parts of the survey should be deleted. The dissertation committee reviewed the survey in order to obtain face validity. They determined that it looked like a reasonable way to gain the information being sought, that it was well-designed, and that it appeared it would yield reliable data.

Instrument Reliability

Due to the limited number of teachers who have participated in the COSEE:CGOM program, actual COSEE participants were not used for the pilot study. Therefore, the instrument was pilot-tested in a graduate level education course at MSU consisting of veteran and preservice teachers. Each individual was given a paper copy of the survey and asked for input. A record of the time to complete the survey was taken as an indication of whether or not the survey should be shortened to avoid fatigue by participants. After all participants had completed the survey, a focus group was formed and discussed changes that would make the survey stronger. Their comments helped to establish the internal consistency of the items on the survey, if they related to one another, and how they related to the entire survey. Members of the focus group gave suggestions for rewording some questions, ideas for additional choice selections, and comments for formatting the survey to make it easier for participants to answer questions. The suggestions of the focus group were incorporated into the online version of the survey. The survey was also reviewed by other educators who have not participated in the COSEE:CGOM program to determine if the questions were understandable and reasonable before being administered to the target population.

Data Analyses

Previous research studies have focused on quantitative analysis of science teacher education programs. For example, Anderson (1993) reported the findings from SCI-LINK which has a similar format to COSEE in that teachers and scientists work together to create lessons for students. Anderson described a survey that was conducted to determine which teachers were using the lesson plans, if teachers shared them with other teachers, and if this form of peer-teaching had encouraged other teachers to attend the project. Although this information is valuable, the study only reported percentages and thus was not able to explain if these results were greater than those that would be obtained by chance. Additionally, there was not a report of how other variables could have interacted to produce the results found. For example, did teachers who implemented the curricula have more resources available to them than the teachers who did not use the curricula as often? To answer this and other more detailed questions, a combination of methods was employed. This study was a mixed methods study utilizing both quantitative and qualitative measures.

Survey Analysis

To address the first research question concerning how frequently teachers use the COSEE:CGOM lesson plans; how many different types of plans they use; and how they are used in the classroom, a logistic regression was performed with frequency as the dependent variable. Based upon survey responses, teachers were placed into two groups defined by frequency of use (those who use the lesson plans often versus those who use them very little or not at all). This variable was coded such that teachers fit into one of two groups, high or low frequency. The survey question asked participants to enter an exact number of COSEE:CGOM lesson plans they had used at least once. After the data were analyzed, a frequency distribution identified the median number and it was used to dictate the "cut off point" for the high and low frequency users. Thus, the dependent variable was frequency of use (high or low) which was assigned after the survey results were obtained.

Loucks-Horsley, Love, Stiles, Mundry, and Hewson (2003) produced a model which details the contextual factors that influence teacher professional development. Learning environment, available resources, organizational culture, individual teachers' learning needs, and state and national policies were among the factors which impact professional development experiences. This model reiterates and lends support to the groups of independent variables selected for this study.

In this research, there were five groups of independent variables: (a) teacher demographics, (b) school demographics, (c) opportunities for use, (d) available resources, and (e) time elapsed (how long it has been since the teacher participated in the COSEE:CGOM program). Some teachers participated in COSEE:CGOM in earlier years and may be in different states of curriculum implementation. Therefore, this variable (time elapsed since attending COSEE:CGOM) was included in the regression as an independent variable, in order to account for any variance due to maturation and to determine if it was significantly contributing to the model. Table 2.12 delineates survey questions for each category of independent variable. Table 2.13 reveals survey questions for the dependent variable. See Appendix A for the full online survey.

Table 2.12 Sample Survey Questions for Each Independent Variable Group

Independent Variable Group	**Survey Question**
1. Teacher Demographics	What is your gender?
	Please select the word that best describes your ethnicity.
	In which state do you currently reside?
	What type of teaching certificate do you have in this state in your main assignment field?
	Counting this year, how many years in total (include part-time teaching) have you taught at either the elementary, middle, or secondary level? What grade level do you currently teach?
	If you are certified/have an endorsement to teach science, what

Table 2.12 (continued)

Independent Variable Group	Survey Question
1. Teacher Demographics	discipline of science do you teach?
	Are you Nationally Board Certified?
	Please check all professional teacher organizations in which you are currently an active member.
	What is the highest academic degree you hold?
	Do you have a current subscription to any of the following scientific or science education journals?
2. School Demographics	Do you teach in a public or private school?
	If you teach in a public school, in which school district do you teach?
	Please select the approximate number of students that your public school district serves.
	What is the name of the private school at which you teach?
	Please select the approximate number of students that your individual school serves.
	How many students at your school are in the grade that you primarily teach?
	What is the average student-teacher ratio in your classroom?
	Which of the following best describes where your school is located?

Table 2.12 (continued)

Independent Variable Group	**Survey Question**
2. School Demographics	Which of the following best describes the population size of your urban city? Which of the following best describes the population size of your rural town or city?
3. Opportunities for Use	At the time you attended the COSEE:CGOM Workshop/Institute, were you teaching the same grade level that you teach now? At the time you attended the COSEE:CGOM Workshop/Institute, were you teaching the same science classes that you teach now? Please select the type of schedule that your school follows. How many classes do you teach where you could use COSEE:CGOM lesson plans? What are the total number of different classes you teach, i.e. Biology and Chemistry would be two even if you teach several class periods of each? How many COSEE:CGOM lesson plans did you create while attending the Workshop/Institute? How many different COSEE:CGOM lesson plans have you downloaded from the Web?

Table 2.12 (continued)

Independent Variable Group	Survey Question
3. Opportunities for Use	Of the COSEE:CGOM lesson plans that you created or downloaded, have you used any of them in your classroom?
	Please indicate why you used these lesson plans.
	Which of the three main themes/categories of lesson plans did you use?
	If you selected more than one theme, which one did you use the most?
	Please briefly explain why you used this theme the most in your classroom.
	In what ways have you evaluated student learning after implementing the COSEE:CGOM lesson plans?
	Some of the lesson plans come with PowerPoint® presentations you can download. Have you ever used this resource? How many times per year have you used the PowerPoint® presentations? Were the slides you downloaded user-friendly?
	Have you disseminated COSEE:CGOM information to your school, your district, your state, or nationally?
4. Available Resources	Do you have a computer in your classroom?
	Do you have access to the Internet in your classroom?
	Do your students have access to computers?

Table 2.12 (continued)

Independent Variable Group	Survey Question
4. Available Resources	How many school hours do you have designated as preparation time per week?
	What is your science budget?
	Do you have the resources to implement the COSEE:CGOM lesson plans?
5. Time Elapsed	How long has it been since you attended a COSEE:CGOM Institute?
	Have you attended more than one COSEE:CGOM Institute?
	In what state(s) have you attended the COSEE:CGOM Workshops/Institutes?

Table 2.13 Sample Survey Questions for the Dependent Variable

Dependent Variable	Sample Survey Questions
Frequency of Use	How many COSEE:CGOM lesson plans have you used at least once?
	Do you plan to use COSEE:CGOM lesson(s) in the future?
	How many COSEE:CGOM lessons do you plan to use in the 2008-2009 school year?

The decision to use logistic regression was made because it does not face strict assumptions like discriminant analysis and is much more robust when assumptions are not met (Hair, Black, Babin, Anderson, & Tatham, 2006). With a dichotomous dependent variable (high frequency versus low frequency), this statistical analysis is appropriate and revealed a wealth of information concerning which teachers were more likely to implement the lesson plans on a regular basis, as well as which factors posed barriers to usage. Again, this design allowed for modeling of a discrete dependent variable (frequency of current use "high" vs. "low") and the modeling of the probability of an event (teachers using the lesson plans in the future). In this case, it allowed for modeling of potential predictor variables (availability of resources, teacher demographics, school demographics, opportunities for use, and time elapsed) to determine if they are affecting the use of lesson plans by teachers. When significant predictor variables were identified, it was possible to address those variables that were hindering use of lesson plans by teachers (not enough resources, no support from school district). These findings also revealed reasons why teachers use the COSEE:CGOM lesson plans in their classroom (ease of use, large budget for science).

Interview Analysis

In order to gain a more complete picture, qualitative methods were used to seek a more holistic approach. To corroborate the findings, triangulation was used when reporting results. Multiple data sources (interviews, observations, archival data, and survey results) were utilized to answer the second research question, which addresses teacher perceptions of working collaboratively with research scientists. Using qualitative methods, the researcher attempted to determine what value this experience had for teachers and what it meant to them. After the survey results were analyzed, five teachers were asked if they would be willing to participate in an interview. This sample of teachers was a convenience sample and it was not possible to equally represent all teachers who participated in the COSEE:CGOM Institutes. However, an attempt was made to identify teachers who represented each of the five states, who had high and low frequency of lesson plan use, and who had various levels of teaching experience. Appendix C contains the protocol of topics for teacher interviews, as well as a table with the actual interview questions. Interviewees were asked if they could provide a sample COSEE:CGOM lesson plan they have used in the past and any modifications they have made to that plan for document analysis.

Internal Threats

Each teacher in this study had various levels of background science knowledge prior to attending the COSEE:CGOM Institute. To attempt to control for this factor, the COSEE:CGOM program administered pre- and posttests during the Summer Institutes in an effort to eliminate the variance due to prior knowledge. Selection of teachers who participated in the survey was based upon their completion of at least one Summer Institute or Workshop in the COSEE:CGOM program. An attempt was made to select teachers who represent the population of teachers who participated in the COSEE:CGOM program. These teachers may have been more highly motivated to implement this curriculum than teachers who have not vested time in creating the lesson plans. In addition, selected teachers were preferably teaching science in their classrooms. Although the COSEE:CGOM Institute pays the teachers' room, board, materials, supplies, and stipend, as part of the selection process, teacher applicants have to obtain written support from their principal and superintendent to attend the COSEE:CGOM Institute. Many potential applicants could have seen this as a barrier to their participation if they did not perceive this kind of support from their district.

External Threats

It is possible that some of the teachers who attended the COSEE:CGOM Institutes were already conducting science-based activities in their classrooms to enhance student learning before they attended the COSEE:CGOM Institute. It may be difficult for them to distinguish between what they were previously doing in the classroom to what activities are unique because of their COSEE experience The findings of this study will not attempt to generalize to teachers who did not attend the COSEE:CGOM Institute. However, it is understood that even in the study population individuals were different and some teachers may not be as motivated to add new lesson plans to their curricula. The lesson plans presented were determined by the teacher and may be a result of what the teacher was already comfortable teaching. The researcher was only able to generalize to similar groups. In addition, some of the teachers who participated in the survey and interview process were teaching outside of their certification area.

Limitations of the Data

Some data taken during the earlier years of the COSEE:CGOM program were lost during *Hurricane Katrina*. It was difficult to track teachers who participated in these years (2003-2005). Therefore, it was assumed the data collected would be skewed toward the most recent participants and their perceptions of their experiences. However, the results revealed this was not the case. Another limitation of the study is there was no way to verify the submitted surveys were completed by the teacher to whom the survey was sent because it was all handled electronically. Furthermore, the teachers who participated in this study attended the Summer COSEE:CGOM Institutes during different years and therefore had varying opportunities to engage in reflection as it related to their classroom practice and teaching. Finally, the five interviewees were interviewed only once.

CHAPTER III

RESULTS AND DISCUSSION

Introduction

This chapter reports the results from both the survey and the interviews. First, the descriptive statistics from the online survey are discussed and then the development of the model examining lesson plan use by participants is presented. Next, the analyses of the interviews are detailed and the themes that emerged are discussed. Finally, the research questions are answered drawing on data from both survey and interview results.

Survey Data Analyses

After the survey data were downloaded, each question was placed in a category based on whether it would be included in the logistic regression analysis (i.e. the dependent variable or one of the five independent variables) or whether the descriptive statistics would be used to answer one of the research questions. See Appendix D for a list of the coding for each of the variables in the logistic regression. An expanded descriptive summary of the survey results can be found in Appendix E.

Demographics of Survey Participants

Location of participants. There were participants who responded to the online survey from all five Gulf states involved in the COSEE:CGOM program. Figure 3.1 indicates the number of participants from each state who responded to the survey versus those who did not respond, but were sent an invitation. Texas did not participate in the COSEE:CGOM grant after the summer of 2005; therefore, the number of potential survey participants was lower for that state. Participants in Mississippi had the lowest response rate in comparison to the others states. It should be noted that the participants may have attended the COSEE:CGOM Institute in a neighboring state. Thus, Figure 3.1 represents the state of residence that the participants reported and not necessarily the state in which they attended the Institute.

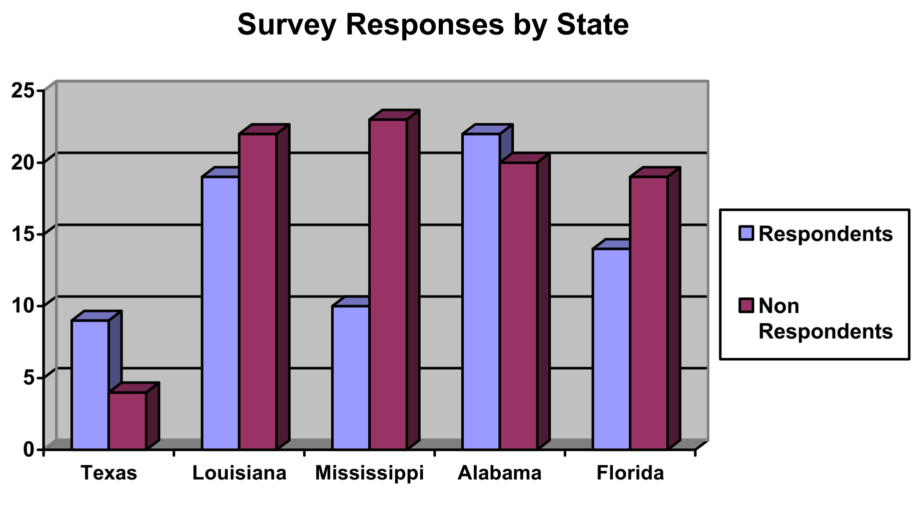

Figure 3.1 Survey Responses by State

Seventy-five percent of the respondents (57 out of 76) reported attending one COSEE:CGOM Institute. The other 25% of the respondents (19 out of 76) reported they had attended more than one COSEE:CGOM Institute. This statistic is relevant because participants are to participate for only one year in the Institute. A closer inspection of the data revealed that those reporting multiple experiences had done so for one of the following reasons: (a) they were a teacher at the time they attended the COSEE:CGOM Institute and changed professions, participating as a researcher in a subsequent year, (b) participated in one of the programs similar to COSEE:CGOM prior to 2003 (such as Coast Pilot) and had a difficult time distinguishing between them, (c) attended the summer COSEE:CGOM Institute and also attended one of the Two-Day Workshops during the school year, (d) attended a COSEE Institute in another region of the country (COSEE-SE), or (e) mistakenly received the survey and were later found to be a COSEE Educator or Scientist rather than a classroom teacher. There were more respondents who participated in the survey that attended the Alabama Institute (29.9%) versus the other four states, Louisiana (27.3%), Mississippi (20.8%), Florida (14.3%), and Texas (10.4%) respectively.

Teacher Demographics

The majority of the survey respondents were Caucasian (89.1%) and female (83.3%). Other ethnicities represented in the data included: African American (4.7%), American Indian/Alaska Native (3.1%), Asian/Pacific Islander (1.6%), and Hispanic (1.6%).

The COSEE:CGOM Institute was designed for teachers in the middle grades. However, some school districts define middle school differently than others. For example, in one school district middle school could be grades 6th-8th while in another district it could be 7th-9th. In addition, some middle schools begin their students at grade five. Figure 3.2 reveals that there seems to be a large number of teachers attending who teach high school. However, this figure should be interpreted with caution. In some cases, high school teachers were extended an invitation to participate in the Institute because there were not enough middle school teachers who agreed to attend. In other cases, the teacher has changed grade levels and is now teaching high school but at the time of the Institute was teaching middle grades. This is an important statistic to report because it helps to understand the findings of the survey when the grade level taught is taken into consideration. For example, some teachers may have reported lower use of lesson plans because they have changed grade levels or are teaching different subject matter. The "other" category consisted of teachers who reported teaching community college or who reported they are no longer teaching.

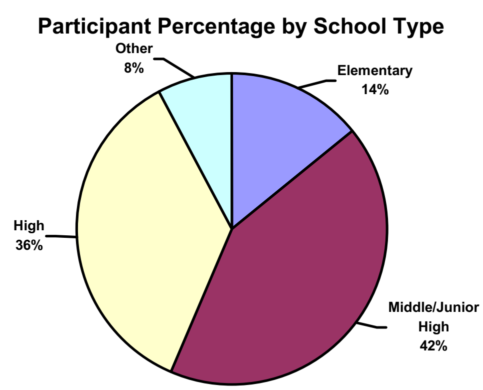

Figure 3.2 Participant Percentage by School Type

Overall, there was an assorted mix of teachers with varying experiences who completed the survey. Figure 3.3 displays the percentage of respondents based upon their teaching experience. Each category of teaching experience had approximately 20% of the participants (with the exception of those teachers who had taught for more than 23 years). This represented a diversity of teaching experience in the survey results. With this in mind, it was decided to select interview participants who characterized this range of teaching experience.

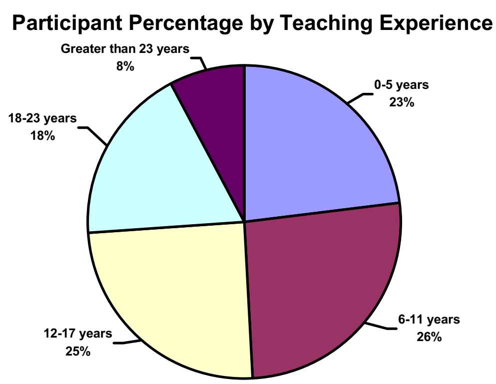

Figure 3.3 Participant Percentage by Teaching Experience

The majority of the survey respondents reported having a regular or standard state certification (87.5%). Others reported holding an alternate route certification (6.3%), temporary, emergency, or provisional certification (1.6%), or certification by an accreditation body other than the state (1.6%). Two teachers reported not having a certificate in their main assignment field (3.1%).

Five teachers reported that they were Nationally Board certified (8.1%), while six (9.7%) reported they were currently in the certification process. The other 82.3% were not Nationally Board certified and did not report intensions of completing this process.

Respondents described a broad range of science disciplines they were certified or endorsed to teach. Participants were allowed to check as many disciplines as applicable. This explains the cumulative percentage over 100. Figure 3.4 displays the variety of science subjects participants reported.

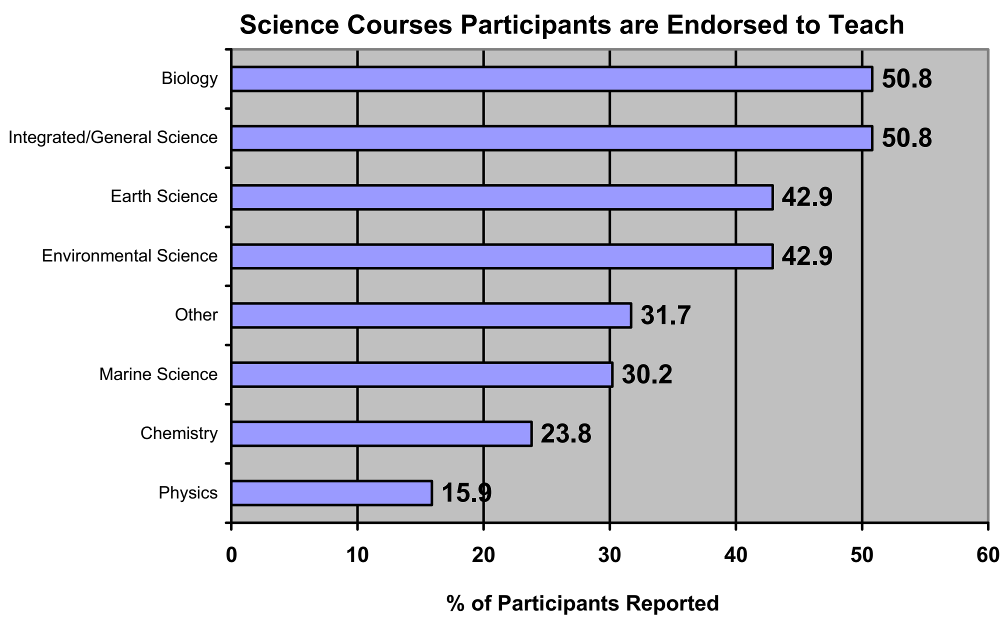

Figure 3.4 Science Courses Participants are Endorsed to Teach

In Figure 3.4, "Other" areas of endorsement reported by respondents included: elementary, SPED, math, gifted, forensics, social studies, technology, and Spanish.

Over half of the survey respondents reported belonging to at least one professional teacher organization. Teachers were asked to check all organizations in which they are an active member. Overwhelmingly, 67.9% reported active membership in the National Science Teachers Association (NSTA). Other organizations teachers reported with high percentages were the National Education Association (39.6%) and the National Marine Educators Association (24.5%). In addition, over half of the survey respondents reported having a current subscription to at least one science magazine or journal. The majority of teachers who answered the survey held at least a Bachelor's degree (33.8%) or a Master's degree (49.2%). Over half of the survey respondents (58.5%) reported that it was difficult for them to stay current with the latest scientific research, while 41.5% of the respondents reported no problems with staying current. A larger percentage of survey participants reported having difficulties finding time to stay current with the latest scientific research (75.4%). Although respondents stated difficulty with finding time to stay up-to-date with the latest scientific discoveries, only 36.9% reported having difficulty interpreting the findings of scientific research.

Year Attended Institute

In order to determine if time elapsed since attending the COSEE:CGOM Institute was a factor in the use of COSEE:CGOM materials and lesson plans, each participant was asked to provide the year in which they attended the Institute. Figure 3.5 below reveals that for each year of the five year period from 2003-2007, there were roughly the same number of respondents to the survey. Therefore, the survey data should be a valid representation of the participants from each of the five years.

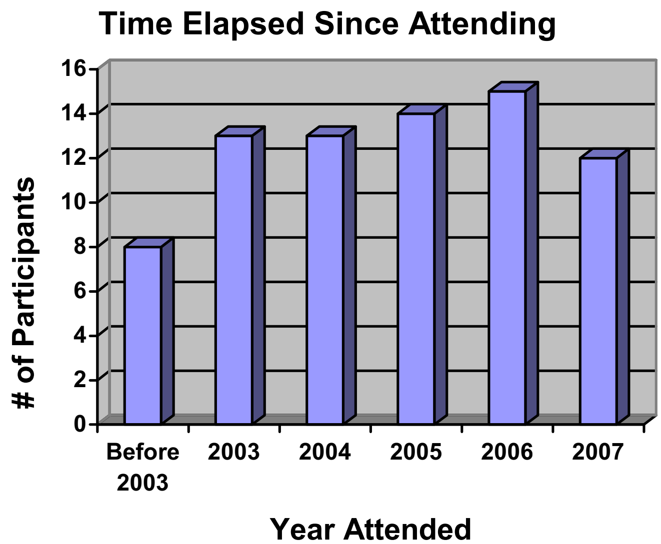

Figure 3.5 Year Participants Attended COSEE:CGOM Institute

School Demographics

The majority of survey respondents teach in a public school district (86.2%) while a smaller percentage currently teach in private schools (4.6%). The other 9.2% of respondents reported teaching in specialized school settings (School for the Deaf and Blind), homeschool, are no longer in the teaching profession, or are unemployed. There were differences in the number of students who were served at each individual school as displayed in Figure 3.6.

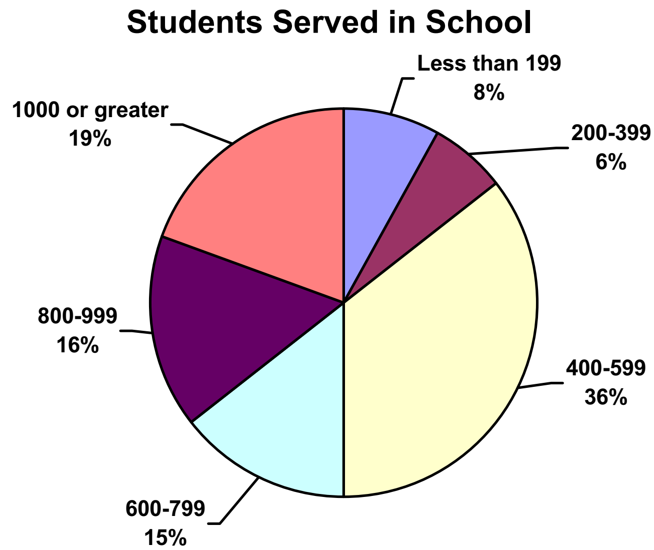

Figure 3.6 Students Served in School

More respondents reported living in a rural area (57.8%; which was defined as greater than 25 miles from a city with a population greater than 100,000) than reported living in an urban area (42.2%; which was defined as less than 25 miles from a city with a population greater than 100,000). The largest percentage of respondents reported that the average teacher to student ratio in their classrooms was between 1:22-1:27 (41.0%). These ratios are displayed in Figure 3.7.

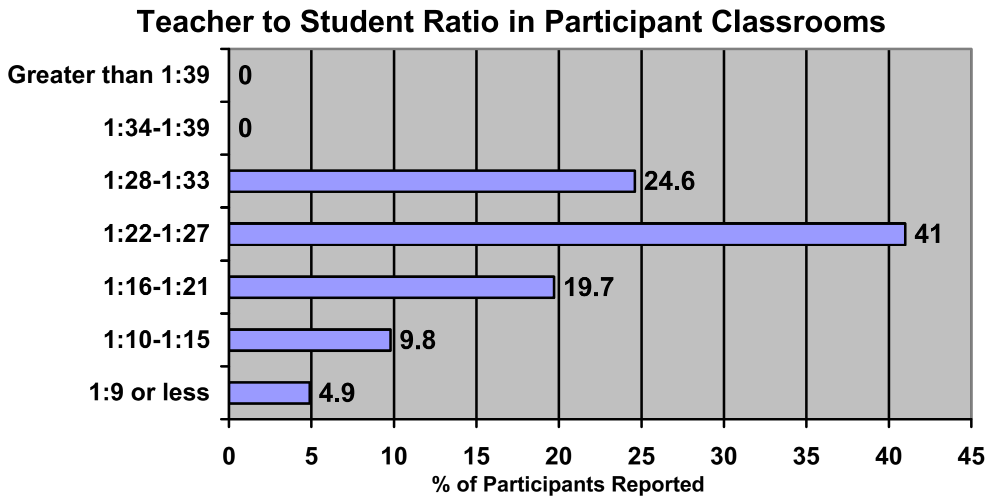

Figure 3.7 Teacher to Student Ratio in Participant Classrooms

Availability of Resources

Survey respondents reported receiving most or all of the resources they needed to teach their classes from their school or district. Figure 3.8 reveals how participants perceived their availability of resources.

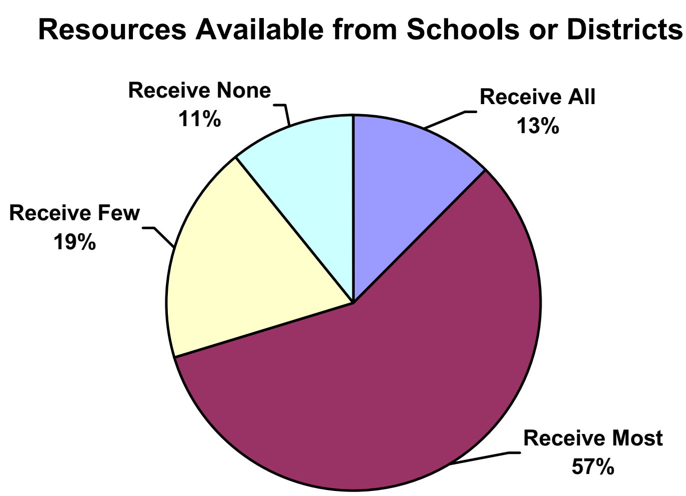

Figure 3.8 Resources Available from Schools or Districts

Most respondents reported having a computer in their classroom (95.4%) and also having a personal computer in their classroom intended for teacher use only (88.5%). When asked about computers available for student use in the classroom, there was a broader range of responses in terms of the number of computers available and with a working Internet connection. Figure 3.9 displays the number of computers available for student use in the respondents' classrooms. The majority of respondents had between one and four computers available for student use (73.1%) in their classroom.

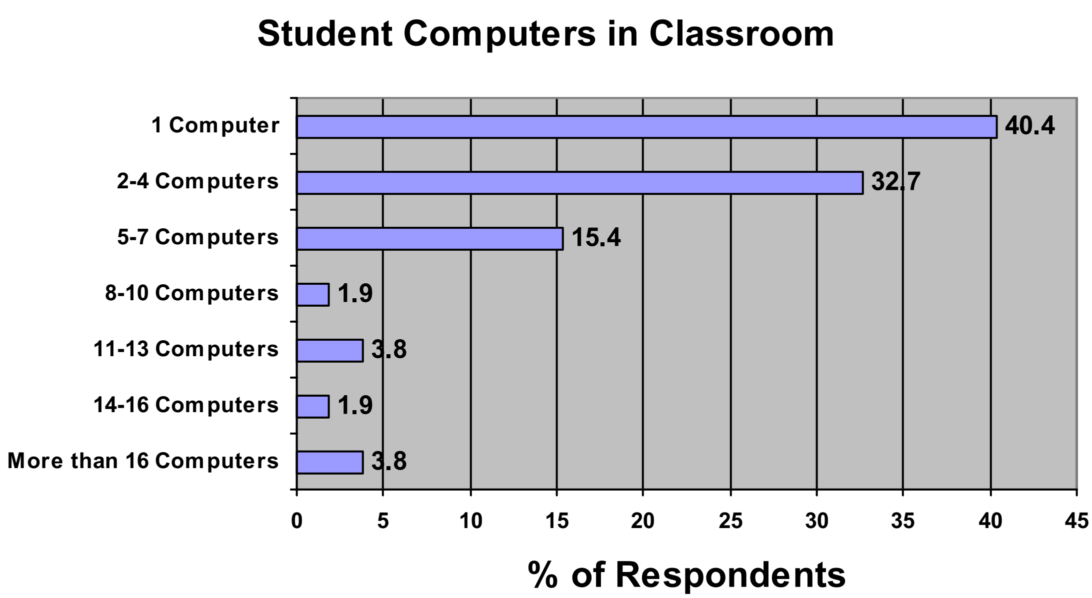

Figure 3.9 Student Computers in Classroom

Of the respondents who had student computers in their classroom, 78.3% also had Internet connectivity either via a phone/cable line or wireless connection for these student computers. Although some respondents did not have Internet connectivity in their classrooms for all students, there was a range of alternative locations in the schools where students could get access to the Internet. Figure 3.10 outlines these alternate locations and the percentage of teachers who reported having access to them in their schools. It should be noted that respondents could choose more than one location. This is reflected in the cumulative percentage which is over 100.

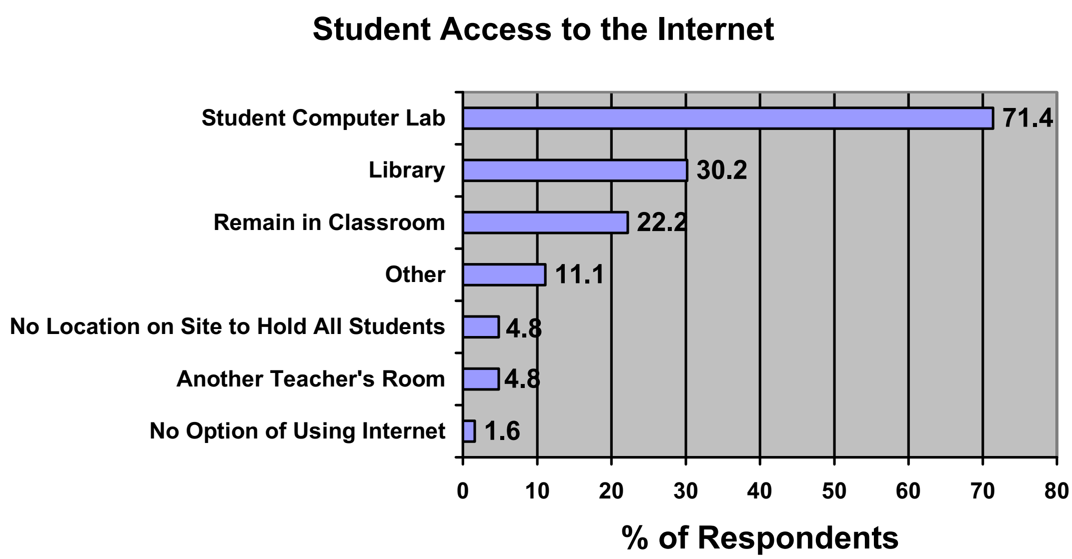

Figure 3.10 Alternate Internet Locations for All Student Access to Internet

In terms of money available to teachers in their science classrooms, only about half of the teachers reported having a science budget (55.6%), while 31.7% reported having no budget and the other 12.7% did not know if they had a science budget. The amount of money available to teachers in their science classrooms varied. Figure 3.11 depicts the percentages of respondents who reported the money they were allotted per school year.

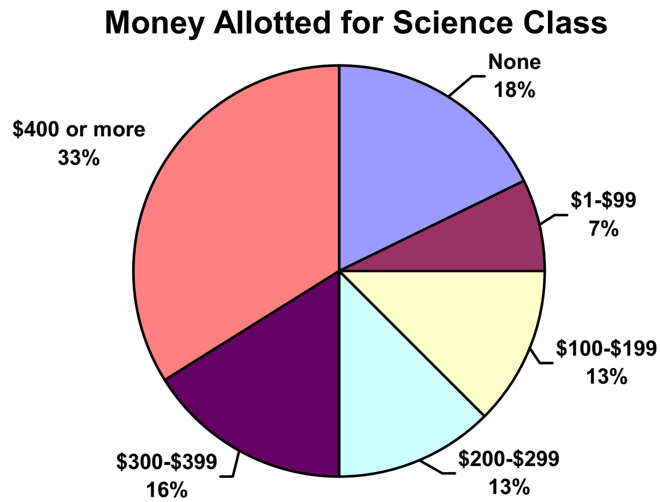

Figure 3.11 Money Allotted Per School Year for Science

Overall, 74.2% of respondents reported having the resources they needed to implement the COSEE:CGOM lesson plans. The other 27.4% who did not believe they had the resources to implement the plans gave a list of what they would need in order to be able to use them: science equipment and consumable materials budget, aquariums, heaters, coolers, living labs, more technology, resources they could borrow (resource books, supplies), and water quality kits. Other reasons cited for not utilizing the lesson plans were: not enough space in their classroom and distance from the coast too great to make a field-trip with students. These explanations reveal that some teachers perceive that the lesson plans be used in a field-trip setting or with other extensive and well-equipped laboratories. This fact will be explored in the analyses of interviews as a problem with participants' integration and incorporation into their existing curricula.

Opportunities for Use

The majority of respondents reported they are teaching the same grade level (73.3%) and same science classes (60.8%) now that they were teaching when they attended the Institute. Still, 26.7% are not teaching the same grade level as they did when they attended and 39.2% are not teaching the same science classes. This became relevant when conducting the interviews. Teachers who were teaching a different science class were no longer able to use the lesson plans they had created while at the COSEE:CGOM Institute or had to modify them in order to fit their new course and standards.

Other differences emerged in the amount of time teachers were teaching their science classes. Figure 3.12 displays the variety of daily schedules followed in the participants' schools. Block schedules typically range from 90 minutes to two hours in length, while teachers who teach in schools with 6, 7, or 8 periods a day may have 40 to 60 minutes for a class. However, block schedules generally rotate such that each class is taught every other day while traditional 6, 7, or 8 periods meet each day. There are a wide range of differences between schools and districts so it is difficult to capture all potential combinations in a survey. It is important to note that teachers have different time periods in which to convey information to students. This could affect what lesson plans they decide to use and how often they decide to use them. Schedules not listed in the figure below which fall under the category of "Other" were: teachers who now teach college, homeschool, Montessori setting where students decide when to do science, three-period a day schedule, no longer teaching, and informal science center settings.

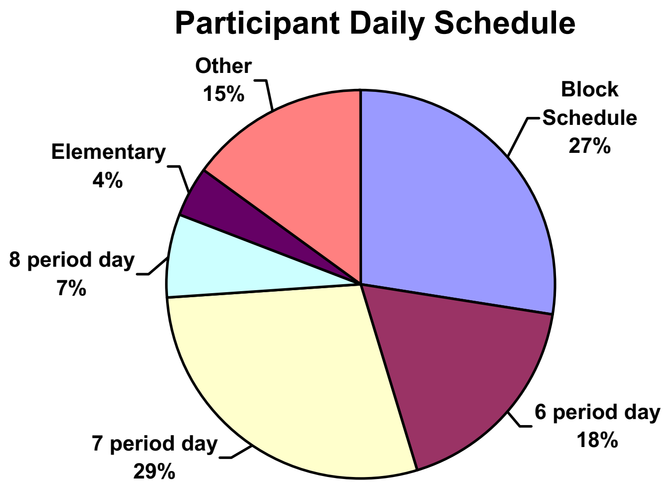

Figure 3.12 Participant Daily Schedule

In addition to variations in time spent teaching science, respondents also reported differences in the number of assorted science classes they teach each semester. For example, if a participant taught Biology for two periods and Integrated Science for three periods a day, this would total two different science classes taught that semester. Figure 3.13 summarizes these differences in opportunities for presenting COSEE:CGOM concepts in the classroom. Some courses lend themselves to integration of COSEE:CGOM topics more readily than others. This figure reveals that some teachers have a greater variety of subjects they teach in a semester than others. It should also be noted that some respondents no longer teach science or teach other subjects during the day (i.e. math, social studies).

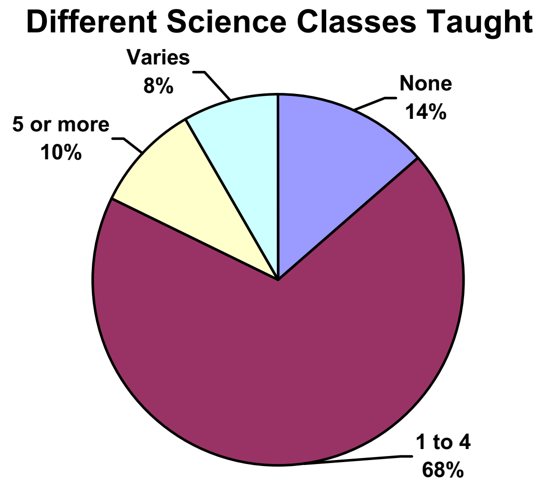

Figure 3.13 Participant Different Science Classes Taught in a Semester

Respondents were also asked how many periods a day they teach science subjects and which subjects they teach. Figure 3.14 conveys the number of class periods in which teachers reported teaching science. The “Other” category consists of respondents who were no longer teaching or taught science subjects that were not listed on the survey (i.e. environmental science). A list of these subjects is located in Appendix D along with the expanded survey results.

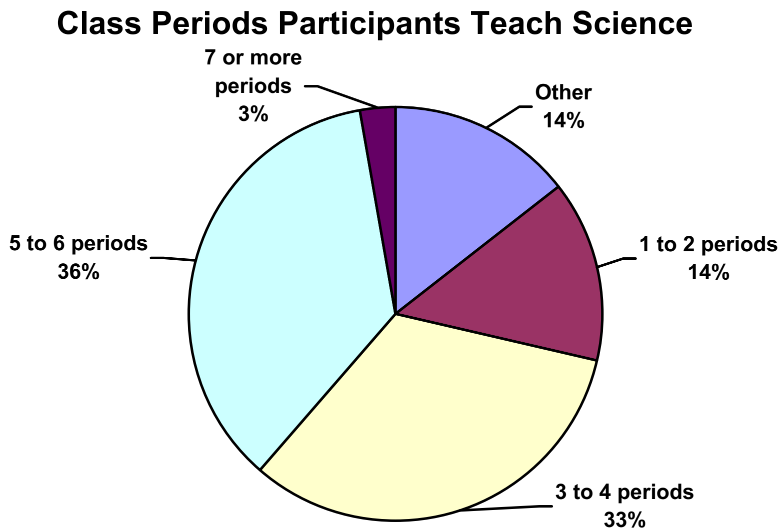

Figure 3.14 Number of Class Periods Participants Teach Science

Participants were asked how many classes they teach in which they could use the COSEE:CGOM lesson plans. In the survey, this question was expanded to allow participants to denote which subject areas and periods per day they believed they could use the plans. Figure 3.15 displays a summary of those respondents who believed they could use the lesson plans in multiple subjects versus those who believed they could use the plans in one subject or no subjects. It is important to note those respondents reporting use of lesson plans in only one subject may teach that same subject several periods during the day. Therefore, Figure 3.15 should be interpreted with caution when determining teachers' opportunities for use of lesson plans in their classrooms.

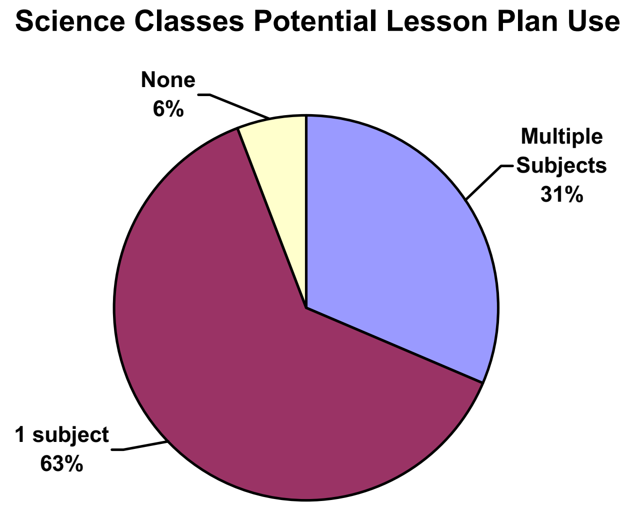

Figure 3.15 Science Classes Participants Reported Potential Use of Lesson Plans

Participants were asked about the amount of preparation time they had per week to plan for their classes. Figure 3.16 details the differences in planning period time per week for respondents. The majority of participants (53.7%) reported they had five or more hours per week to prepare for teaching.

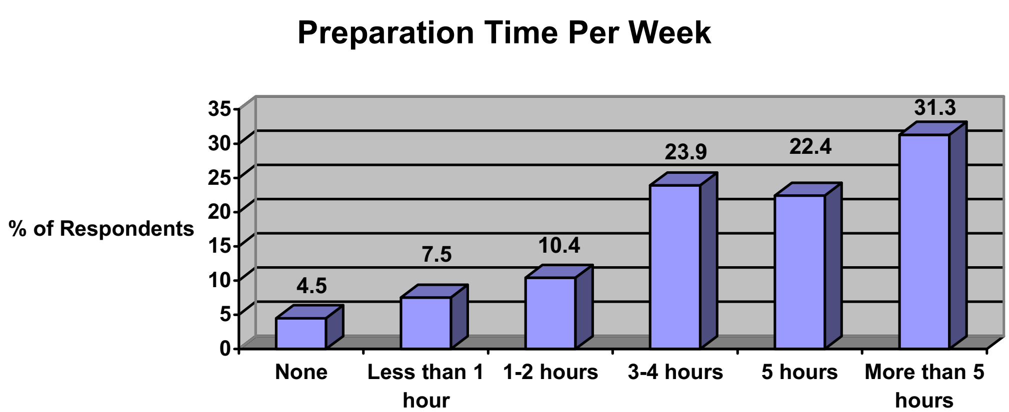

Figure 3.16 Preparation Time Per Week

Lesson Plan Descriptive Statistics

Respondents were asked about their creation of lesson plans and the frequency with which they used the plans they created while attending the COSEE:CGOM Institute. Figure 3.17 compares the number of lessons respondents reported creating at the Institute and the number of lessons they reported downloading from the Web site after the Institute.

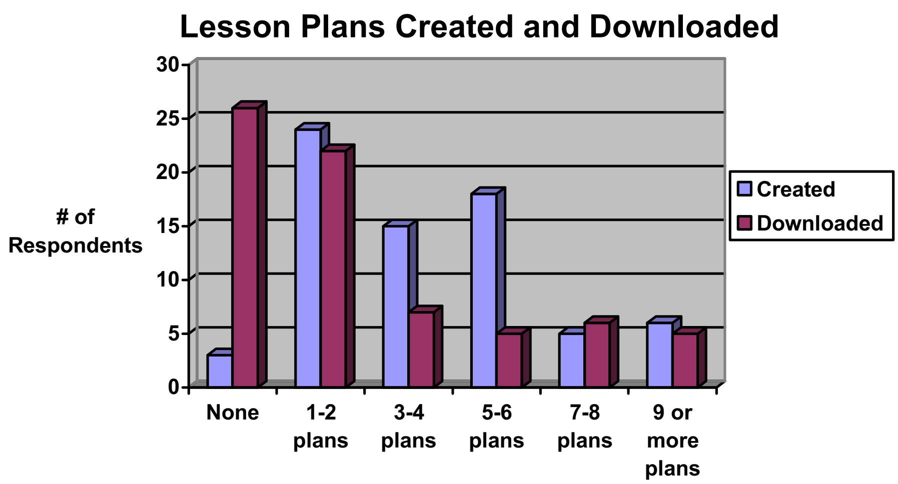

Figure 3.17 Lesson Plans Created and Downloaded by Participants

Of the lesson plans participants created or downloaded, 81.4% reported using them. Figure 3.18 displays the reported use of lesson plans both created and downloaded by participants.

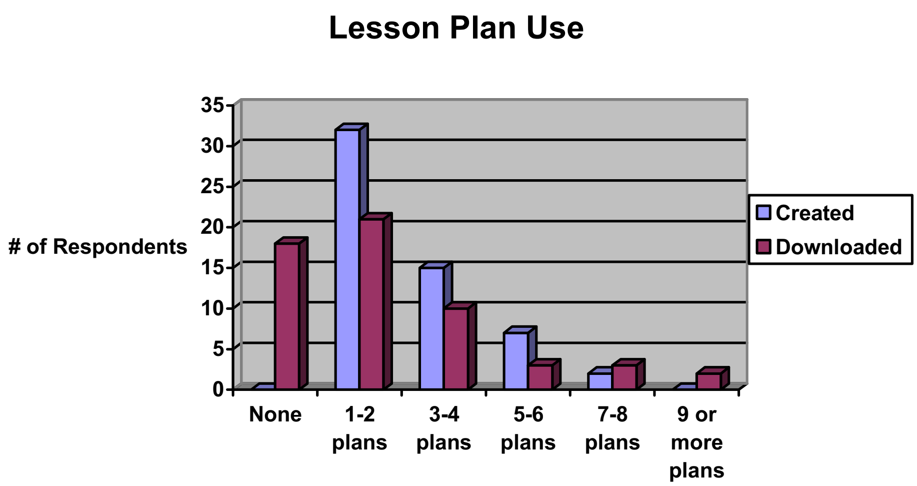

Figure 3.18 Lesson Plan Use

Respondents were asked to characterize the frequency with which they use the lesson plans either created or downloaded. Figure 3.19 reveals respondents tend to use lesson plans on a monthly, semester, or yearly basis. This was explained in the interviews by teachers who commented they use lesson plans to teach certain topics during the year. It should be noted the frequency reported could be determined by the type of schedule the teacher is required to follow by the school. Therefore, this finding should be interpreted with caution. The interviews with teachers gave more insight into the reasons why they may use the lesson plans more or less frequently.

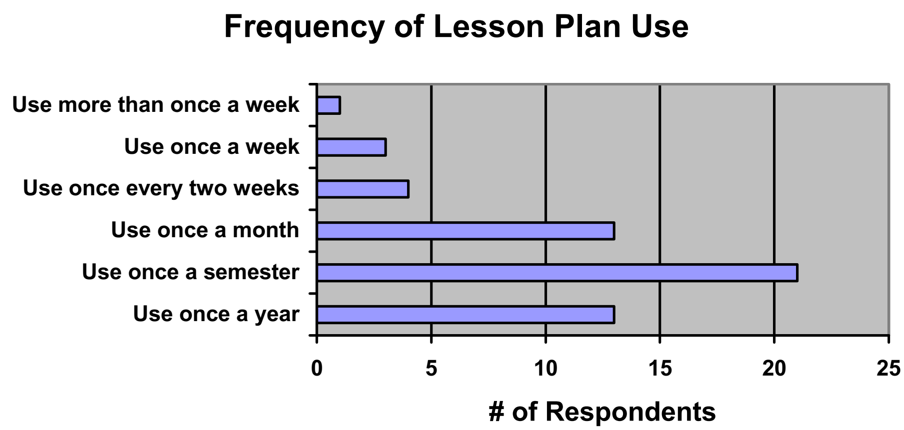

Figure 3.19 Frequency of Lesson Plan Use

There were many ways in which respondents are using the COSEE:CGOM lesson plans. Figure 3.20 displays the manner in which teachers are using the lessons in their classroom. It should be noted teachers could select more than one way in which they are using the plans.

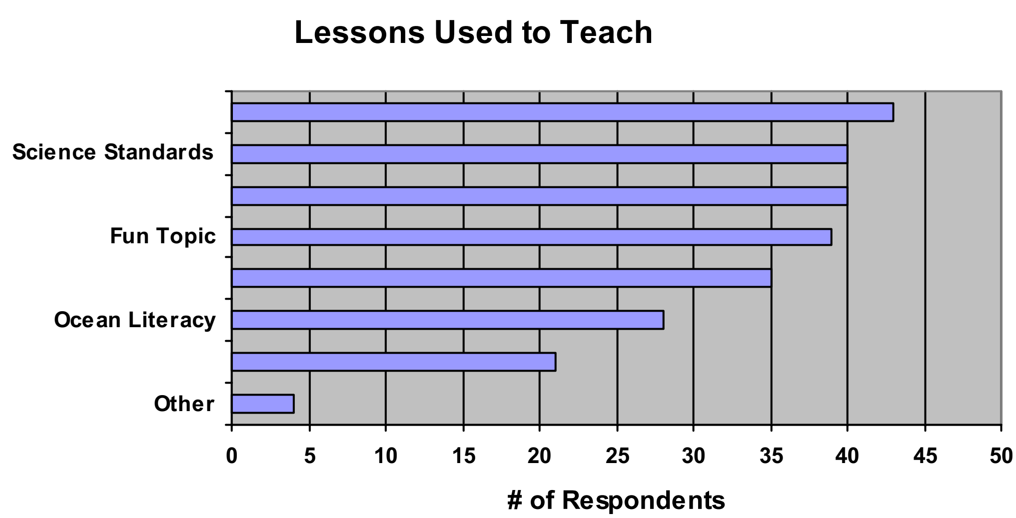

Figure 3.20 Ways Lesson Plans are Used by Participants

Of the three themes or categories under which COSEE:CGOM lesson plans are organized, Habitats and Organisms is used most often (80.4%), followed by Coastal Processes (73.2%) and Marine Technology (25%). On a Likert-scale, 98.2% of respondents agreed or strongly agreed that the COSEE:CGOM lesson plans were easy to understand (clear format and wording), 96.4% reported they were easy to use, 100% agreed they were aligned to *National Science Education Standards*, 100% agreed they were aligned to *Ocean Literacy Essential Principles and Fundamental Concepts*, and 98.1% reported the plans were aligned to their *State Science Education Standards*. Most of the survey respondents reported they had evaluated student learning of the lesson plans after implementation. Figure 3.21 reveals the ways in which teachers have evaluated student learning after presenting a COSEE:CGOM lesson plan. Again, participants could select more than one way in which they have evaluated student learning of the plans.

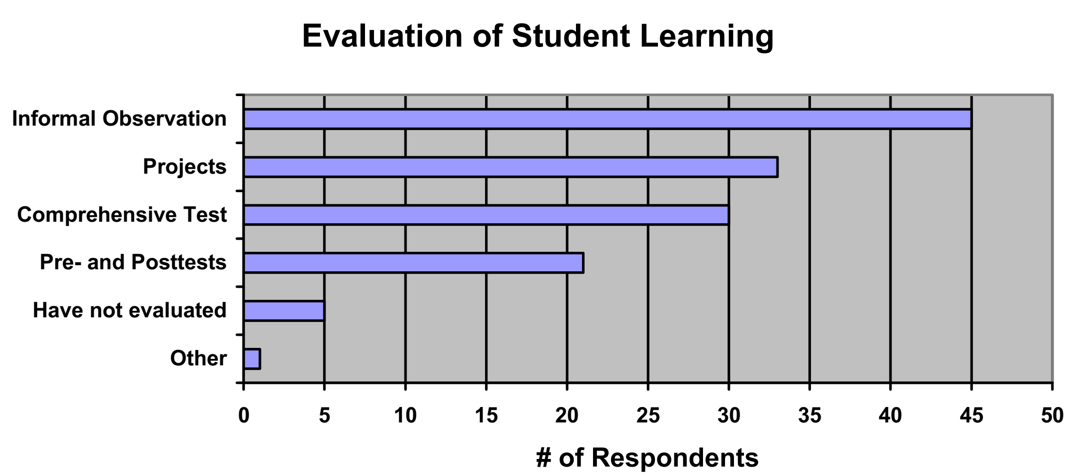

Figure 3.21 Evaluation of Student Learning by Participants

Less than half of the survey participants (46.4%) reported using the PowerPoint® presentations that complement some of the lesson plans. Of those participants who reported using the PowerPoint® presentations, the majority (58.1%) indicated they used them one to three times per year. In addition, 64.5% of the PowerPoint® users claimed they have used one to three PowerPoint® presentations more than once. Although a smaller number of participants reported using the PowerPoint® presentations at all, the respondents who did report usage claimed that the PowerPoint® presentations were user-friendly (96.8%). Overwhelmingly, 100% of respondents reported that if they had never used the PowerPoint® resources before, they believed this was a resource they could use in the future.

In terms of potential future use of COSEE:CGOM lesson plans, 90.8% of respondents said they plan to use the lesson plans in the future. The average response for how many lesson plans a participant had used at least once was 4.17. Figure 3.22 reveals how many lesson plans respondents estimated they would use in the next school year (2008-2009).

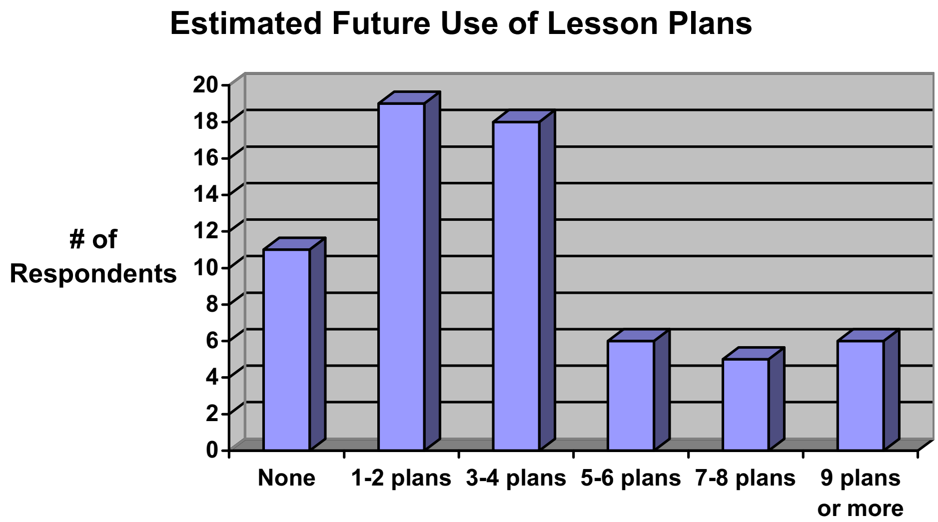

Figure 3.22 Estimated Future Use of Lesson Plans

Survey participants said they would be more likely to use the COSEE:CGOM lesson plans in the future if: (a) there was a search engine to help find relevant lesson plans online (50.8%); (b) teachers were sent an e-mail when new lesson plans were added to the Web site (47.7%); (c) the COSEE:CGOM lesson plans were linked to other lesson plans databases (32.3%); and (d) teachers were allowed to add their own lessons after attending the Institute (9.2%). Approximately 12% of the respondents believe the current Web format is fine and does not need to be revised. In the "Other" category, respondents reported they would be more likely to use the lesson plans in the future: (a) if the plans did not contain technology (due to lack of resources at their school); (b) if participants taught science classes again; or (c) if the plans correlated with their particular state's standards. If a search engine was created to allow participants to search the Web site for lessons, teachers indicated they would prefer to search by grade level (76.9%), theme (66.2%), subject area (49.2%), and state standard (46.2%) rather than by

Institute/Workshop (3.1%), *National Standards* (15.4%), or *Ocean Literacy Essential Principles and Fundamental Concepts* (7.7%). It should be noted respondents could select multiple answers for this question.

Other Relevant Survey Descriptive Statistics

Science as inquiry. The majority of survey respondents reported using inquiry to teach science in their classrooms (80.6%). Still, 4.5% said they did not use inquiry and 14.9% were not sure if they used inquiry. When asked to explain how they used inquiry in their classrooms, participant answers ranged from detailing how they use hands-on labs, to open-ended questioning techniques, to constructivist approaches to teaching, to the use of authentic assessments, or to providing dilemmas that students must work together to solve. Most respondents explained they used lab activities to engage students in scientific inquiry.

Dissemination of information. Most of the respondents reported they had disseminated information they learned at the COSEE:CGOM Institute to their school, district, state, or nationally (80.3%). How they disseminated information was varied. Figure 3.23 documents the many ways in which teachers have shared what they learned at the Institute with others. Teachers were allowed to select more than one way in which they have disseminated the COSEE:CGOM information.

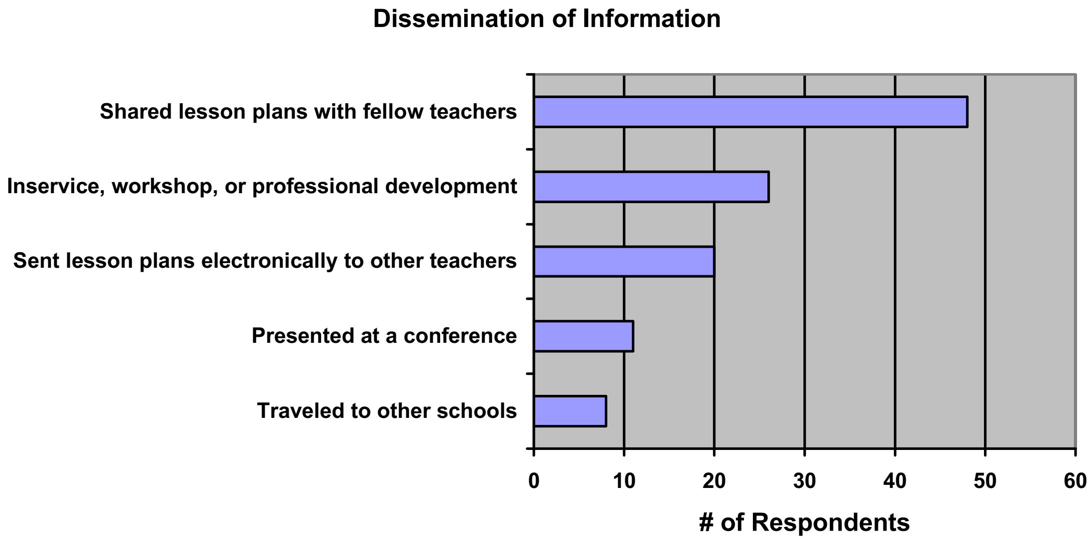

Figure 3.23 Ways of Disseminating COSEE:CGOM Knowledge

Future COSEE:CGOM Institute attendance. The majority of participants (90.8%) specified that they would attend a COSEE:CGOM Workshop or Institute in the future; 10.8% indicated they would not participate in future Institutes. Participants who indicated they would participate in the future would do so for the following reasons: (a) the workshops and hands-on experiences were "invaluable," (b) enjoyable learning atmosphere, (c) interaction with research scientists, (d) to keep up-to-date with current information, (e) to gain new resources, (f) expanded their knowledge of the Gulf coast area, (g) felt energized as a teacher, (h) networking opportunities, (i) field experiences, and (j) enjoyed working with other teachers. Participants who would not participate in the future sited the following reasons: (a) would like to attend but bad health (cancer) may not permit them to be involved; (b) if the subject matter was changed each time, they would participate in future sessions; (c) if the scientists were more collaborative and helpful, they would participate; (d) no longer teach science or are retired; (e) not applicable to what they are teaching; and (f) believed they had a bad experience related to their post-COSEE experience involving their assignments and the way credit for the program was granted.

Collaboration with scientists and peers. On the survey, participants were asked to describe how they have maintained contact with the scientists, peer teachers, and COSEE:CGOM instructors since their participation in the Institute. Table 3.1 details their responses to this question. The majority of participants (56.4%) did not keep in touch with scientists who were at their Institute after the Institute was completed. However, 36.4% reported keeping in touch via e-mail, and 9.1% via the COSEE:CGOM online discussion board. A greater number of participants reported keeping in touch with their fellow teachers via e-mail after the Institute (59.6%) than those that did not keep in touch at all (38.6%). Similarly, more participants reported keeping in touch with their COSEE:CGOM Instructors via e-mail after the Institute (60%) than those who reported not staying in contact (38.2%). Clearly, the online discussion board was not utilized by participants after the Institute as a means of continued communication.

Table 3.1 Participant Reports of Continued Contact with COSEE:CGOM Constituents

	Via the online discussion board	Via e-mail	Did not keep in touch	Response Count
Scientists	9.1% (5)	36.4% (20)	56.4% (31)	55
Peer Teachers	1.8% (1)	59.6% (34)	38.6% (22)	57
COSEE:CGOM Instructors	1.8% (1)	60.0% (33)	38.2% (21)	55
Other	0.0% (0)	9.1% (1)	90.9% (10)	11
			Answered question	64
			Skipped question	16

* Numbers in parentheses represent respondents who selected that choice.

Participants were asked to rate their experiences working with research scientists on a Likert-scale. Table 3.2 displays the questions they rated, the percent of participants who rated in each category, and the overall count of responses. The majority of participants (93.6%) agreed or strongly agreed that they enjoyed working collaboratively with research scientists in developing lesson plans. In addition, they believed they benefited professionally from this collaboration (95.2%), perceived the lessons they created were based on the most scientific research (91.8%), and believed the lessons they created during the partnership with scientists were of a higher quality than plans they might produce on their own (83.9%). Participants also said they would seek assistance from the research scientists in the future (82%). Communication with the scientists also rated high and the majority of participants responded they believed the scientists listened to what they had to say and that each party learned from one another (85.4%).

Table 3.2 Likert-scale Survey Results for Collaboration with Scientists

	Strongly Agree	Agree	Disagree	Strongly Disagree	Rating Average	Response Count
I enjoyed working collaboratively with the research scientists in developing lesson plans.	**60.3% (38)**	33.3% (21)	4.8% (3)	1.6% (1)	3.52	63
I benefited professionally from working collaboratively with the research scientists at the COSEE:CGOM Workshop or Institute.	**71.4% (45)**	23.8% (15)	3.2% (2)	1.6% (1)	3.65	63
I believe the lesson plans I created are based on the most recent scientific research.	**49.2% (30)**	42.6% (26)	6.6% (4)	1.6% (1)	3.39	61
The lesson plans I created collaboratively with the scientists/researchers are of a stronger quality than if I had produced them on my own.	**45.2% (28)**	38.7% (24)	12.9% (8)	3.2% (2)	3.26	62
I found it difficult to communicate with the scientists/researchers.	5.0% (3)	13.3% (8)	28.3% (17)	**53.3% (32)**	1.70	60
I would seek assistance from these scientists/researchers in the future.	**41.0% (25)**	**41.0% (25)**	14.8% (9)	3.3% (2)	3.20	61
I believe I would have created better lesson plans without help/input from the scientists/researchers.	3.4% (2)	3.4% (2)	36.2% (21)	**56.9% (33)**	1.53	58
I believe the scientists/researchers listened to what I had to say and we learned from each other.	**54.8% (34)**	30.6% (19)	11.3% (7)	3.2% (2)	3.37	62
					answered question	64
					skipped question	16

Finally, participants were asked to comment on their experience of working with other teachers at the Institute. Table 3.3 delineates 95.4% of participants shared the information they learned at the COSEE:CGOM Institute with other teachers in their school. Additionally, 98.4% of respondents enjoyed working with their peer teachers at the Institute and 98.4% of participants believed they benefited from the collaboration they had with other teachers at the Institute.

Table 3.3 Likert-scale Survey Results for Collaboration with Teachers

	Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**	**Rating Average**	**Response Count**
I have shared the information I learned in the COSEE:CGOM Workshop or Institute with other teachers in my school.	38.5% (25)	**56.9% (37)**	3.1% (2)	1.5% (1)	3.32	65
I enjoyed working with other teachers at the COSEE:CGOM Workshop or Institute.	**61.5% (40)**	36.9% (24)	1.5% (1)	0.0% (0)	3.60	65
I benefited from the collaboration with other teachers at the Workshop or Institute and prefer this method of learning.	**65.6% (42)**	32.8% (21)	1.6% (1)	0.0% (0)	3.64	64
					answered question	**65**
					skipped question	**15**

Summary of Descriptive Statistics from Survey

Taken together, these descriptive statistics help paint a picture of the demographics of the participants; how they perceive their available resources and support; what opportunities they have for integrating COSEE:CGOM concepts into their curricula; and the differences that exist among participants. Results of the Likert-scale items on the survey suggest that teachers enjoyed their interaction and active partnership with the research scientists and were able to see this relationship added to the value of their overall experience. This supports the findings of Varelas, et. al. (2005) that suggested this interaction between science experts and novices allows teachers to make connections between their experiences and the cultural practices in a lab with their practice in the classroom. Drayton and Falk (2006) found that when structured correctly, teacher-scientist partnerships can deepen a teachers' sense of professional competence. This finding was demonstrated in respondents' rating of the lesson plans they created with the scientists. They believed the lesson plans they created with the scientists were more grounded in science than ones they might created on their own. The findings also support the benefits of peer-teaching as described by Hutchins (1994). Participants reported positive ratings of collaboration with their peer teachers, enjoyed working with their peers, and shared the information they learned with other teachers when they returned to their schools. Although the descriptive statistics give a glimpse into the perceptions that teachers have of their COSEE:CGOM experience, additional analyses are necessary to address the usage of lesson plans (a product of this experience) by teachers and the factors that may help or hinder the usage of these lessons. For insight into this issue, a different statistical method was employed.

Logistic Regression Analyses

Logistic regression analyses were run in order to identify potential predictor variables that may hinder or enhance participant use of lesson plans. This statistical method was appropriate as it allowed a model to be developed that could predict frequency of use of lesson plans by teachers. In order to run the logistic regression analyses, every answer choice under each survey question had to be coded and entered into SPSS© Version 15.0 for Windows. This coding was achieved by downloading the condensed survey data from *SurveyMonkey* in the form of an Excel spreadsheet. Each question number was then entered in a table and the consecutive coded variable number was assigned to the question (see Table 3.4). This nomenclature allowed for ease of coding from Excel spreadsheet to SPSS© data entry worksheet.

Table 3.4 Independent Variable Matched to the Numbered Survey Question

Independent Variable Group	Survey Question Number	Excel Spreadsheet Variable Number
Frequency	Q34	V1 (original cut off) V2 (cut off after frequency distribution)
Available Resources	Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46	V3 V4 V5 V6 V7 V8 V9 V10 V11

Table 3.4 (continued)

Independent Variable Group	Survey Question Number	Excel Spreadsheet Variable Number
Time Elapsed	Q47	V12
School Demographics	Q50 Q54 Q58 Q59 Q60 Q63	V13 V14 V15 V16 V17 V18
Teacher Demographics	Q64 Q65 Q66 Q67 Q68 Q69 Q70 Q71 Q72 Q73 Q74	V19 V20 V21 V22 V23 V24 V25 V26 V27 V28 V29
Opportunities for Use *Lesson Plans*	Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9	V30 V31 V32 V33 V34 V35 V36 V37
Opportunities for Use *PowerPoint® Presentations*	Q22 Q23 Q24 Q25	V38 V39 V40 V41

After all of the data were coded and entered into SPSS©, a correlation matrix was produced to determine the strength and degree of relationship between the variables. According to the StatSoft Web site (2008), creating a correlation matrix is a common first step in data analyses where there is more than one variable. In this case, the correlation matrix allowed the researcher to examine all variables for expected (and unexpected) significant linear relationships. These relations are interpreted with caution as the general nature of statistic significance will find many statistically significant results when there are many correlations analyzed. However, this analysis did give a general idea of variables that were appropriate to include in the regression model. Those variables with positive linear relationships were selected to be the first variables tested in the regression model. A summary of the significant relationships matrix can be found in Appendix E. The significant correlations are reported below. The correlations are arranged by the five independent variable groups (teacher demographics, school demographics, available resources, opportunities for use, and time elapsed).

The following section is included to demonstrate the first step process in determining which variables might be appropriate to include in the modeling stage. Information concerning strong correlations helped to reduce the amount of time spent developing the final regression model, thus a summary of these correlations is included to set the stage for discussing the development of the model.

Teacher Demographics Significant Correlations

Beginning with the independent variable group of teacher demographics, five significant correlations are reported. The frequency variable denoted as “Freq2” refers to the number of lesson plans a participant reported using in a year. This continuous variable was modified into a dichotomous variable for purposes of analyzing the logistic regression. An explanation of how this was achieved is described later in this chapter under “Dependent Variable.” Correlation tables are located in Appendix F.

The frequency variable was found to have a positive linear relationship with the years of teaching experience variable (Year_Teach), $r = .295$, $n = 57$, $p < .05$, two-tailed. More teaching experience was associated with higher frequency of lesson plan use. The frequency variable (Freq2) had a strong inverse correlation with the grade level variable (GradeLevel), $r = -.319$, $n = 56$, $p < .05$, two-tailed. If the teacher taught a higher grade level, this was associated with lower frequency of use of lesson plans. The teacher's level of education variable (T_degree) significantly correlated with the years of teaching variable (Year_Teach), $r = .270$, $n = 65$, $p < .05$, two-tailed. Greater teaching experience is associated with higher levels of teacher education as defined by the number of degrees that a teacher holds.

The variable asking teachers if they subscribe to more than one journal (Journals) had an inverse correlation with Freq2, $r = -.401$, $n = 33$, $p < .05$, two-tailed. Teachers who subscribe to more than one science journal have a strong, positive linear relationship with teachers who use lesson plans more frequently. The Journals variable was coded such that a "1" answer meant "yes, I subscribe to more than one journal" and a "2" meant "no, I do not subscribe to more than one journal."

Finally, in this group of independent variables, teachers who were certified to teach more than one subject (Disc_Cert_T) were inversely correlated to the grade levels (GradeLevel) that the participant currently teaches, $r = -.268$, $n = 62$, $p < .05$, two-tailed. The higher the grade level that the teacher teaches is associated with a larger number of areas in which they are endorsed. This interpretation is made with the understanding that the variable Disc_Cert_T was coded as 1 being "yes, certified to teach more than one subject area" and "no, only certified for one subject area or teach elementary." The elementary teachers were placed in the "no" category because they are not endorsed to teach the higher level science disciplines of biology, chemistry, physics, Earth science, or marine science. Although they teach multiple subjects, the subjects are not on a level that PRAXIS exams require separate endorsement testing of knowledge. This is the case for all five states.

School Demographics Significant Correlations

For this group of independent variables, a total of five significant correlations are reported. First, teachers' perceived support from their administrator (Adm_Support) was strongly correlated with frequency of use (Freq2), $r=.267$, $n=57$, $p<.05$, two-tailed. Teachers who perceived having strong support from their administrators to attend the COSEE:CGOM Institute were associated with those teachers who reported higher frequency of use of lesson plans. The variable for teaching in a public or private school (Pub_Private) had an inverse correlation to the number of students served in the school (SsServed), $r=-.371$, $n=62$, $p<.01$, two-tailed. Public schools were coded with a 1 and private schools with a 2. The students served were coded into categories where the fewer students were given a 1 and the most students were given a 6. Therefore, this correlation can be interpreted that the public schools had a larger number of students served.

In addition, the students served in the school variable (SsServed) had a positive correlation with the number of students reported in a certain grade (Ss_in_grade), $r=.286$, $n=61$, $p<.05$, two-tailed. The larger the number of students reported in each grade was associated with a larger number of students reported per grade level. The variable for teaching in a public or private school (Pub_Private) also had an inverse relationship with the teacher to student ratio variable (T_Ss_Ratio), $r=-.474$, $n=61$, $p<.01$, two-tailed. Since the T_Ss_Ratio variable was coded with lower numbers meaning fewer students per teacher, this correlation can be interpreted to imply the private schools had a lower teacher to student ratio. Finally, the T_Ss_Ratio variable had a positive linear relationship with the Ss_in_grade variable, $r=.332$, $n=59$, $p<.05$, two-tailed. The larger the number of students per teacher corresponded to the larger number of students served in the grade.

Available Resources Significant Correlations

This group of independent variables also had five significant correlations to report. Teachers who reported they had at least one computer in their room (Computer) had a positive linear relationship with teachers who believed they had the instructional materials they needed (InstrMat) for their classroom, $r=.285$, $n=64$, $p<.05$, two-tailed. Teachers who reported having enough computers in the classroom for all students (AllSsAccess) also reported a larger number of student computers in their room (SsCompRm), $r=-363$, $n=51$, $p<.01$, two-tailed. It should be noted that the "AllSsAccess" variable was coded with a 1 denoting "yes, all students have access to a computer in my classroom" and a 2 denoting "no, not all students have access to a computer in my classroom."

Additionally, the variable for teachers who reported having the resources to implement the lesson plans (ResImplemt) had a positive linear relationship with the variable for teachers who reported having the instructional materials they needed in their classrooms (InstrMat), $r=.477$, $n=61$, $p<.01$, two-tailed. The teachers who reported having the resources to implement COSEE:CGOM lesson plans also reported receiving all or most of the instructional materials they needed for their classrooms. Another linear relationship found was between the variable stating all students had access to the Internet (AllSsAccess) and the variable asking if classroom student computers had Internet access (SsInternet), $r=.279$, $n=59$, $p<.05$, two-tailed. The category of teachers who reported having student access to computers in their room also reported having access to the Internet for student computers.

Finally, the variable for money allotted for science budget (MoneyAllot) was inversely correlated to the variable indicating teachers have a science budget (SciBudget), $r=-.348$, $n=56$, $p<.01$, two-tailed. The category of teachers who reported having a science budget also reported a larger amount of money they were allotted for their classroom. Since SciBudget was coded as 1 meaning "yes, I have a science budget" and 2 meaning "no, I do not have a science budget" and MoneyAllot was coded as lower numbers meaning less money allotted.

Opportunities for Use Significant Correlations

This final group of independent variables had six significant correlations to report. Not surprisingly, teachers who reported teaching the same science classes now that they taught when they attended the COSEE:CGOM Institute (Same_Sci_Class), had a strong correlation with those teachers who reported teaching the same grade (T_Same_Grade), $r=.633$, $n=74$, $p<.01$, two-tailed. The variable Sci_Cl_Use was coded such that teachers who reported being able to use the COSEE:CGOM lesson plans in multiple classes were coded with a "1" and those who were not, were coded with a "2." Therefore, Sci_Cl_Use had a significant inverse correlation with the Freq2 variable, $r=-.289$, $n=56$, $p<.05$, two-tailed. Teachers who reported using the lesson plans more frequently also reported being able to use the lesson plans in more than one class they taught.

The variable which asked teachers how many science classes they teach in a semester (Sci_Class_Teach), had a positive linear relationship with the variable which asked teachers how many different science classes they teach (Diff_Sci_Class). A larger number of science classes reported being taught was associated with greater number of different science classes taught, $r=.239$, $n=70$, $p<.05$, two-tailed. In addition, teachers who reported teaching greater numbers of science classes were strongly correlated with teachers who reported being able to use the COSEE:CGOM lesson plans in multiple classes, $r=-.326$, $n=68$, $p<.01$, two-tailed. It should be noted the variable Sci_Class_Use was coded such that an inverse correlation was determined (1=yes, multiple subjects; 2=no, only 1 subject). Refer to Appendix D for variable coding.

Finally, teachers who reported using the PowerPoint® presentations multiple times (PPMultUse) had a positive linear relationship with the number of times per year teachers reported using the COSEE:CGOM PowerPoint® presentations (PP_xyr_used), $r=.660$, $n=31$, $p<.01$, two-tailed. As expected, if a teacher reported using the PowerPoint® presentations more than one time, they also reported using them more times per year.

Time Elapsed Correlations

The time elapsed variable (TimeElapsed) did not have a positive linear relationship with the frequency (Freq2) variable. Therefore, the length of time since the participant attended the COSEE:CGOM Institute was not significantly correlated with their frequency of use of lesson plans in the classroom. Additionally, some variables were omitted from the regression analysis because there were not enough responses to the question. This was a result of the design of the survey where skip logic was used. Therefore, not every person answered every question. Although the significant correlations may have been reported for these variables, they were not included in the regression analysis model unless every participant had an opportunity to answer.

Dependent Variable

The dependent variable (frequency of use of lesson plans) for the logistic regression analyses had to be modified from a continuous variable to a dichotomous variable in order to perform the regression. Logistic regression is appropriate for a binary dependent variable (Hair et. al., 2006). In this case, the researcher sought to determine high or low frequency of use of lesson plans in order to develop a model for predicting lesson plan use by teachers. For this reason, the frequency variable had to be converted into a dichotomous variable. This was achieved by taking the number each teacher entered and running a frequency distribution in order to make a determination about where the cut off should be for high versus low frequency of use of lesson plans as reported by teachers. All cases were included in the frequency analysis of the dependent variable. Table 3.5 outlines the frequency distribution of teacher use of lesson plans. The cut off that was determined was between 0-two lesson plans (47.5%) and three or more lesson plans (52.5%). This left a total of 28 cases in the low frequency category and 31 cases in the high frequency category. Low was coded as "1" and high was coded as "2" in SPSS©.

Table 3.5 Frequency Distribution of Teacher Use of Lesson Plans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	8	6.2	13.6	13.6
	1.00	6	4.7	10.2	23.7
	2.00	14	10.9	23.7	47.5
	3.00	9	7.0	15.3	62.7
	4.00	3	2.3	5.1	67.8
	5.00	3	2.3	5.1	72.9
	6.00	3	2.3	5.1	78.0
	7.00	2	1.6	3.4	81.4
	8.00	4	3.1	6.8	88.1
	9.00	2	1.6	3.4	91.5
	10.00	1	.8	1.7	93.2
	12.00	1	.8	1.7	94.9
	14.00	1	.8	1.7	96.6
	15.00	1	.8	1.7	98.3
	25.00	1	.8	1.7	100.0
	Total	59	45.7	100.0	
Missing	System	70	54.3		
Total		129	100.0		

Following the coding of the dependent variable, each of the individual questions that were asked on the survey under each of the independent groups was analyzed as a single regression against the dependent variable of frequency. The number of levels of the independent variable was recorded along with the total number of cases included in the analysis, total missing from the analysis (unanswered), the p value of any significant predictor variables and the prediction percentage before and after the regression variables were added (see Table 3.6). After each of the individual questions was analyzed, the groups of questions under each independent variable were analyzed as a whole. For example, there were nine questions that fit under the "Available Resources" independent variable. These questions asked participants about the resources that were available to them in their school (i.e. instructional materials, computers).

Then, each of the nine questions was analyzed individually and they were analyzed as a group against the dependent variable (frequency). In addition, those questions that had several levels (possible answers) were collapsed and re-analyzed against the dependent variable and again as collapsed in their group of independent variables. The results of these analyses are located in Table 3.6. The resulting regression analyses identified possible predictor variables for lesson plan use as "Money Allotted" (p=0.054), "Administrative Support" (p=0.049), "Journals" (p=0.027), "Science Classes Where You Can Use Lesson Plans" (p=0.035), and "Number of Periods Per Day Where You Could Use COSEE Lesson Plans" (p=0.024). The next step was to try and build a model using these predictor variables as a guide.

Table 3.6 Logistic Regression Analyses

Individual Runs-no collapsed categories

DV	Q #	Coded Variable #	# of levels
Frequency 2	34	2	2

IV Group	Q #	Coded Variable #	# of levels	N/missing	P value	Prediction %
1) Time elapsed	47	12	8	58/22	NS on any of the 8	53.4/67.2
Time Elapsed 2 (c)		46	3	58/22	NS on any of the 3	53.4/58.6
2) Available Resources						
Instructional Materials Instructional Materials 2 (c)	38	3 48	4 2	58/22 58/22	NS on any of the 4 NS on either of the 2	53.4/56.9 53.4/53.4
Computer	39	4	2 (y/n)	58/22	NS p=0.921	53.4/53.4
Teacher Computer	40	5	2 (y/n)	56/24	NS p=0.546	53.6/55.4
Ss Computer in Room Ss Computer in Room 2 (c)	41	6 49	7 2	47/33 47/33	NS on any of the 7 NS on either of the 2	53.2/68.1 53.2/61.7
Ss Internet Access	42	7	2 (y/n)	55/25	NS p=0.345	54.5/54.5
All Ss Access	43	8	2 (y/n)	57/23	NS on either of the 2	54.4/54.4
Science Budget	44	9	3	57/23	NS on any of the 3	54.4/56.1
Money Allotted Money Allotted 2 (c)	45	10 50	6 2	51/29 51/29	#4 ($200-$299) was sign. 0.054 NS on either of the 2	52.9/66.7 52.9/54.9
Resources to Implement	46	11	2 (y/n)	56/24	NS p=0.130	53.6/57.1

Table 3.6 (continued)

All 9 variables as a group (no collapsed categories) All 9 variables with collapsed categories (InstrMat2, SsCompinRm2,MoneyAllott2)				41/39 41/39	NS on any of the V's SsCompRm2 Sign. P=0.054	53.7/95.1 53.7/70.7
3) School Demographics						
Administrative Support	50	13	2 (y/n)	57/23	S p=0.049	52.6/61.4
Public vs. Private School	54	14	3	57/23	NS on any of the 3	54.4/54.4
Students served Students Served 2 (c)	58	15 51	6 2	54/26 54/26	NS on any of the 6 NS on either of the 2	57.4/59.3 57.4/57.4
Students in grade	59	16	continuous	55/25	NS	56.4/56.4
Location	60	17	2	56/24	NS on either of the 2	55.4/55.4
Teacher-Student Ratio Teacher-Student Ratio 2 (c)	63	18 52	5 3	55/25 55/25	#4 (1:22-1:27) was sign. p=0.086 NS on any of the 3	56.4/67.3 56.4/63.6
All 6 as a group (no collapsed categories)				52/28	S AdSupport p=0.034	57.7/73.1
All 6 as a group (with collapsed categories SsServed,T-SsRatio)				52/28	S AdSupport p=0.052	57.7/69.2
4) Teacher Demographics						
Teacher Gender	64	19	2 (f/m)	57/23	NS on either of the 2	54.4/54.4
Teacher Ethnicity	65	20	5	56/24	NS on any of the 5	53.6/58.9

Table 3.6 (continued)

Years Teaching Years Teaching 2 (c)	66	21	10 53	57/23 57/23	NS on any of the 10 NS on either of the 2	54.4/73.7 54.4/59.6
Grade Level	67	22	4	56/24	NS on any of the 4	53.6/62.5
State Reside	68	23	6	56/24	NS on any of the 6	53.6/64.3
Teacher Certificate	69	24	5	56/24	NS on any of the 5	55.4/57.1
Disc_Cert_T (are you certified to teach more than one subject?) Elem=no	70	25	2 (y/n)	55/25	NS on either of the 2	52.7/52.7
National Board Certification	71	26	3	56/24	NS on any of the 3	55.4/55.4
Teacher Organizations (active member of more than one?)	72	27	2 (y/n)	47/33	NS on either of the 2	55.3/55.3
Teaching Degree	73	28	5	57/23	NS on any of the 5	54.4/57.9
Journals (subscribe to more than 1?)	74	29	2 (y/n)	33/47	S p=0.027	63.6/69.7
All 10 as a group(omit journals) (no collapsed categories)				42/38	NS on any of the 10	52.4/100
All 10 as a group (omit journals; with collapsed category Yrs_Teach_2)				42/38	NS on any of the 10	52.4/83.3
5) Opportunities for Use						
Attend Multiple COSEE	2	30	2 (y/n)	58/22	NS on either of the 2	51.7/51.7
State Attended	3	31	5	59/21	NS on any of the 5	52.5/64.4
Teaching the Same Grade	4	32	2 (y/n)	59/21	NS on either of the 2	52.5/52.5

Table 3.6 (continued)

Teaching the Same Science Classes	5	33	2 (y/n)	59/21	NS on either of the 2	52.5/54.2
Teaching Schedule	6	34	4	59/21	NS on any of the 4	52.5/52.5
Different Science Classes You Teach	7	35	4	59/21	NS on any of the 4	52.5/54.2
Science classes teach	8	36	continuous	57/23	NS	50.9/59.6
Science classes you can use LP (could you use in multiple subjects?)	9	37	2 (y/n)	56/24	S p=0.035	53.6/62.5
Used PowerPoint® presentations	22	38	2 (y/n)	59/21	NS on either of the 2	52.5/54.2
Times per year used PP	23	39	4	25/55	NS on any of the 4	60/68
How many PP used more than once	24	40	4	25/55	NS on any of the 4	60/68
PP user-friendly	25	41	2 (y/n)	25/55	NS on either of the 2	60/60
Preparation Time you have	29	42	6	58/22	NS on any of the 6	51.7/56.9
# of periods/day where you could use lesson plans	9	47	continuous	57/23	S p=0.024	52.6/63.2
All 11 as a group (omit 39,40,41 due to only 25 cases) (no collapsed categories)				53/27	NS	50.9/83.0

Table 3.6 (continued)

Models						
(1) Sign. Pred. (Sci_Class_Use, scipdperday, AdSupport, journals, MoneyAllot, T_Ss_Ratio)				29/51	NS	65.5/100
(2) Sign. Pred. (scipdperday, MoneyAllot, AdSupport, T_Ss_Ratio)				48/32	Scipdperday, p=0.037; MoneyAllott, p=0.022; T_Ss_Ratio, p=0.026	54.2/77.1
(3) Sign. Pred. (MoneyAllot, AdSupport, Sci_Class_Use, scipdperday) Omit journals-too few cases				49/31	MoneyAllot shows p=0.053	53.1/73.5
(4) Sign. Pred. (Scipdperday, MoneyAllot, AdSupport, Sci_Class_Use, Yrs_Teaching)				48/32	MoneyAllot, p=.039 Sci_Cl_Use, p=0.046 Yrs Teaching, p=0.023	54.2/81.3
(5) Sign. Pred. (MoneyAllot, Sci_Cl_Use, Yrs_Teaching)				48/32	MoneyAllot, p=0.032 (on level) Sci_Cl_Use, p=0.014 Yrs_Teaching, p=0.02 (on level)	54.2/85.4
(6) Sign. Pred. (Sci_Cl_Use, Yrs_Teaching) *with AdSupport is less predictive at 79.2%				54/26	Sci_Cl_Use, p=0.02 Yrs_Teaching, NS on any one level both show sign. p if not run as categorical variables	55.6/79.6

Table 3.6 (continued)

(7) Sign. Pred. (Sci_Cl_Use, Yrs_Teaching, T_Ss_Ratio) if you use YrTeach2, p=0.04 but model is less predictive		*Model 5 and 7 are similar		52/28	Sci_Cl_Use, p=0.04 NS on YrsTeach or T_Ss_Ratio	57.7/84.6
(8) Sign. Pred. (Sci_Cl_Use, Yrs_Teaching, T_Ss_Ratio, Grade_Level) *If just grade level and no T_Ss_Ratio the predictive value is 79%, lower than with just T_Ss_Ratio alone with the other two				51/29	Sci_Cl_Use, p=0.043	56.9/88.2

Building the Model

According to Peduzzi, Concato, Kemper, Holford, and Feinstein (1996), it is recommended that the smaller of the classes of the dependent variable have at least 10 events per parameter in the model. Binary Logistic Regression is a large sample method that uses maximum likelihood estimation (MLE) rather than ordinary least squares (OLS) to derive parameters. Peduzzi et. al. (1996) stated that it is preferable to have 40 cases for each predictor variable (20 "yes" cases and 20 "no" cases). The reliability estimates for MLE decline when there are fewer cases for each combination of independent variables. If there are too few cases in relation to the number of variables, a solution may not be found. Therefore, when running the regression analysis, it was decided to take a conservative approach and use 50 cases as the cut off for a reliable and valid predictive model.

For the first attempt at creating a model, all significant predictor variables were added to the model. This model included the variables: science classes in which participants perceived they could use the lesson plans, science classes taught per day, perceived administrative support, participant subscription to journals, money allotted for classroom, and teacher to student ratio. It should be noted teacher-to-student ratio was included because it showed significance on one of the levels of the categorical variable. The result was a model that was 100% predictive (as compared to 65.5% predictive without adding the variables) but only included 29 cases, omitting 51 cases. This finding was due to the low number of participant responses on the "journals" variable. Therefore, another regression was analyzed excluding "journals" because there were too few cases.

The resulting model was 73.5% predictive (as compared to 53.1% predictive without adding the variables). Still, the number of cases used in the regression was 49, just one below the determined cut off described above. In this same fashion, several other attempts were made at creating a model. These attempts can be found in Table 3.5.

It was found that two variables (science classes in which teachers perceived they could use the lesson plans “Sci_Class_Use”, and years of teaching experience “Yrs_Teach”) produced high predictive value when analyzed in the regression together. With a total of 54 cases, the two variables together were 79.6% predictive (as compared to 55.6% without adding the variables). Two other variables demonstrated significant predictive value, teacher to student ratio (T_Ss_Ratio) and grade level taught (GradeLevel). It was determined that by adding them, a model could be created that was 88.2% predictive (as compared to 56.9% predictive without the variables) using these four variables together and meeting the case requirement with 51 cases. No other combinations produced this strong predictive power and the addition of other variables did not add significantly to the predictive power of the model.

Interview Data Analyses

Selection of Interview Participants

After the online survey was completed, five teachers were selected to participate in a follow-up interview to help explain the survey results and to share their perceptions about the COSEE:CGOM Institute. Participants were selected based upon the following criteria: (a) completion of the online survey, (b) year in which they attended the

COSEE:CGOM Institute, (c) state in which they attended the COSEE:CGOM Institute, (d) years of teaching experience, (e) current grade level taught, (f) response to an invitation to participate in the interview, and (g) willingness to participate.

To determine how time elapsed since attending the COSEE:CGOM Institute could effect the implementation of curriculum, an effort was made to select teachers who had participated in different years. Similarly, teachers were selected from each of the five Gulf states as they attended different Institutes and their experiences would vary. An attempt was made to select teachers with a diversity of teaching experience and varying teaching assignments (i.e., elementary, middle, and high school) to represent the array of participant backgrounds.

Although there are too few case studies to make generalizations about overall participant perceptions of the COSEE:CGOM program, these individual cases revealed how some teachers perceive their experience and use or do not use what they learned from the Institutes in their classrooms.

Analyses of Interviews

Each interview was audio recorded both in analog and digital formats. After the interviews were completed, the recordings were transcribed verbatim into five, separate Microsoft Word documents, one for each interview. During the interviews, detailed notes were kept identifying common themes mentioned by interviewees. These themes were used to begin the analyses of the transcripts. Beginning with the first interview, each section of transcription was read and then summarized under the appropriate theme(s) which were previously identified. When appropriate, direct quotes from the interviewees were included in the analyses. The same format and interview protocol was used for all five interviews. If a new theme emerged during the reading of the transcription, it was added in a logical place in the analyses, if appropriate.

Introductions to Interviewees

The following paragraphs are introductions to the five participants in this study: Marina, Mark, Carrie, Ben, and Lauren. Four of the interviews were face-to-face: Marina, Mark, Carrie, and Ben. The fifth interview was with Lauren and was conducted by phone. Although this method does not allow for social cues to be detected, it was necessary as Lauren acquired flu on the original interview date. After driving to Lauren's school and viewing her classroom on the date she was absent, it was decided that an additional trip to conduct the interview face-to-face was not necessary. Table 3.7 displays a summary of the date, time, and location of these interviews.

Table 3.7 Teacher Interviews

Teacher	State	COSEE Year	Sex	Location	Date
Marina	MS	2003	F	In her classroom	Friday, 1/11/08
Mark	LA	2005	M	In his classroom	Monday, 2/11/08
Carrie	TX	2004	F	In her classroom	Friday, 2/15/08
Ben	FL	2006	M	In his classroom	Tuesday, 3/4/08
Lauren	AL	2007	F	Over the phone	Tuesday, 3/11/08

Case Study 1-Marina. Marina is a Caucasian female teaching at a private elementary school in Mississippi. She has over 30 years of teaching experience, most of which were in the public schools of Mississippi where she taught elementary education (multiple subjects) and science. After 29 ½ years in the public schools, Marina retired and was recruited by the principal at the private school where she now teaches. She has experience teaching talented and gifted students, and currently teaches fourth and fifth grade science along with second and third grade science enrichment once a week. Marine has experience organizing school-wide science fair competitions. Marina attended the COSEE:CGOM Summer Institute in 2003 and also participated in the *Sea Scholars* experience aboard a Navy vessel prior to 2003. Marina believed she was supported by her district and principal when she attended the COSEE:CGOM Institute.

Marina did not seem to be able to clearly distinguish between her many COSEE:CGOM experiences (Sea Scholars, Summer Institutes) when discussing how she uses the information in her classroom. She said it was “difficult to measure” how she had incorporated so many ocean topics into her curriculum. It was easy to see from observing Marina’s classroom the ocean was used as a theme for many lessons. She had specimens in jars, large paintings and wall hangings with ocean themes, and marine debris decorated parts of the room; these were treasures she had collected with her students during field trips.

Marina shared many personal stories about how she came to know her peer teachers, principals, and administrators. She detailed her move from the public school system to the private school where she is currently teaching. Marina explained her interest in marine science stemmed from when she was teaching fourth grade vertebrates and invertebrates. Most of the invertebrates in the book she was using were sea animals. One of her students asked her if there was a place they could go to see these types of animals. This question encouraged Marina to plan a field trip to the coast with her students. She contacted a high school teacher on the coast who took her and her students in “off the street.” Each year Marina added something new to the field trip and eventually began taking students on overnight trips to the coast. The student who asked that one question has now graduated from college with a double major in journalism and marine biology which she attributes to Marina’s influence as her classroom teacher. Marina told this story with great pride and passion.

Case Study 2-Mark. Mark is a Caucasian male teaching at a public high school in Louisiana. He is a nontraditional certified teacher who came into the profession through Teach for America. He was not sure he wanted to go into teaching although his mother was a teacher for a long time. Mark’s undergraduate degree is in Sociology and Biology from a northeastern university. When Mark applied for Teach for America, he was placed at an underperforming school in Louisiana teaching 8th grade science, math, English and Spanish. In his second year, Mark taught Physical Science and Biology, and in his third and fourth year he taught Physical Science, Advanced Placement Biology, and regular Biology. His school had no technology and limited resources (i.e., limited copying, no textbooks for one class). This is the school Mark was teaching at when he attended the COSEE:CGOM Institute in the summer of 2005.

After struggling with differences of opinion with the administration and not feeling appreciated, Mark decided to apply for a teaching job in his current school district and is now in his fifth year of teaching. His current teaching assignment is different from the one he had when he attended the COSEE:CGOM Institute and he is now located at a higher performing school with better resources in Louisiana.

Mark enjoys professional development, has completed one-half of a Master's degree, and is pursuing National Board Certification. He is already certified to teach AP Biology and grades 7-12 Social Studies, Biology, and General Science. Mark learned of the COSEE:CGOM Institute through another teacher who was the curriculum coordinator for his district. Mark indicated that he did not have very high expectations for the Workshop and was pleasantly surprised at how much he learned and what he was able to take away from his experience. Although Mark prefers to teach Biology and mentioned that more of the COSEE:CGOM lesson plans can be adapted to meet the Biology standards, he will likely not be teaching Biology anytime soon because he does not have seniority at his new school. Mark believes it was a "trade off" not teaching exactly what he wants in exchange for a "better school" and higher performing students.

Case Study 3-Carrie. Carrie is a Caucasian female teaching at a public middle school in Texas. She has 10 years of teaching experience. Carrie holds a Biology degree and is certified to teach secondary math and science. She taught at a private school in Dallas for one year, then four years at a low-income public school, and then moved to Austin. Carrie now teaches at a middle school in Austin and has been there for five years. Her current teaching assignment is eighth grade science. Carrie's middle school is on a block schedule, so she sees her 165 students every other day for 90 minutes.

Carrie teaches in a Title I school with approximately 54% economically-disadvantaged students. She thinks that approximately 90% of her students have never been to or seen the ocean. Carrie has been fortunate to keep her same classroom while she has been at her current school because many of the teachers have had to "float" from room to room. There are approximately 1100 students at her school in the 6th, 7th, and 8th grades. Carrie is one of seven science teachers in the department. Carrie learned of the COSEE:CGOM Institute while attending an informal educator's association meeting. She then attended the COSEE:CGOM Institute in the summer of 2004 in Texas.

Carrie's classroom was originally designed to be a science room but her gas connections do not work. She has numerous cabinets filled with specimens, many of which she collected and preserved during her COSEE:CGOM Institute. She was able to pull her COSEE field notebook, binder, and other teaching resources from a bookshelf in which she has easy access and that she also allows her students to use. Carrie said that she is fortunate because a previous principal at her school was a former science teacher and was very supportive of the science department receiving the resources they need.

Case Study 4-Ben. Ben is a Native American male teaching at a year-round alternative school in Florida. He participated in the COSEE Institute in 2006 in Florida. He is certified to teach grades 6-12 in Language Arts, Social Studies, and Biology and middle grades General Science. Ben currently has seven classes in which to prepare, as well as his Horticulture class, which is a science elective for Biology students. Ben currently does not have a traditional teaching arrangement where he teaches a certain topic each period. His school uses differentiated instruction which means that he could have two students working on biology, while three do Earth and space science, and another works on chemistry. Ben has smaller classes, 15 students or less, but teaches multiple subjects in each class. At the beginning of the day, Ben gives a general lecture that meets the Florida State Standards, and then he facilitates small groups of students.

While most people tell Ben they do not envy the challenges of his job, he comments, “The opportunity to do hands-on science in a facility like this is incredible because you do not get the opportunities like this in a public school, and I think it's awesome because the kids stay involved and they're engaged.”

Ben sees 60 students each day who range in age from 13-19 years old. They wear bright orange uniforms to school and the campus is secured by barbed wire and multiple safety check points. The campus used to be a prison and has been converted to the alternative education center. Ben has students who have failed in the public school system more than once. They have been expelled for various reasons or have been ordered by the court to attend an alternative education facility because they have committed a crime. Students rotate classrooms between science, English, social studies, math and reading. The facility also has a vocational track for students seeking skills in areas like business or accounting. Ben teaches Horticulture during the vocational track period.

At the end of the day students “line up” and go to tutoring in subjects like anger management counseling or drug and alcohol addiction counseling. After these sessions, the students end the day with behavior monitoring where they discuss the behavior problems they experienced that day. Ben explained his job is not only to educate the students but also to try and change their behaviors. Ben uses a positive behavior reward system in his class and helps students find ways to have ownership with their education.

Ben did not think he would ever become a teacher. He describes himself as the school troublemaker. On his mother’s side, Ben is from the Lower Brule Sioux tribe and he commented the tribes did not value education. Ben began his path toward teaching as a Boy Scout camp counselor in the Yellowstone Basin, received his wilderness guide certification, and began leading expeditions. In college, he “tinkered” with science courses and someone told him he would be a great at working a summer camp. Because the tribe paid for part of his education, Ben spent his first year teaching on the reservation in South Dakota. Ben commented that he has grown as much as he can in his current school and would like to possibly teach a gifted class in the regular public schools.

Case Study 5-Lauren. Lauren is a Caucasian female teaching in a public middle school in southeastern Alabama. Lauren was accepted into the education program when she first applied to college but decided to get a business degree instead. Lauren has a Bachelor’s of Science in Business Administration and Management Information Systems. After working as a configuration manager, she went back to school to complete an alternative program earning her Master’s degree in Early Childhood and Elementary Education. While earning her Master’s degree, Lauren completed internships in kindergarten, third grade, and sixth grade. She is currently teaching sixth grade science and pursuing an Education Specialist’s degree in Elementary Education. Lauren has been teaching different classes each year she has been at her middle school. Although her school follows the middle school concept that teachers specialize in their subject, this year Lauren is teaching in an advanced self-contained classroom. She instructs her students in reading, math, science, English, and history. The number of students at the school this year constituted one more class and Lauren volunteered to teach them.

Lauren's alternative certification qualifies her to teach preschool through sixth grade in Alabama.

Lauren attended the COSEE:CGOM Institute in 2007. She learned about the Institute at a grade level department meeting where her administrators shared the announcement with teachers. Another teacher from Lauren's school district had attended the Institute and highly recommended it so Lauren decided she would go. Her school district was supportive of her decision to attend and wrote her the required letter of recommendation. The only cost that Lauren incurred was for gas to travel down to Dauphin Island and back. Her food and lodging were included in the Institute registration. She also received a stipend when she returned from the Institute and completed the required assignments.

Themes

As evidenced by the above descriptions of the interview participants, each one had a unique experience at the COSEE:CGOM Institute they attended. However, there were some common themes that emerged in the discussions that helped: (a) to provide an overall feel for the participants' experience, (b) to answer the research questions for the study, and (c) to give suggestions for change or follow-up opportunities.

Overall Program Experience Themes

Increased self-confidence. Interviewees expressed increased self-assurance and confidence in themselves and in their ability to explain and present scientific information to their students after their COSEE:CGOM Institute experience. Participants noted their interaction with scientists in a professional setting where they felt comfortable asking questions about science content gave them the confidence they needed to continue to seek other similar educational experiences. Marina, Mark, Carrie, and Ben all made remarks about having gained more confidence in how and what they were teaching.

Marina

Marina commented that since her experience at the COSEE:CGOM Institute, she has "sought out other opportunities" that she would have otherwise "shied away from." Having performed experiments herself, Marina now has the confidence to pursue certain topics with her students. She explained that her experiences, the things in which she has participated, have become more lessons than the lesson plans themselves. The example she gave was from her Sea Scholars experience while learning about acoustics. Marina commented that in the past she did not teach sound because she was not familiar with acoustics. After she participated in a Sea Scholars cruise aboard a naval vessel, she understands acoustics better because she helped the surveyors perform tests. Marina stated, "Otherwise I was reading something out of a book and I am dependent on what this book [tells me]."

Marina also made the comment "I feel like [I have earned] a notch in my belt or a metal for each thing I have accomplished or finished with [COSEE Administrator], and my teaching [and] my career are all at a higher level." She believes she learns a great deal just by "hanging out with that caliber [people]." Although the course load was difficult and challenging, Marina said she stuck with it because there was "a lot to be gained." She said that the COSEE Administrators had done an excellent job of establishing an environment that make teachers believe they could "hang with these professionals" (referring to the scientists). Marina appreciated the efforts of the Institute organizers because they made her feel like she was valued as a teacher which also has led to an increase in self-confidence.

Mark

Before COSEE, Mark had never worked with a professor nor had a professor come into his classroom. After COSEE, he has contacted professors from University of Louisiana, Nickel State, Southeastern University, Louisiana State University, and Woods Hole Oceanographic Institute to obtain information he needed for his students. He also mentioned having "the confidence to go back and ask my old professors at Boston University [for help]." He attributes this to his positive interaction with scientists during his COSEE:CGOM experience. For Mark, the idea of asking college professors for help had not crossed his mind and he saw his teaching of high school students as a "separate world" from what they were doing at the university level. Mark's time at the COSEE:CGOM Institute helped him to see researchers as a powerful resource and after collaborating with them, he now believes that the researchers share his passion for sharing knowledge with others.

Mark also explained that his confidence in his instruction increased. He now believes there is more validity to what he is teaching in his lessons because he learned first-hand from the research scientists instead of reading it from a textbook. Mark also believes he is validated by the comments the researchers would make such as "Wow, that's an innovative way of thinking" or "Wow, I wouldn't have thought about teaching it that way.” Mark commented that the scientists gave him the technical background he was missing and he held the scientists and their knowledge in high regard. Mark believes the information he was getting and then teaching to his students is more accurate because it came straight from the source. In addition, Mark commented, “It made you feel like a little bit bigger person to go and be with a researcher and not just be with another group of teachers.”

Other participants commented on how first hand experience added validity to their teaching and increased their confidence. One example was when Marina explained, “You can’t tell about a train ride you haven’t been on…my experiences, this wealth of [information] I [did not] just read it out of the teacher’s manual. It’s real. I’ve experienced [it].”

Carrie

In addition to learning a great deal herself, Carrie believes her COSEE experience gave her the confidence she needed to feel comfortable taking her students to the coast for field trips. Before her COSEE experience, Carrie had never taken a group of students to the coast and now she plans a field trip each year. Carrie said that although she was familiar with Biology, she did not know that much about marine science before attending the Institute. Having this new knowledge, gave her new confidence to teach marine science in her classroom.

Carrie commented that the way that the Institute was established, with themes for each ecosystem, was helpful when she returned to the classroom. Now when she takes groups of students to the coast, she uses the same format to teach them about the various habitats they visit. Therefore, Carrie not only learned a great deal of information at the Institute, but she is emulating the way in which the material is presented by using the same format with her students. Carrie said, “it [the material] just was so well presented that it made it very easy for me to feel comfortable doing that [the activities]. I mean even if I had figured out marine sciences, taking students down there it just would not have been the same.” Carrie is describing her increased self-confidence in venturing to take a group of eighth grade students to the coast and lead them in a field experience similar to the one she experienced during the COSEE Institute.

Before COSEE, Carrie had not worked with scientists in her classroom and now she remarked that she collaborates and depends on many “COSEE people” when she has questions. She liked working with the scientists at COSEE so much that she offered to have a GK-12 fellow in her classroom. She explained that GK-12 fellows are graduate students in a science related field. She had two different fellows, one each semester. They came and spent time in her classroom helping her to plan activities and write labs for her students. She said it like having the scientist come to you instead of you going to the scientist. She confessed that she liked the COSEE model better because she believes she was able to understand more of what the scientists were doing by being in the field.

Ben

Ben expressed greater confidence in his own content knowledge and therefore, increased teaching confidence with his students because he knew the information he received came directly from the scientists. He said

> It was really great having somebody there who had actually studied it and could tell me about it because then I brought that first-hand knowledge back to my kids, and I had primary source information. It wasn't like I read that in a magazine. It was primary source information.

With this statement, Ben is describing how he trusts the information he received from the scientists and considers them to be the best source for accurate information that he can then relay to his students. Ben believes it gives him more credibility with his students to have heard it from the person who is doing the research than from just reading about it in a book. Ben has more details to share with his students and a better conceptual knowledge of the subject as explained by the person who is actually collecting data and doing the science.

Increased content knowledge. When interviewees described their COSEE experience, it was clear they had gained a great deal of knowledge about ocean science. Many of them detailed the ways in which they have been using this knowledge while others commented on their increased confidence as a result of becoming more knowledgeable about science related content. Marina, Mark, Carrie, and Ben all had responses that suggested they had gained content knowledge as a result of their COSEE:CGOM experience.

Marina

Marina explained that she was better able to interpret scientific research as a result of her COSEE experience. The way Marina described it was a “layering” effect.

She may learn new terms and experience new things at the Institute, and then when she gets back to her classroom she can better make connections to current news events or scientific discoveries. Having the initial exposure is essential, and then being able to place that information into new contexts allows Marina to be able to use it with her students. Marina has the attitude that you should try and learn something new everyday.

Mark

Mark mentioned that he not only learned new content knowledge during the field experiences and lectures by the scientists, but also during the informal meals and breaks. He believes he gleaned important information from the "small talk" at the dinner table about science issues that were of importance. He gave a specific example of how there was sea salt at the table and someone made the comment of how they liked sea salt better than table salt and how one of the professors "jumped in" and gave a brief lecture about how all of the salt comes from the ocean and proceeded to discuss the geology behind it. Mark described this speech as a teachable moment in which he was able to "take in" and absorb valuable information he could use with his students.

Carrie

Carrie enjoyed the Institute because it allowed her to "refocus on science and content knowledge" rather than her daily focus of student pedagogy and pressures to meet state standards. Carrie remarked it would be very time consuming for her to have collected the information that was "handed to you" at the Institute. She appreciated the high level of content and the challenging materials. Carrie also mentioned she has gained knowledge of the coastal area where she participated in the COSEE:CGOM Institute and would be comfortable bringing her students there. When discussing the information received at the Institute, Carrie said, "every bit of it was valuable and totally applicable to my class."

In fact, Carrie learned so much during her COSEE experience that she applied for other similar opportunities such as Sea Scholars where she was immersed in science on a naval ship. Carrie also applied and was accepted to the Mid-Atlantic COSEE program. She said this was a great opportunity for her to compare the flora and fauna from the Chesapeake Bay versus the Gulf of Mexico and to gain new knowledge to share with her students.

Carrie commented that although she may have done similar labs or activities with her students even if she had not attended the COSEE Institute, she would not have been able to make the same connections for her students. Carrie said, "…that doesn't mean to say I wouldn't be doing a lot of the same types of labs and activities, but my background being so much deeper, I mean, the real world applications that I'm offering my students while we're doing the lab, it's just a better experience than with some teacher who's just doing the lab and not making that connection for them." Therefore, Carrie believes that her enriched content knowledge allows her to be able to draw on more experiences and make more connections for her students.

When asked if she would participate in another COSEE experience, Carrie immediately indicated that she would. However, she was more reluctant to agree she would attend if the scientists were not part of the experience. Carrie said, "I want somebody there who's the actual content expert." This statement supports her earlier comments concerning how she appreciated the high level of information that was being presented. Carrie placed a high value on having science experts lead the Institute. They added credibility to what she was learning and disseminating to her students. Although there was too much information for Carrie to absorb all at once at the Institute, she believed she left with the resources and contacts she needed to fill any gaps she may have forgotten when she returned to her school district. Overall, Carrie commented, "I have a better scope of content knowledge." Carrie believes she benefited from the high level of content knowledge coupled with the connections that the presenters made between their material and possible ways that could fit into their classroom curriculum.

Ben

Ben believes the state of Florida does not focus enough on ocean science in the curriculum, which he believes is a shame. Ben was able to describe how to cultivate sea grasses for replanting in damaged or destroyed areas. Ben could discuss how to sample sediments using a bottom dredge and he could describe invasive species and how he incorporates this topic into his lesson plans. Ben claims that he did not have this depth of knowledge of these topics before his COSEE experience. Ben said, "I think things like COSEE give me more resources where we can use real world, hard science approaches to what's going on in the world." By this statement, Ben is confirming his belief that the COSEE content knowledge is valuable for what he does in his classroom. Ben's remarks document the manner in which he values the relevance of the COSEE content to what he is doing in the classroom. Ben was able to make the connections between solving real, world problems using scientific methods.

Increased integration and reflection. It was not only apparent that the interview participants had gained new knowledge and displayed increased confidence, but it was also evident they had been creative in the ways they had incorporated this information in their classrooms. While some participants gave specific examples of integration of multiple subjects into lesson plans using COSEE themes, others discussed the ways in which they have reflected on the knowledge they gained and new ways to present this material to their students. All interviewees discussed how they reflected on and integrated into the classroom the knowledge they learned at the Institute.

Marina

Marina believed the "holistic approach" to the Institute she attended helped her to improve her lessons. Marina said it was "difficult to measure" how she had incorporated so many ocean topics into her curricula. Marina said she integrates reading activities with her science lessons. She said science is the perfect place to incorporate reading because the students don't know they are doing it. Marina commented that it is important to "blend" old and new information together in lesson plans. She admits it is difficult to stay abreast of all of the latest scientific research and she does not throw a lesson away just because it is old. Marina also commented that what she learned during the COSEE:CGOM Institute not only helped her in teaching science but also helped her in other subjects.

Mark

Mark was able to give specific examples of how he had integrated COSEE:CGOM information into his classroom curricula. Many of his students had family members who worked on the oil platforms in the Gulf of Mexico. With this in mind, Mark developed lessons based on construction challenges of building an off-shore oil platform, such as locating a good site and working around the wildlife. He incorporated the physical science concepts of simple machines in terms of power, work, and efficiency, as well as depth, sound, and echolocation in his lessons. He explained the ocean is a great theme to bring concepts together for students. Another example of integration Mark cited was having students calculate the thermal, potential, and kinetic energy using the temperature of the Gulf of Mexico. Then, Mark pushes students to think why this is important in terms of hurricanes. He incorporates the concepts of gravitational and potential energy to help students understand why two degrees makes a difference between a category one hurricane and a devastating hurricane like *Hurricane Katrina*. He believes this is a “testimony of how you can take anything from COSEE and make it work.”

An example of integration is in Mark’s Biology classes. He has integrated literature into his curricula by utilizing the book, *Bayou Farewell*, which he received while attending the COSEE Institute. Mark explained when he changed schools, it forced him to think of new and creative ways to integrate COSEE information into his Forensics class. He commented that it is easier to integrate when the information is fresh on your mind. After time, Mark says it is harder to think about where you learned the information and it becomes more of an automatic retrieval.

Carrie

Carrie was able to show me her COSEE:CGOM field notebook where she took notes, drew diagrams, and reflected on lessons she might teach as a result of her new knowledge and experiences. Carrie said her COSEE experience was like a “summer camp for grown-ups” and it has helped her to “see connections” she can make in her teaching.

In addition, Carrie was able to use one of the Online Institute PowerPoint® presentations in a very creative way. At the time, she was teaching seventh grade science and needed an example of simple machines. The COSEE PowerPoint® was discussing the challenges of measuring deep sea tubeworms so Carrie developed problem cards where the students were asked to create a simple or compound machine that would help them take measurements of tubeworms at great depth. Carrie piqued the students’ interest by showing them pictures of the tubeworms on the PowerPoint® and then allowed them time to be creative with their machines. This lesson was so successful that it was added to the seventh grade curricula. Even though Carrie currently teaches eighth grade, the lesson she created is still being used by other teachers in her school.

Another example of the manner in which Carrie integrated COSEE concepts in her classroom was by her creation of two games which demonstrate symbiosis. Carrie developed the idea after watching one of the PowerPoint® presentations which outlined the various kinds of symbiotic relationships in the ocean. One of the games is similar to a dating game where the students try and determine who goes with whom. The other version is similar to a real estate model where students represent the realtors and they are trying to ascertain in which habitat the organisms can live. Both of these creative uses of information demonstrates Carrie's ability to take a concept learned at the COSEE Institute and integrate it into her curricula.

Ben

Ben mentioned he likes to plan thematic units with the other teachers. He said coordinating these units can be challenging and takes experience. One example of the manner in which he has integrated COSEE topics into activities with other teachers is when discussing bottom sampling. He showed his students pictures of the bottom samples he collected during his COSEE experience and the math teacher discussed the rate of sampling and how to statistically analyze the sample. Ben organized the lesson and coordinated with the math teacher in order to make it easier for the students to understand how solving problems often involves more than one discipline. Ben took information from the COSEE notebook he received and made student versions suitable for his class.

Lauren

Lauren discussed how she integrates the ocean themes she learned at the COSEE Institute into her reading class. She also uses COSEE information during the summer enrichment course she teaches. Lauren has achieved this integration despite the fact that the curriculum for the sixth grade has changed since she attended the COSEE Institute.

Although Lauren faces greater challenges when trying to incorporate marine science concepts, i.e., it no longer clearly falls within the standards for the sixth grade, she still makes an effort to integrate the concepts in creative ways in other subject areas. Lauren had less teaching experience than the other teachers interviewed, and her ability to see clear mechanisms in which the COSEE concepts fit within her existing curricula were limited based upon her description of how she teaches COSEE concepts in her classroom. This integration could be a result of her experience or simply a result of her interests.

Immersion in science (field experiences, creation of culture). Interviewees assigned great value to the field experiences that were associated with the COSEE Institutes. They saw these opportunities for hands on learning as extremely valuable. The field experiences created a "culture" they perceived was important to the success of the Institute. This perception was a common finding among participants regardless of the state and Institute they attended. Marina, Mark, Carrie, and Ben all commented on the value of these field experiences.

Marina

Marina mentioned that as a participant in the Institute "you experience the culture of where you are." She called this "a holistic approach" whether it was intentional or unplanned; she beleives that this approach worked for her. In addition to the importance of performing experiments, Marina discussed the value of the field experiences and how her students enjoyed seeing images of her implementing all the activities they were discussing in class.

Mark

Mark described his experience as a vacation. He was able to "go out" in a research vessel in the Gulf and see dolphins, catch fish, and talk to other teachers. He said that every morning the participants awakened, dressed, and "hung out" together. Mark enjoyed the casual attire and the laid back atmosphere. However, in the midst of this relaxed setting, he said that the program was academically rigorous. Mark commented that he probably learned more about the Gulf Coast and Louisiana during the Institute than he did through any of his high school or college experiences. Mark was able to incorporate much the information he learned about the local flora and fauna into his lessons.

Like Marina, Mark described his experience in terms of a type culture that was present at the Institute. He said, "I just loved it because it was academics and culture and it was a professional environment and we were learning and sharing and it was just… it was what I envision education to be." Mark commented that he was "doing nothing but loving learning and enjoying it and doing it hands-on and academically everyday even during mealtimes." Mark suggested the location of the COSEE:CGOM Institute at Louisiana Universities Marine Consortium (LUMCON) added to the experience. He said the "field experience in and of itself was more invaluable to me than anything that I've ever done." Mark believes that he would not have otherwise taken it upon himself to drive around Louisiana seeking areas of saltwater intrusion or inlet highways. He accredits this first-hand experience to making him a better teacher and also to generating the interest of his students. He said, “it makes my kids’ interest level shoot through the roof because there’s just a passion you can put in it when you’ve been there.”

Carrie

Carrie’s COSEE experience introduced her to five different ecosystems on the coast by visiting them, collecting samples, and then having follow-up lectures to emphasize the important features and develop lesson plans for the classroom. Carrie uses the photos she took at the Institute to help her students make connections to the material she is trying to teach them. Carrie joked that the students all “make fun of some stupid hat I’m wearing, but that’s okay.” Since the majority of her students have never been to the coast, she uses the pictures to help them relate to the subject they are studying since they cannot be in the field themselves.

Ben

Ben believes that the COSEE field experiences allowed him to validate the information he is teaching his students. Ben tells his students, "I'm not talking about this because somebody told it to me. I've been there. I've seen it." When he has his students grow sea grasses to send to Tampa to be planted, he shows his students images he took and explains what he witnessed what has happened to the area. Ben can show his passion about the topic and demonstrate to his students why the topic is so important.

Relationships and bonding with peer teachers. Although participants were not directly asked about their experiences with the other teachers who attended, some commented on how this was an important aspect of their experience. Interviewees believed that this "bonding experience" speaks to the success of the Institute. Mark and Carrie detailed how they valued the relationships they developed with other teachers.

Mark

Mark commented that after *Hurricane Katrina*, he and the other teachers were concerned about one of their peers who lived in New Orleans. When she finally was able to e-mail her COSEE:CGOM cohort she told them that every single cohort member had tried to contact her to check on her safety. She told them that people she had known for a long time had not even tried to contact her but that her COSEE friends had all cared enough to make sure she was out of harm's way. Mark said this was a testament to the culture of the Institute because they only knew each other for two weeks but had formed a lasting bond.

Carrie

Carrie still keeps in touch with many of the teachers who participated in the COSEE Institute with her. She admits that she already knew some of them because they taught in her district. Carrie attended the Institute with a peer teacher from her school and she said it was easier for her to decide to go since her friend was coming with her. They also participated in Sea Scholars together.

Staying current. When asked about how they stay up-to-date on the latest scientific research, the interviewees were quick to relay a multitude of ways. However, all participants admitted this takes time and occasionally they are better at staying abreast of current research while other times they are not.

Marina

Marina subscribes to e-mail list servers that deliver frequent science updates. She said she tries to read a lot but it is easy to get inundated with too many things.

Mark

Mark mentioned with his heavy teaching load, parent conferences, and other teacher responsibilities; it is difficult for him to find time to stay abreast of the latest scientific research. He admits that he uses the television to watch educational programs to help him stay abreast of recent developments. Mark also surfs the Web for science news but has to fit in reading time during meals, prep period, or after school hours. This is the time when Mark is most exhausted and so if he does not make a conscious effort to stay current, he falls behind. Mark did some peer-editing for a textbook company a few years ago which he said helped him to stay current with the latest developments.

Carrie

Carrie reads scientific magazines as much as she can to keep up-to-date on the latest scientific research. Due to her COSEE experience, Carrie joined the Texas Marine Educators Association. When asked about how important it is to stay current in order to meet the state standards, Carrie brought up some valid points. She explained that she does not want to give her students inaccurate information. However, Carrie stressed the fact that the state tests students are required to pass are not always as up-to-date as they should be. Therefore, Carrie struggles with the issue of wanting to teach the most accurate information, but also wanting her students to be able to pass the state tests.

Carrie gave an example about ecological succession. A scientist who was working with her in her classroom told her the way the science book presented the information was not how scientists think it happens anymore. This leaves Carrie in a difficult position as a teacher. She explains, “they can barely learn the one [model for ecological succession], so I wish that I could tell them here’s what’s really going on, but here’s what I need you to say on the test when it’s from the state, not when it’s from me.”

Ben

Ben explained that in his district there is currently no incentive for teachers to stay current in their field of study. When it is time for his evaluation and rating, there are no categories that give points for increased content knowledge. In fact, he said the only points he can earn are for attending the district in-service trainings which he considers to be boring. Therefore, all of Ben’s continued education has been from a passion he has for science. Ben has put himself on every mailing list possible for educators in Florida, and he is a member of the Discovery Educator Network as a star educator.

Ben subscribes electronically to *Scientific American* and *Science Daily*. He confessed that it is time-consuming for him to stay current because it takes a long time to read all of the information and then decide how to use it in the classroom.

Lauren

Although Lauren has a broad background in several areas, she said the COSEE Institute was beneficial to her in helping her to stay current with the latest research in ocean sciences. Lauren said she knows how to conduct research and where to go to find the latest information but doing this is very time-consuming. Therefore, having all of the information there at one place at one time was convenient and helpful for her.

Affordable to attend. For many of the interviewees, cost was a major consideration in whether they would be able to attend the Institute. Mark, Carrie, and Ben shared their thoughts on how this affected them and how it could determine who attends in the future.

Mark

For Mark, having COSEE:CGOM cover the costs of attending the Institute was important. He believed that it is an attractive offer for teachers who come from districts that cannot cover the expenses for an extensive summer professional development. He also mentioned it is a good way to earn Continuing Education Units (CEUs) in his state. He said this is a component he thinks COSEE should keep because it is a huge selling point for some teachers, especially in the summer.

Carrie

Carrie said it was "well worth it" for her to attend. Her room and board was covered and she received a stipend after she had completed all the required components of the Online Institute. The only cost she had was travel to the coast four hours away.

Ben

Ben said his district is currently under a "budget crunch;" therefore, if he wants to plan a field trip or do professional development, it all has to be paid by him and he has to use personal leave days to attend. Luckily, when he attended the COSEE Institute, his district was not under such stipulations. However, his principal was hesitant to allow him to attend the Institute for fear that he would not be able to use any of the information he learned in his classroom.

Ben thinks "the big benefit for a lot of teachers is they didn't have to pay anything." Ben believes this fact is a big incentive for teachers to attend, especially those who would not otherwise have the finances to do so.

Themes that Address Research Questions

The following sections denote themes that address the three research questions. At the end of these sections, the research questions are presented and answered using these data, as well as data from the survey.

Lesson plan creation and use-Research question #1. Interviewees were asked a variety of questions concerning the creation, use, and implementation of COSEE:CGOM lesson plans in their classrooms. It was evident each participant had a different experience and thus utilizes the lesson plans they created in various ways.

Marina

When asked about the lesson plans she created collaboratively with a scientist at the Institute, Marina mentioned she felt pressured to complete the task of writing the lesson plans and stressed she does not use that particular lesson in her classroom. She expressed her intimidation in creating the lesson plans, "we were all struggling to make it work and get it the way it was supposed to be by the time it was supposed to be done."

Marina said she did not expect anyone to lower the standard or requirement for her to complete the assignments, but she just thought there was not enough free time to work on the lesson plans. She also said that being away from her familiar classroom where she knew what resources were available to help her in creating lesson plans added to her anxiety. She was put in an environment in which she was not familiar and given an assignment she knew she could do but believed she didn't have her "tools" there to help her.

Marina does not feel completely comfortable with the science behind the lesson plans she created with her group and believes she has forgotten some of the information she learned since she attended the Institute. Marina admitted she does not use the lesson plans she created at the Institute. She thinks the reason she does not use the lesson plans she specifically created is because they were "hatched too quickly and they were hatched to somebody else's requirements rather than what I actually needed as a classroom teacher." Marina met the requirements of the Institute, but does not use the products her group created.

However, she shared examples of other COSEE lessons she uses quite often in her classroom that were created by other teachers at the Institute. She also is of the opinion the knowledge she gained from the experience has helped her to broaden the scope of what she teaches to her students because she is more comfortable with the material.

Interestingly, Marina commented she did not think it was "bad" that she had to go through the exercise of creating lessons she does not use. She said she rarely can use any lesson the exact way it is written and there is always some refining she must do to make it applicable to her classroom.

For Marina, learning how to balance the wealth of topics she had to teach and developing them in a general enough format to use it with her students was the challenge. Marina commented the specific details of how science was done (i.e. tagging blue crabs) she really took to heart and she believes it added to her depth of knowledge. Although Marina struggled with the science behind the lesson her group created, she did believe it was more grounded in science than ones she would have created on her own. The problem she said was "sometimes it is not always practical for the students to always do all of those things." Marina was specifically referring to the banding of blue crabs and the tracking of their migration in the lesson her group created with the lead scientist.

Mark

In contrast, Mark believed he had plenty of time to complete the required number of lesson plans during the week he attended the Institute. Mark described being up late at night creating lesson plans with other teachers and having a "blast" doing it. Mark said he and the other teachers would joke about how to make the information understandable to the students. He explained that the goal was to develop with two good lesson plans that were applicable to what he was teaching. He described pairing with another teacher based on teaching assignments so they could create lesson plans that would work best for them in their subject areas. Mark said the two scientists circulated among the groups and offered help and suggestions as they put activities together. After the lessons were created, Mark explained he was given copies of all of the other participants' lesson plans which were a resource he could take back to his school and utilize in his classroom. Mark said some lessons would be able to use right away while others would need to be modified to fit the topic he was teaching. Mark expressed he was thankful for the time he had to process the information he learned at the Institute and to create lesson plans based on that information. Mark gave examples of how he has used the COSEE lesson plans and resources with his students to teach about pelican sanctuaries, the Gulf Stream, pollution, overfishing, and hurricane recovery. Mark turned many of the resource articles from his COSEE binder into class lessons. Mark said he is of the opinion he had the resources to implement the COSEE lesson plans in his classroom now that he has changed schools and has better funding.

Mark also explained it was easier to integrate the information he learned at the COSEE Institute when it was fresh on his mind. When Mark first returned from the Institute, he was able to remember the information he learned and immediately apply it to a lesson for his students. He mentioned the pacing guide for science teachers in the state of Louisiana that mandates how much time teachers spend on certain topics in order to meet the state standards by the end of the school year. Mark said that he had to make sure his lessons were going to meet the Grade Level Expectations (GLEs) because with the state pacing guide, he was "on the clock." Mark had to make wise decisions and choices about what he taught. Although an activity might be fun, if he did not cover the standards, there could be future repercussions if he does not teach the required curriculum. On the other hand, Mark thought the pacing guide was helpful to him when he returned from the COSEE Institute. Mark knew exactly where he would place the lesson plans he created or obtained and how much time he would have to cover that lesson with his students.

Mark reported being able to integrate COSEE concepts into his Biology class much easier than in his Physical Science classes. He also mentioned having to be more creative with his lesson plans in terms of materials available when he worked in a school with less funding. Mark was able to integrate COSEE material because the school had a literacy grant since the school was identified as low-performing and was given funds for improving reading scores. Mark used the novels he acquired at the COSEE:CGOM Institute to integrate science and literature. He said his students are so engaged in the book they often to not realize they are learning until later. This makes Mark feel like he has achieved his job as a teacher.

Mark shared a few of the lessons he had created while at the COSEE Institute which he has "refined" and "polished" since their original creation. He believes that the current version is much better than the first draft he created because he has had time to go through and field-test it in his classroom to see what works and what needs improvement.

During Mark's COSEE Institute, he described being energized by his peers when creating lesson plans. He discussed giving a lot of his time and energy to the program but feeling like he was rewarded with a wealth of new knowledge and ideas. Mark said he paid attention in the field because he knew when he got back to the classroom, he would need all of the information he learned to complete the activities and create his own lessons. Mark also said that the long-term networking he did at the Institute gave him contacts that have helped him to build lessons.

Carrie

Although it was difficult for Carrie to remember the differences between many of the COSEE experiences in which she had taken advantage, she tried to recall the specifics about creating lesson plans at the COSEE:CGOM Institute in 2004. She remembers creating seven lesson plans, one of which remains in her mind as the largest. The topic was about salinity along the Texas coast. Students create a hydrometer and use salinity readings along with temperature and precipitation data to determine the part of the coast from which a mystery sample is likely to be taken. Carrie took this lesson plan and modified it after her second COSEE program in Maryland. She now has adapted it to use real-time data that the students collect from buoys rather than handing them a packet with this information. Carrie has taken information from different COSEE experiences and used it to build the ultimate lesson plan for her students. Carrie said in the creation of the lesson plans, all of the participants were in the lab together bouncing ideas off of one another. Carrie commented that she received a lot of help from some of the scientists because she had never made a hydrometer before. She said there was time for collaboration and for individual help. Carrie asked many questions to try and determine how she would present the information to her students.

Carrie also mentioned she believes the lessons she created at the COSEE Institute are more grounded in science than ones she would have created on her own or excerpted from a book. Each teacher had an opportunity to create a lesson plan based on what they had done that day in the field or the lectures they had heard. Carrie liked the freedom to be able to decide on which topics she would create a lesson plan. Therefore, Carrie said they received at least something on each topic between all of the teachers because they each got a copy of all of the lesson plans. Carrie says she has used some of the lessons created by the other teachers. One lesson she could recall was about currents carrying debris along the beach. She also talked about a water cycle game that she received from COSEE that she plays with her students. Carrie said there are some subjects that are harder than others to incorporate COSEE concepts, i.e. geology, but she thinks that is fine because not every lesson connects to COSEE concepts. Carrie thinks a few key places in the curriculum are sufficient. Carrie mentioned she has plans to continue to use some of her COSEE lesson plans with her students.

Carrie also shared her ideas on scientific inquiry in the classroom and how she believes this method is effective for helping students who do not have enriched informal learning experiences to "bridge the gap." Carrie said, "…the more sort of hands-on involved they're getting to be into it, the more they're interested in it. Now they're developing their own questions because they're involved in it. That definitely helps fill in that gap." Carrie thinks the COSEE lesson plans are definitely inquiry-based and she would be disappointed if they were not.

When asked about the best strategy for sharing lesson plans with other teachers, Carrie discusses a few ideas. She said that compiling all of the lessons in a binder or on the Web site would make them easily accessible and having them categorized to make it simple to search would be helpful. Carrie thinks the very best way to share the lesson plans is to have the teacher who is using it or created it demonstrate it for another teacher.

Therefore, Carrie believes peer-sharing of lesson plans is the most effective way to disseminate the information.

Ben

Ben said he has used one or two of the lesson plans he created during the COSEE Institute. He recalls using the lesson on hurricanes and how they affect Gulf Coast ecosystems. Ben adds, “what it's helped me more with is my future lesson plans-modifying lesson plans.” He described using the local Florida clam industry as an example and asking students what they should do now that a hurricane has destroyed the ecosystem where the clams live? Ben extended this lesson and described how he has turned the ecosystem concept into an aquatic lesson on coastal zone management where he discusses the human impact on coastal ecosystems. Ben uses the PowerPoint® slides he obtained at the COSEE Institute to show his students examples of erosion and damage to various habitats. Ben discusses invasive species and uses handouts he received at the Institute to supplement his lessons.

Another lesson Ben remembers using was on the topic of nature of science. He invited a scientist to come and speak to his students and explain how scientists conduct their work and then meet with their peers who will try and challenge what they have done. Ben explained that he wanted his students to understand how science works and how others can help to evaluate the work. Ben believes the ocean should be the underlying concept by which to teach science.

In the future, Ben wants to return to the regular public school system where he could teach Marine Biology and possibly keep live animals in a sea table for students to observe. Ben said he could see himself implementing an entire Gulf of Mexico unit with a focus on local Florida ecosystems. Ben mentioned that since Ocala is in the middle of the state, it is sometimes difficult to obtain support needed to complete marine related projects. However, Ben would love to have his students grow their own clam larvae or "bring back" dredged bottom samples and "set up" a tank environment where students could observe the organisms in the sediment. Ben expressed he would love to establish aquariums with different ecosystems and have students learn about organism interactions firsthand. Ben calls these ideas his "pipe dreams" because it is what he would like to do with the COSEE materials if he had the resources. Currently, Ben is restricted to using just plastic in his science classroom because of the security at his facility.

Ben said it was difficult for him to create lesson plans in the summer and then have to wait until the school year to implement them. He commented that he submitted his lesson plans to the COSEE Instructor who e-mailed him later saying that she never received them and so he had to go back and find them and resubmit everything. Ben said that once he got that straight and had some time to think about how things would fit into his curricula, the lessons flowed better. Ben also mentioned that part of what made it difficult to plan was not being able to locate the equipment he needed in order to be able to perform some of the activities in the lessons he created.

Ben remembers creating one lesson plan while at the COSEE Institute. He mentioned it was difficult for him to digest all of the information during the COSEE Institute. Ben said, "you have to have time to allow that information to digest and process." He recalls not having enough time to write good lesson plans. After the long days of field experiences and new information, he was exhausted and found it difficult to focus on writing. When he returned to his classroom, he looked back at the lesson he created and thought it was “garbage” because he was just trying to take in everything and absorb information. However, once he returned from COSEE, he spent time spreading all of the information into piles and creating units for his science class. It was after this processing time that Ben believes he was able to develop what he called “really good lesson plans.”

When creating the lesson plans at the Institute, Ben said it was 100 percent individual. He did not collaborate with any of the scientists or teachers. He believes it would have been helpful to have been able to sit down with one of the scientists when creating his lesson plans so he could ask them questions. Ben has e-mailed questions to some of the participating scientists. Ben also said that if he creates a lesson plan, he is going to use it. Ben does not let it sit on a shelf and collect dust. He may have to make modifications to the lesson but he has used the lesson plans he created at the COSEE Institute.

Lauren

Lauren said she did not create any lesson plans while she was at the COSEE:CGOM Institute. She said they listened to scientists’ lectures and they did some activities and field work but they did not collaborate on lessons during the week she attended. Lauren said the lesson plans she created were during the online component of the program after she returned from the Institute. Lauren also commented she has not been able to use many of the lesson plans she created because the state has moved to a new curriculum and many of the ocean topics are no longer taught in her grade. Lauren said she has tried to use some of the materials she received and has modified some of the lessons so she can use them with her students.

Lauren also mentioned it was difficult to create the lesson plans in the summer before she knew how she was going to use them in her classroom. She said when she was creating the lesson plans, she really did not have her students in mind because she was not even sure what she would be assigned to teach that year. Therefore, many of the lessons she created were not useful and had to be changed or modified.

Lauren said it would have been more helpful to create the lesson plans while she was attending the COSEE Institute because she had extra time there where she could have created them. Lauren would have preferred to have collaborated with the other teachers in a group-setting during the Institute to create lesson plans. Because there were teachers at the Institute from other states, Lauren said it would be helpful to put the teachers into groups according to their state because each state had different standards they were trying to meet. Lauren said she would prefer to create lesson plans with the other teachers because in Lauren's opinion, the scientists "didn't really understand what I need in my classroom." Lauren said the other teachers would understand what she needed and be able to collaborate on lesson plan content.

Lauren mentioned she was very busy when she returned from the Institute and found it difficult to complete the required homework assignments from the Online Institute on time. She said she did not realize it would take so much time to complete the assignments and that it would have been nice to have been given a time frame or anticipated time commitment so she could plan for the Online portion of the Institute. She admitted that it was not the “fault” of the Institute organizers, but rather that she had other commitments for the latter part of the summer which included teaching summer school.

Although Lauren commented the curriculum in her district had changed making it more difficult to use the COSEE lesson plans, she did mention being able to use the lesson plans during the summer enrichment class she teaches. In addition, Lauren has been able to incorporate ocean themes into the reading she does with her students during the school year.

One comment Lauren made was about the titles of lesson plans she created. She mentioned that by the time her students get to the sixth grade, they have already studied the ocean and think they know everything about it. Therefore, she has to give her lessons a different title so they will realize they are learning something new and will understand the ocean is not just about water and sharks. Lauren was explaining how the theme “ocean” is a broad term and one in which students have limited association before they reach middle school.

Lauren mentioned she was of the opinion the lesson plans she created as part of the Institute were more grounded in science research than plans she would have created on her own before attending the Institute. She said it was like, “here's the research, now write a lesson plan on it.” She commented that all of the information she learned, she could go back and access when she needed it. Lauren also said that she thinks she has the resources to implement the lesson plans she created at the Institute. She shared that her school is very supportive and that if she needs something, the school will provide it or she can share with another teacher.

Summary of lesson plan creation and use. Clearly, the interviewees had differing thoughts about the lesson plans they created while attending the COSEE:CGOM Institutes. Marina felt pressured to complete the lesson plans in the time allotted and never felt completely comfortable with the science behind the lesson plan her group created. Therefore, she does not use it in her classroom. However, she was able to demonstrate she uses COSEE lesson plans created by other teachers in her classroom. Overall, Marina believes the COSEE experience strengthened her ability to teach marine science in her classroom. Mark did not have any problems creating lessons in the time frame given. His biggest challenge was incorporating the information into his classroom curricula while it was still fresh on his mind, aligning the lesson plans to the Louisiana state standards, and being creative about methods in which to integrate COSEE concepts when he was assigned different science classes to teach.

Carrie seemed to connect to one particular lesson and really focus on the details of how to make it work in her classroom. She was appreciative of all the help she received from the scientists and reflected about COSEE concepts in a journal she maintained. Carrie also explained the lesson plans she created collaboratively were of a much higher science quality than those she would have created on her own. Ben described using the lesson plans he created but in a more supplemental way. He takes ideas from what he learned at the COSEE Institute and uses them to enhance what he is already doing in the classroom. Ben's greatest challenge has been modifying the materials list for lesson plans such that he can do them in his classroom. Finally, Lauren claims she did not create any lesson plans at the Institute. She created the plans she was required to submit during the online component of the program. She did not report any collaboration with scientists and explains that she uses very few of the lesson plans she created because the curriculum for sixth grade in her state has changed.

Regardless of whether the lesson plans were created in a group, with collaboration, or on an individual basis, all teachers agreed that they have used the lesson plans to some extent. They all also agreed that they have used the new knowledge they gained from their COSEE experience.

Frequency of use survey question. After analyses of the survey data, it was noted the question regarding frequency of use of lesson plans could have been interpreted differently by the survey participants. In order to determine how this would affect the results of the regression, interviewees were asked how they interpreted the question. Marina and Ben commented they did not have any problems interpreting the question and reported that they determined frequency as being one lesson, regardless of how many days it took to teach. Mark, Carrie, and Lauren had more to add to explain their interpretation.

Mark

Mark said he had difficulty answering the question on the survey dealing with frequency of use of lesson plans. He commented it was difficult to quantify because he considered a lesson the activity he would perform with his students and that could take several days or class periods depending upon the content. In Mark's words, "it's so hard to quantify and say because in reality probably the number of lessons I get to do now that are strictly COSEE lessons, two. Now, the amount that I integrate, way more." Mark is explaining that when answering the question on the survey, he did not believe there was an option that encompassed how he integrates portions of the COSEE lesson plans even when he does not use the entire plan itself. Mark thinks the better way to ask the question is, how many lessons do you think you have been able to incorporate COSEE data or COSEE concepts. In addition, he believes the term "lesson plan" should be better defined.

Carrie

When asked how she interpreted the survey question pertaining to frequency of lesson plan use, Carrie said she thought of it as asking, how many activities that she designed is she using. She said a single activity may take five days or thirty minutes to complete in the classroom. Carrie also added her theory on why the teachers who reported higher frequency of use of lesson plans were primarily the teachers who had attended the COSEE Institute in the most recent years. She explained what teachers are being asked to teach keeps changing and the amount of information teachers are expected to teach in a certain time frame is being "piled on." For this reason, she believes many teachers like her who attended in earlier years of COSEE, are not able to use the lessons anymore. She commented she is lucky because she helps to write the district curricula. Therefore she has "something to do with what is going on in Austin." She also mentioned having very supportive administrators who allow the teachers in her school to be creative in the ways they are meeting the state standards. She said this would be one reason for having a follow-up session for COSEE participants so they could "revamp" their existing lessons to meet their current state and district science requirements.

Lauren

Lauren said when she answered the question pertaining to frequency of use of lesson plans; she considered a lesson plan to require a fifty-minute block of time. She also mentioned she thought the question was asking about the lesson plans she created at the COSEE Institute which she said had specific time requirements in the homework assignments. For example, the homework would tell her how long of a lesson plan she should write, but most of the time it was a lesson that would take fifty minutes.

Although each participant described minor differences in the way they answered the survey question, it was determined that a lesson plan constituted a single activity the teachers performed in their classroom regardless of the time it took to complete it. This lends support for using the frequency variable in the model.

Online resources-Research question #1. When participants returned from the one-week COSEE Institute, they participated in an Online Institute (in the first COSEE:CGOM award this was a six-week period; in the most recent award funding this is a three-week period). During the Online Institute, teachers logged in on the COSEE:CGOM Web site, viewed PowerPoint® presentations developed by research scientists, and answered questions about each presentation. Participating teachers were given a password so they could view the presentations and access the discussion board.

Teachers were able to ask the scientists, COSEE Instructors, and their peer teachers questions about the material presented via the discussion board. Teachers created lesson plans that highlighted the information they learned from each scientist's presentation. All teachers had to complete this online portion of the COSEE Institute in order to receive continuing education credits or college course credit. The experiences during the Online Institute were different from those of the face-to-face Institute and are reported below.

Lesson Plans and Materials

Marina

Marina does not use the COSEE:CGOM Web site to download lesson plans for her classroom and admits that she did not know it contained such resources. However, she mentioned she does download lesson plans from other science Web sites. She was unaware the themes for the COSEE:CGOM Institute change each year and new information was being added to the Web site after each year's Institute. She commented that now that she knows, she will be more likely to utilize the Web site for resources as long as the lesson plans are user-friendly. Marina also said there needs to be a simpler format for the lesson plans and that they should not take long to download. She also said you should be able to scan the lesson plan quickly and get the general "feel" for it. Otherwise, Marina thinks teachers will not waste their time trying to determine the content because they are so busy.

During the Online Institute, Marina had difficulty uploading one of her homework assignments. Her dial up connection to the Internet was slow and she had to ask for an extension in order to get her work submitted. This situation caused her a great amount of stress and she said she understands there have been many improvements since she attended to address this problem. Marina also mentioned there were times during the Online Institute where she felt “totally inadequate.” Marina said that “the material, the wording, everything was way out of my ballpark.” Marina remakred she could read the materials but that she was not always sure what the presenter was asking her to do. She recommended that it would be useful to give the scientists training in pedagogy so they would know how to better relate to the teachers when designing their PowerPoint® presentations for the Online Institute.

Mark

Mark did not expect to use the online resources as much as he did. His first thoughts were that he would do the assignments, submit them, and never really look at it again. However, he explained that he took a lot of the online material and integrated it into his Environmental Science curriculum at this school and “went back and pulled” from the contacts he made all year. Since this was a new subject, Mark’s district did not have a book or materials for him to use to guide the creation of his class. Therefore, Mark took advantage of interacting electronically with other teachers during the COSEE:CGOM Online Institute to see what they were doing in their classrooms. From this interaction, he gained ideas for his own lesson plans. Mark said that “long term I made some contacts that helped to build lessons.”

After the Institute, Mark has not used the Web site much to download lesson plans or materials. He said he is disappointed that there is not more of a selection of lesson plans although he did report having been impressed with the ones that were posted. Mark suggested the search engine be linked to key terms that were directly associated with each state's standards and benchmarks so that teacher can easily find lessons to meet the requirements. Mark uses the Internet to search for new lesson plan ideas mostly in the summer when he is planning for the next year. He mentioned a technology Web site to which he often posts his lessons for the state of Louisiana and how user-friendly it is and how the lessons are peer-reviewed. Each lesson has the same format and so he always knows what to expect. He submits samples of student work to this Web site and finds it very helpful to get ideas from other teachers from a source he can trust. Mark said he would trust the COSEE:CGOM Web site for accurate, high-quality lesson plans.

Carrie

Carrie recalled the Online Institute portion of her COSEE experience, where she watched PowerPoint® presentations and completed homework. She was then asked to create lesson plans based on the topic covered in the PowerPoint® presentation. She confessed that she does not use these very much. There was one topic about tube worms and deep ocean vents that did turn into an innovative lesson as described earlier in the integration and reflection section. Carrie recalls believing the Online Institute took up a "large chunk" of her time. Carrie is glad that she created the lessons to use in her classroom but thought that maybe the homework assignments could be a little shorter.

Carrie admits she does not use the COSEE Web site to download lesson plans but that she would trust it as a source for quality lesson plans if she needed a lesson about a certain marine topic because she knows the science behind it would be accurate. Carrie was not aware that she could still access the PowerPoint® presentations for use in her classroom. She was also unaware that the presentations change each year and that she could use any of the presentations posted on the COSEE:CGOM Web site.

Ben

Ben said that when he was teaching in the regular public schools, he used the COSEE Web site often. He had students conduct guided, Web quests or had them complete activity sheets found on the site. In his current teaching position, he has not used the Web site much because the computer lab at his school is being "retrofitted" and only has four computers. Therefore, Ben cannot take all of his students to the computer lab at one time.

Ben said he has not disseminated any of the PowerPoint® presentations to other teachers that were made available to him during the Online Institute because he did not know if he had permission to do so. He said it would be helpful if they had made it clear how that information could be disseminated. Since he has to have a password to access the presentations, Ben was afraid of sharing someone else's intellectual property.

Lauren

Lauren recalls being required to complete five lesson plans during the COSEE Online Institute when she returned to her classroom. She said she was supposed to watch the scientists' PowerPoint® presentations and then develop a lesson plan that she could use in her classroom that was related to each scientist's topic. She remembers having a different topic each week for the Online Institute and she said that if she did not have enough time to complete the homework (lesson plan) she could e-mail it in late. She mentioned there was no collaboration with the scientists. She recalls it was more of an "individual thing." When she returned to her school, she had to teach a summer program so she was completing the COSEE homework in addition to her teaching responsibilities.

Lauren said she did not believe she had as much contact with the scientists when completing the Online Institute. She commented it was not as easy to access them and ask them questions when they were not present. She said that the scientists' PowerPoint® presentations were lengthy and had many words per slide. Lauren would have liked to have had an hour or so each week where the scientists presented their slides to the teachers in a videoconference because she found it difficult to read through so much material at once and not be able to ask questions. In Lauren's opinion, the interaction with scientists while she was at the Institute worked well but when she returned and was completing the Online Institute, she did not think it was productive. Lauren did not perceive she was really able to interact with the scientists online.

Lauren said that because the slides were not user-friendly, it would be time-consuming for her to modify the content to teach to her students. She also mentioned the content on the PowerPoint® slides was too detailed for her as a sixth grade teacher. She said, "I didn't need to know all of that."

Although Lauren does not use the COSEE Web site often, she said she does use other science Web sites that she finds in journal articles or receives from other teachers. She said if the site contains helpful information she can use, she is more likely to go back and use it again. If Lauren were to receive updates about the COSEE Web site, she would be more likely to use it. She said being able to download lesson plans, videos, and pictures would be useful for her to use in her classroom. Lauren also mentioned she prefers to use sites with search engines or categories so she does not have to spend a lot of time searching for what she needs. Lauren would also like to be able to search for lessons by state standard. She said this was important because it would reduce the amount of time she spends looking for an activity and also validates the use of the lesson plan if it meets the standard.

Online Discussion Board

As mentioned before, the Online Discussion Board was used as a means of communication during the second portion of the COSEE:CGOM Institute. Participants were given a password and user account so that they could "log in" to the program and review the scientists' PowerPoint® presentations. Then teachers received their homework assignments. If participants had questions regarding the presentations or the homework, they were to use the discussion board. Marina, Mark, Carrie, and Lauren commented on use of the discussion board. In reviewing the transcript for Ben's interview, the question pertaining to the discussion board was not asked due to time constraints. Ben's overarching comments indicated he believed that the Web was an "underutilized tool" that COSEE could strengthen and use to keep in contact with teachers.

Marina

Marina had limited computer skills when she attended the COSEE Institute. Consequently, she had trouble using the discussion board. She said, "We were supposed to have a place where we could ask a question. Somehow that never worked or I never got a reply or didn't get it in time." This coupled with her troubles downloading homework assignments caused her much anxiety.

Mark

Mark used the online discussion board during the COSEE:CGOM Institute, but after the Institute he said it "fell by the wayside." When teachers were required to post comments, more people would use the system. He said it was easier to simply call the people with whom he made contact because he received immediate feedback, as most people did not use the online programs after the Institute concluded. Mark believes this fact was because there was no incentive for continued use of the message board or e-mail.

Carrie

Carrie does not recall using the online discussion board much during the Institute. She thought it was mostly for asking questions of the scientists or other teachers. She has not used it at all since the Institute.

Lauren

Lauren mentioned she knew there was a discussion board but she was so busy teaching her summer classes that she did not use it. She does recall e-mailing some questions to one or two of the scientists during the Online Institute.

Teaching different grade level and/or content area. A common theme that emerged among interviewees when discussing lesson plans, was the fact many of the teachers were no longer teaching the same subject area or grade level as they were when they attended the COSEE:CGOM Institute. Participants reported how this affected the frequency and continued use of COSEE lesson plans. Mark, Carrie, and Lauren are now teaching in different areas.

Mark

Now that Mark has changed content areas, he has found it more difficult to implement the COSEE:CGOM lesson plans. He believes that it is harder to integrate COSEE concepts into Physical Science. Mark commented he wishes there were more connections he could make for his students between COSEE concepts and physics. Thus far, Mark has integrated wave functions, beach erosion, and SONAR into his classes. Mark explained that as he gains more experience with this new course curricula, he is able to incorporate more COSEE content.

Carrie

Like Mark, Carrie is no longer teaching the same grade level she was teaching when she attended the COSEE Institute. There are many activities she no longer gets to use since she is teaching eighth grade. She does have an appreciation in knowing the seventh grade science teachers are able to use resources she left for them.

Lauren

Lauren mentioned she tried to use some of the COSEE lesson plans she created while at the Institute when she returned to her classroom. However, she claimed the Alabama Department of Education changed the school curricula. She would have been able to use more of the lesson plans from COSEE if this change had not occurred. Lauren further explained the Alabama Department of Education has now trained science and math teachers to use kits from the Alabama Math, Science, and Technology Initiative (AMSTI). These kits do not contain as much ocean science content as the previous curricula Lauren was using. The ocean related topics had been moved to a different grade and the COSEE lessons she created did not necessarily pertain to the topics she now teaches.

Appreciated and use the resources from the Institute. Many of the interviewees commented on how much they use the resources that were provided at the COSEE:CGOM Institute. Although the materials supplied at each of the Institutes were different, the result for each teacher was the same. Mark, Carrie, and Ben all reported using them.

Mark

Mark commented he "would go back and re-do the whole thing just to get the resources and stuff that were offered." Mark described the resources he received as, "current, they were interesting research, they were great reads about the ocean, they were related to what we were studying and the data and the facts and the imagery that are in them just made me want to teach marine biology." He compared the books, maps, binders, and other resources to "prizes" that served as an incentive to participate.

When Mark attended the COSEE Institute, he was taught how to use a water quality kit and other instruments. He was able to keep some of these supplies when the Institute was completed. However, when Mark changed schools, he was not able to take this equipment with him. Therefore, he has begun the process of trying to rebuild his laboratory supplies. Mark said if he can show his district he knows how to use the equipment, they are more likely to purchase it for him. Mark said if he gives them a sample of what he can do i.e., test pH or oxygen levels, and how that can be incorporated into a lesson plan, then the school administrator or even a parent is more likely to fund his class projects.

Although Mark has changed schools and subjects, he had a relief map that he was given during his COSEE Institute hanging on the wall and uses it every year. In Forensics, he uses it to calculate map scale and then asked his students how they would do the same thing in the ocean. Mark admitted this is not a direct COSEE link but the resource is still being used to teach a lesson in Forensics. Mark also mentioned he received a large, well organized binder with resources from the COSEE Institute which he still has at home and uses as a reference. He said it has been valuable to be able to go back and review content that he has forgotten. As the science department chair at his school, Mark shares this binder with his fellow teachers and said that they have also found it to be very user-friendly.

Carrie

As mentioned before, Carrie was able to excerpt from her COSEE binder and field notebook to demonstrate she uses the resources she was given, as well as the ones she created. She has preserved specimens she collected while on the boat, made and displayed algae presses, and created field guides that her students use when conducting research. She said since she only gets to take 20 students on the field-trip to the coast each year, these specimens allow her to share the ocean with all of her students.

Carrie explained the resources she was given at the COSEE Institute have been useful to her and to her students. She commented, "we [the teachers] get there and we've got a COSEE bag and a pile of books… it's like the first thing you get and then we're using all that during the week. Then you get to bring it back with you, and when I'm doing stuff with my kids, I have these resources and [the students are] using them."

Ben

Currently, Ben uses his COSEE binder, charts, maps, and handouts in his classroom. He was able to take his COSEE binder from his shelf and flip directly to some of the materials he has used with his students. Ben said the COSEE materials he received were extremely valuable in helping him show his students real-world examples of how marine science is used in Florida industries. Ben mentioned that even though some of the resources he received are not directly a part of the lesson plans he created, they are very helpful in enhancing his teaching. For example, Ben received a wealth of information on invasive species at the COSEE Institute. He now incorporates this topic into his

Horticulture classes. Ben also uses the slides he made while at the clam factory to show his students how juvenile clams are raised in five-gallon water containers.

Accessibility of scientists-Research question #2. Interviewees were asked about their perceptions of the availability of scientists to help them during both portions of the Institute. Some participants commented on their impressions of working closely with scientists during all times of the day. Other participants discussed the continued availability of the scientists even after the Institute was completed. Marina did not elaborate on the accessibility of the scientists at the Institute she attended but did mention they were always there to answer questions and participated with the teachers in the field experiences, which impressed her. Lauren did not have the same positive and actively engaged collaboration that was described by the other teachers. In fact, she said she did not have any contact with the scientists except to listen to their lectures. However, Mark, Carrie, and Ben said their experience was that the scientists were readily available both during and after the Institute.

Mark

Mark said he appreciated that one of the scientists at the Institute he attended would e-mail information back and forth to him. He was impressed that a college professor would take the time to send information to help him. Mark stated he was just a teacher working with 200 students out in a sugar cane field in rural Louisiana and was honored to have the university connection. He believed he was able to build personal relationships with the scientists and explained that he felt comfortable calling or e-mailing them with questions even after the Institute. Mark also mentioned the scientists with whom he worked not only acted as resources themselves but also gave him names of other people he could contact to answer his questions.

Carrie

Carrie mentioned the two lead COSEE Instructors for the Institute were always available to help her. She liked this component of the Institute. Other scientists lectured in the afternoons and then left, but two of the scientists were with her the entire time. Although she said it would have been nice to have had additional time with more scientists, she commented she would not have changed anything about the way the Institute was designed. Carrie explained the COSEE Instructors who led the field experiences knew how to make the information applicable to her classroom instruction.

Carrie believed she benefited from having knowledge handed to her "by someone who really knows." She noted it would take her so much time to research all of the topics that were presented at the Institute. Further, Carrie appreciated the fact the lead scientists had taken the time to make all of the connections and real-world applications between COSEE content and teaching materials, so she did not have to do it. Carrie was relieved to attend a professional development that excited her about teaching science again.

Ben

Ben mentioned he keeps in contact via e-mail with many of the people and scientists from the COSEE Institute he attended. In fact, one of the extension agents he met at COSEE, has sent him sea grass plugs he uses with his Horticulture students. The plan is for Ben's students to grow plugs and then ship them to Tampa Bay when they are ready to plant. In this manner, Ben's students can contribute to the sea grass planting program even though he cannot take them on a field trip to Tampa Bay. Ben plans to use the unit he developed at COSEE to complement the growing of the sea grasses. He has photos to share with his students to demonstrate human impact on sea grass beds and explains why they are being destroyed. Due to the contacts Ben has maintained from his COSEE experience, Ben is able to involve his students in a project to help another part of the state and discuss concepts about the way in which everything in nature is connected.

Another long-term contact Ben has made from his COSEE experience, is a Florida fisherman who always sends him dogfish sharks to dissect with his students. Although the fisherman was not at the COSEE Institute, his name was mentioned and Ben followed-up with a phone call. The fisherman would be throwing the dead sharks back into the water once they are caught in his nets. Instead, the fisherman shares them with Ben's students so they can learn shark anatomy. Ben mentioned yet another person he considers a resource whom he contacted through his COSEE experience. This scientist directs one of the labs on the Florida coast and has helped Ben plan field-trips.

Ben said not all of the scientists at the Institute stayed to participate for the entire Institute. He said he "picked the brain" of the scientists who did stay and appreciated their willingness to share their wealth of information. He liked the interaction with the scientists who stayed throughout the Institute and Ben was comfortable in asking them questions.

As mentioned before, Ben has e-mailed some of the scientists from the COSEE Institute to ask questions. He said some of the scientists have been great at answering his questions and he has continued to stay in touch with them while others have never responded to his e-mails. The one scientist who does consistently communicate with Ben via e-mail also sends him information about upcoming workshops he may be interested in attending.

Camaraderie with scientists-Research question #2. The interview participants made positive comments concerning the relationships that were formed with the scientists. Many of the teachers were surprised the scientists were “normal people” and were easy to talk with about marine related topics. Participants also expressed how they were impressed that the scientists stayed in the same dorms, ate with them, and helped with the loading and unloading of gear during field excursions. Marina, Mark, Carrie, and Lauren shared their thoughts on the positive environment they experienced as a result of working “side by side” with the scientists.

Marina

One factor Marina was able to strongly express about her experience at the COSEE:CGOM Institute was the feeling of being on equal footing with the scientists. She believed she could “hang with these professionals.” She commented on the fact that it was comforting to not be the only one that felt lost at times. “We picked up that they [the scientists] were all as lost as we were [at times]. But that at least put us all on the same level and that we could tell that they felt intimidated. Naturally, classroom teachers in there with doctorate people and scientists and whatever, it doesn't take much for us to be intimidated. That was one common glue that we all had." Marina said she was comfortable asking questions of the scientists if there were terms or concepts she did not understand.

Marina also mentioned being impressed the scientists stayed in the same dorms as the teachers, helped to load and unload equipment on the boat, and shared meals and social times with the teachers. These facts made the scientists seem more approachable than she had thought. "We did not feel intimidated being around them." Marina said she learned a great deal from even the brief conversations at meal times and while being transported somewhere on the boat. On one boat trip the weather was bad and they had to return to shore. This experience allowed both scientists and teachers to share in "amended lesson plans, making do, surviving, and camaraderie."

Mark

Mark believed he "built more of a personal relationship" with the scientists at the Institute and he thinks he is a "little more in contact with University folks" than he was prior to his experience. Mark appreciated the atmosphere of the Institute and described it as having, "a good combination of personalities because it was almost like talking about things with your friends. Nobody was on a higher level than anybody." Mark also mentioned that "through the program [he] was able to reach out [to the scientists] long-term and over the years since [he] did COSEE, [he] was able to continue to go back and even draw on that [experience]." Mark described going fishing with the professors, watching movies after hours, and even went to local bars together. They not only talked science but debated about politics. Mark said this constant exposure and communication helped to form the close relationships they shared during the Institute.

Carrie

Carrie said she believed she developed a rapport with the scientists. Although most of the scientists came and lectured and then left, the two COSEE Instructors stayed with them and led them through field experiences. It was difficult to determine if Carrie was distinguishing between the scientists and the COSEE Instructors. Her comments indicated she developed a relationship with the two lead instructors for the Institute who she also referred to as scientists. She did give one specific example of a scientist who gave them a lecture on raising fish and then gave them a tour of the lab where she works. Carrie said other teachers have taken their students to this scientist's lab since the Institute and she has volunteered her time to give student tours.

Carrie said she was comfortable asking questions. Although Carrie was presented with a significant amount of information at once, it was understandable. Carrie mentioned she believed everyone was on the same level. Carrie added, "there wasn't any of that attitude like 'you're an education person, not a science person'."

Lauren

Lauren said she was comfortable asking questions of the scientists at the Institute and stated if she did not understand a concept, the scientist would explain it further. She described how some of the scientists came and gave presentations and then left, but one scientist accompanied them in the field. Lauren enjoyed having the scientists present the material, guide the teachers in completing a lab, accompany them in the field, and then return and debrief with them in the classroom. Lauren stated this was the part of the Institute where she learned the most. She commented the scientists were able to “share with us all day” and this complemented the lecture she received.

Although Lauren has worked with scientists before, she said her COSEE Institute experience was different. She said of the scientists, “at the COSEE Institute we could really just talk to 'em and kind of enjoy it and kind of live it, and then my other experience was more just to go to them for technical information.” Lauren said she believes the relationship was mutual and the scientists were comfortable with the teachers as well.

Overall, the relationships formed between scientists and teachers were described as true friendships and camaraderie between both parties. Teachers were able to break through the barrier of perceiving scientists as unapproachable and working in seclusion. Scientists were able to communicate they placed value on the teachers’ expertise to disseminate the research the scientists were conducting to their students. This scenario opened the door for mutually cognitive relationships to form.

Mutually cognitive relationships. Interview participants were able to describe shared experiences between themselves and the scientists. Most participants believed the scientists gained as much from the experience as the teachers.

Marina

Although Marina experienced some frustrations working with the scientists, she said she believed the scientists left the Institute with an appreciation for what teachers do. She said the scientists probably did not get a “real grasp” because they were not in a classroom situation but that they were able to see some of the challenges teachers face when presenting curriculum. For example, she commented the scientists did not know what it was like to have to raise funds to do science related activities or how much teachers have to multi-task while keeping student emotions at bay during a lesson. However, Marina did describe how her interactions with the scientists made them aware of these challenges, as well as better understanding the state mandated standards teachers must follow.

Mark

Mark explained he has participated in several programs where he has worked with professors but has sensed he was being talked “down to” as if he were back in college. He described his COSEE experience as more of a joint learning experience for the scientists and the teachers. One example he gave was about correcting misconceptions. The scientists had the misconception that schools were over-funded; that teachers had plenty of time to cover topics in detail; and teachers were not doing their job because students were entering college without the skills they needed to be successful. Mark also mentioned the scientists often did not know how to “break concepts down” for students because they were unaware of the pedagogy needed to scaffold concepts for understanding. Further, Mark shared the scientists were unaware of the cognitive functioning of students at different ages. Mark said he believed he contributed to the scientists' understanding of pedagogy and that the scientists helped him to increase his content knowledge.

Further, Mark explained that he contributed to the scientists' understanding of how to break concepts down for students and not just regurgitate information from a textbook. He said the scientists indicated to the teachers they learned a great deal from "bouncing ideas off" of the teachers. It helped the scientists realize why some of their college students were not grasping the concepts being taught. Mark said the scientists had a better understanding of what they needed to do to reach students and how they needed to present material. Mark believed the teachers were able to open the scientists' eyes relative to the large amounts of material they had to cover on a limited budget with limited time. The scientists knew standards existed but had no idea what they were. Overall, Mark thought the scientists left the Institute with a better idea of the teachers' frustrations and teaching strategies they could use in their college classrooms. He also added that one of the scientists claimed he would never vote against more money for schools again because he now sees that teachers do not have all of the resources they need. This scientist sent the teachers resource packets in the mail after the Institute because he realized how much they needed them. Mark said the scientists' eyes were opened to the discrepancies in educational funding throughout the state. Mark believes the scientists were not always aware of the disparity of the students in their classes because they do not know the demographics of the "feeder" schools the students attend before entering college. This is one area in which Mark believes the teachers contributed to educating the scientists.

Mark also explained he was able to add to the scientists' knowledge of creating lesson plans. Mark mentioned the college professors had "no clue how to [develop or implement] a lesson plan." Mark found this amusing because writing lessons is second nature to him. Mark shared information about the format and standards guidelines and the scientists helped him with the content.

Carrie

Carrie did not think that the scientists who presented lectures at her Institute were aware of the state teacher associations, standards, and classroom pedagogy. The scientists attended for a brief period to disseminate information and to suggest ways in which their research could be presented in the classroom. Carrie said the scientists gave her key ideas and then she tried to determine how the ideas would fit into her curriculum. Carrie commented, "they were sort of filling in our gaps more on a presentation to us than figuring out how to present it to the kids." Carrie said this was acceptable because that was what she was there to do. She was comfortable getting the background information from the scientists and then determining how to create a lesson that would meet the standards and be enjoyable to students. Carrie remarked she understood the topics the scientists' discussed were chosen for a reason. She said the lectures complemented what the teachers were doing in the field. She liked this arrangement and believed it facilitated her learning. Carrie said there was significant discussion back and forth between the scientists and teachers. The scientists would make suggestions relative to how the information could be presented and the teachers would tell them their constraints.

Carrie mentioned she felt that one of the lead COSEE Instructors, who was new to the program, learned a lot from the teachers. She thought he walked away with a better understanding of "some of the pressures that are on us with the standards and the testing and that you have to make it [the lessons] fit; that you can't just do it because you want to and that you have this huge sort of scale of student interest, and student ability levels, and you know, kind of getting the idea that we can't just come up with an activity that we think is fun and throw it out."

Carrie believes that she was able to add to the scientists' understanding of what is practical to teach in a certain time frame for a specific age of students.

Ben

Ben said working with the scientists at the Institute solidified in his mind that scientists work collaboratively. He discussed how he was able to teach this concept of working together to his students when he returned by describing how he had worked with the scientists. Ben also believed scientists care about what is happening in the schools. He commented, "I think that really cemented the idea that scientists want to help us in the schools actually accomplish teaching of science."

Ben said the experience of working with scientists also helped him realize that science in America is in trouble. Ben further stated that students today think a computer will spit out the correct answer to the problem and are unaware of the concept behind the answer. He commented, "I think it helped me see that we do need to start pushing hard science instead of this watered-down version that we've been doing." Prior to attending the COSEE Institute, Ben experienced working with scientists at the National Aeronautics and Space Administration (NASA). He said he was used to their strange sense of humor and use of scientific terminology.

Ben commented the scientists also learned from the teachers. The scientists with whom he interacted during meals and over the course of the Institute were amazed at the responsibilities teachers have in the classroom. Ben detailed for the scientists the large amount of paperwork he had to complete to demonstrate the manner in which he is meeting the state standards, the discipline issues with students, and the difficulty he has motivating his students. Ben said that they were "amazed" and were asking him how he deals with all of these challenges. Ben said "it was really eye-opening for them [the scientists]." He mentioned the scientists wondered why he "stuck with it" and why he did not apply to teach at the college level with all of the knowledge he had. Ben explained to the scientists that he gains satisfaction when he sees the "light go on" for students and he is not sure he would get the same fulfillment from another job. Ben concluded by telling the scientists how much fun he has with his students and how you have to have a good sense of humor to teach in the classroom.

Lauren

Lauren said she thinks the scientists at the COSEE Institute she attended were interested in what background information the teachers had and what topics were of interest to teachers. However, she commented she did not think the scientists had a good idea of what she does in the classroom on a daily basis. Lauren did not think the scientists understood the complete picture of what she deals with in the classroom or how she has to modify information to make it understandable to her students. This belief is the result of Lauren having had limited time with the scientists. At the Institute she attended, scientists did not work collaboratively on lesson plans with her and she did not have much interaction with them other than to attend lectures. Lauren did not describe the same side-by-side experience as the other teachers. Instead, Lauren detailed what a traditional teacher professional development workshop would entail including passive learning by the teachers with expert scientists providing information but not partnering with teachers to translate this information into classroom material.

With the exception of Lauren, teachers described their relationships with scientists as being positive. The partnership formed between scientists and teachers was described as both parties sharing with one another and learning from each other. The teachers were able to step back and realize the scientists were regular people and the scientists were able to understand teachers had a very important role to play in educating the next generation with the most current and accurate scientific data. Both parties face challenges in their perspective roles but now have a better understanding of each other's challenges which will inform their future practices.

Frustrations about working with scientists. Participants were given an opportunity to recall frustrations they may have encountered while working with scientists during the Institute. Interviewees reported various concerns mainly focused on the knowledge gap between novice and expert. Teachers related their initial intimidation with working with scientists who they held in high regard. The communication barrier was a result of unfamiliar vocabulary, unrealistic expectations for data collection with students, and differences in prior knowledge of material being covered. Marina, Mark, Ben, and Lauren shared their frustrations about working with scientists. Carrie said she could not recall any frustrations she had.

Marina

Although Marina enjoyed working with a scientist to create lessons for her classroom, she perceived that for her to be able to use the information it had to be "general." "We can't get into these scientific millimeter hair whatevers [measurements]. I don't have the time. I can't take that on as my full time [job]." She said she was more likely to use the information she learned and incorporate it into a lesson she could use in her room. Marina mentioned her science knowledge base was not as good as some of the other teachers who attended the Institute with her. Further, Marina said it was hard for scientists to relate to what teachers are dealing with in the classroom. For example, she mentioned a scientist would potentially never have to experience a child "throwing up" in front of them in the classroom, deal with "unruly" students, endure the many interruptions to teaching each day such as assemblies and testing or sell chocolate bars to finance their research.

When Marina read the COSEE brochure, the information piqued her interest in attending the Institute. Marina was under the impression she would be assigned to a scientist when she arrived for the summer session. Working side-by-side with a scientist appealed to her. She commented she really tries diligently to make science real for her students and expected her COSEE experience to make the science real for her. Then, she would have real life experiences on which to draw when teaching her students. She was disappointed she did not form a lasting relationship with any of the scientists. Marina believed the scientist with whom her group worked acted one way when the COSEE administrators were watching and another way when the group was alone. Marina commented that her group "pretty much carried out the project that she [the scientist] wanted us to do." This project was related to the scientists' research and Marina's group created lesson plans pertaining to that topic. Marina explained this fact is probably why she does not use the lessons in her classroom. It was not a topic that she selected and was one in which she had limited scientific background knowledge.

Mark

Mark said the only frustration he encountered was with the difference in prior knowledge of the other teachers during scientist lectures. Because some teachers had less experience than others, the scientists often had to explain necessary background knowledge before they could proceed. However, Mark said the scientists were patient and did not talk down to them because of their knowledge differences. Mark had reservations before the Institute about feeling inferior regarding knowledge in comparison to the scientists. What he found when he attended was the scientists just wanted to know why he was not aware of some of the things they expected him to know. Mark told them, "it's been about 10 years since I picked up a copy of *Cell.*" Mark believed these conversations about acquisition of knowledge helped the scientists learn how teachers were keeping up-to-date with the latest research. At times, the scientists would quote other researchers or papers that had been published. Mark said the COSEE Instructor would remind the scientists the teachers were not familiar with these studies or with some of the vocabulary being used. Thus, the COSEE Instructor acted as the liaison between the teachers and the scientists during the Institute. By the end of the Institute, Mark said the scientists had learned to "rethink" how they approached their lectures. The scientists changed their vocabulary and methods so the teachers were able to better follow the enhanced content they were providing the teachers.

Ben

Ben said although he was comfortable with the vocabulary the scientists used, he thought other teachers were not. Ben mentioned having a vocabulary list for the teachers, as well as a companion vocabulary list for their students would be helpful.

Lauren

Lauren's main frustration was trying to remember so much information when they were in the field. She does not attribute this to being a problem but suggested that the field experiences be recorded or filmed so participants could "go back" to review and take better notes. Lauren said she knows the scientists told her the information but it was so much so quickly that there were things she missed. She commented, "I mean, we had our notebooks we could write in. But to be honest, we were involved in everything. We didn't write down a whole lot." Lauren is explaining her frustrations with recording so much information in the field while trying to simultaneously participate. Lauren also suggested a guide with commonly asked questions in addition to the recording or videoing of the field experiences so teachers could use them as references after they completed the Institute.

Summary

The main frustrations perceived by Marina, Mark, Ben, and Lauren were: (a) dealing with background knowledge differences of participants and scientists, (b) use of scientific vocabulary, (c) fast pace at which information was being presented, and (d) unrealistic expectations for what kind of data teachers could collect with their students in the classroom due to limited resources.

Continued communication with scientists. The participants were asked about their continued communication with scientists after their COSEE Institute experience. The interviewees participated in different years and so the questions were phrased in a way to denote any type of communication beyond the actual Institute, even if it had been a few years since that communication occurred. The following comments from Marina, Carrie, and Lauren describe how they perceive this continued communication.

Marina

Marina's only disappointment from her COSEE:CGOM experience was not really making meaningful connections with any of the scientists. She explains, "I don't mean like pals for life but that we would make this um, connection uh, meet, work together, and that there would be contact afterwards. Which there's only been one of those and I can't remember her name, isn't that terrible?" Although Marina has not been in contact with the scientists who participated in her Institute, she has been in contact with the organizers of the Institute and is comfortable receiving help from them.

Marina said her overall feeling about working with the scientists was that it was a valuable experience. She said they were all very passionate about their work and she was proud so many of them were natives of Mississippi. Marina said the scientists were able to help her add "depth to her knowledge."

Carrie

Carrie said she has continued conversations with the COSEE Instructors and one of the scientists via e-mail. However, she said it was nice to have them in the same room with her at the COSEE Institute so she could get individualized help with her lesson plans. Carrie appreciated the direct communication "instead of random e-mail back and forth." Carrie placed value on the face-to-face interactions with the COSEE Instructors and scientists. Although continued communication had occurred via e-mail, she preferred to talk with them in person.

Lauren

Lauren said she did not keep in touch with any of the scientists after the COSEE Institute. Although she has not continued communication with any of the scientists, she commented she was given their contact information and is comfortable contacting them should the need arise. Lauren did not express motivation for contacting the scientists as her school curricula had changed and she did not see many future opportunities to incorporate COSEE concepts.

Increased sharing of knowledge-Research question #3. One of the requirements of the COSEE:CGOM Institutes was that participants return to their school districts and share what they had learned with other teachers and administrators. The interviewees selected different ways in which to meet this requirement.

Marina

When Marina returned from the Institute, she hosted a staff development for her school, sharing pictures she had taken and information she had learned. She said she believed the information was well received. Marina presented an activity she had completed at the COSEE Institute, although it was not the one her group had created. However, in addition to the staff development Marina hosted, the group of teachers with whom she worked at the Institute presented one of the lesson plans they created collaboratively with a scientist at the Mississippi Science Teachers Association meeting. Further, Marina has let other teachers and pre-service teachers borrow her lessons that she either created or received during the COSEE:CGOM Institute.

Mark

Mark presented within his parish about overfishing and the red fish population in Louisiana. A colleague suggested data entry for the lesson would be easier using a handheld, Palm Pilot®. Mark then wrote a grant to obtain a classroom set. Following the successful grant submission and award, Mark presented at the Louisiana Environmental Educators conference. On a local level, Mark mentioned he has talked to several teachers in his school about using the resources he received from COSEE. Mark often shares

COSEE lesson plans with teachers or makes copies for them to use. He tells other colleagues about his COSEE experience and how he has gained so much professionally from it. After Mark attended the COSEE Institute, he participated in a Math and Science Partnership (MSP) program that was funded by the National Science Foundation. One of his fellow COSEE teachers also participated and so the two of them "hung out" and worked on their lesson plans for the online portion of the COSEE Institute.

Carrie

Carrie currently writes curricula for her district and has incorporated COSEE lesson plans into the district curricula, as well as in a course she teaches at night for teachers trying to gain their alternative certification. Carrie has also used the lesson plans she created while at the Institute and has presented one of them at the Texas Science Teachers Association. Carrie was very nervous about this presentation and asked one of the COSEE lead instructors to come and present with her. He agreed and came to support her during the presentation. He served as a co-presenter. When Carrie returned from the COSEE Institute, she also hosted an in-service presentation for teachers in the district.

Carrie said other teachers have been very receptive to the lesson plans she has presented from her COSEE experience. Although none of the teachers have asked for her help in implementing the lesson plans in their classroom, she knows they use them and they ask her questions when they need help. Most of the teachers she knows who use them are in her own school but some teachers are from a school in which she used to work in Dallas. Carrie likes the peer-teaching model and thinks it is an effective way of disseminating information. Carrie explains the reason peer-teaching is effective it "because the teacher trusts you, they know that you do cool things in your classroom."

Ben

Ben was not encouraged by his administration to disseminate information to his fellow teachers when he returned from the COSEE Institute. He was told he could talk about his experience during his preparation period and was given no special recognition for his attendance at the Institute. Ben said he did present his lesson plans at the Hearts of Florida Science and Math Conference but not many of the teachers from his county were there. Ben has plans to present his lesson plans on weather erosion, hurricanes, and the Gulf of Mexico at the next district-wide science symposium which is held two to three times a year. Through his online membership of the Discovery Educator Network, Ben has posted lesson plans he created to help other teachers learn about tracking the hurricanes and the damage it does to ecosystems. Ben has continued to disseminate information to other teachers even though he fulfilled the COSEE requirement long ago. He likes having the ability to post lessons on the Internet because he believes he can share his lesson plans and they are "not just sitting around."

Ben knows other teachers are using the plans he posts because he has received e-mails asking for additional information. As mentioned earlier, he has not shared any of the PowerPoint® presentations on the Internet because he did not know if he had permission to do so. Ben mentioned he has not kept in touch with any of the other teachers who participated in the Institute.

Although Ben describes his administration as not being very supportive of his sharing of knowledge, he did present one of his lesson plans at the Best Practices Symposium in his district. He said he thinks it was well received by teachers and that several teachers asked him how he found out about the COSEE Institute and were interested in attending. Now, Ben sends e-mails to the principals in his district informing them about the COSEE Institute each year so they can make the information available to their science teachers.

Lauren

Lauren said when she returned from the COSEE Institute, she gave a presentation about what she learned at a grade-level department meeting in her school district. She said although the presentation was well received, she has not had any of the teachers ask to borrow her lesson plans or materials. Lauren attributes this to the change in curriculum within the state. She said the other teachers probably did not have a need for lesson plans pertaining to the ocean. Lauren said the binder and books she received at the COSEE Institute were full of information and easy to use.

Lauren recalls the teachers to whom she presented were all very interested in the experience she had at the Institute. However, she said she was not sure if any of them would attend in the future because they have families and would not want to be away from their children for an entire week during the summer. Lauren said she thinks peer-teaching is an effective way to disseminate information to other teachers. She commented it is nice to go to grade level meetings and learn a lot from other teachers' experiences without having to travel.

The other interviewees also agreed peer-teaching was an effective way to disseminate information but did not elaborate on the subject other than to explain teachers trust receiving information from other teachers who have tried and tested materials in their classrooms.

Suggestions for Strengthening the COSEE:CGOM Institute Themes

Seek follow-up experience to enhance their professional development. Without being prompted, many of the interviewees expressed an interest in a follow-up experience to the COSEE Institute. Mark, Carrie, Ben, and Lauren made suggestions for what this follow-up might include. Although Marina expressed interest in attending additional professional development experiences such as COSEE, she did not offer specific details to include in this section.

Mark

Mark mentioned he would like to participate in a COSEE Part II as a follow-up and enrichment session. He explained that science is always changing and evolving and it would be nice if there was a follow-up that continued to build on the relationships formed and concepts learned during the original COSEE experience. He suggested having updates on the topics covered during the original session, as well as the addition of new topics, ideas, and concepts. In this follow-up session, Mark proposed bringing some of the original teachers back and asking them to share how they have implemented the lesson plans and materials in their classrooms. Mark explained this would help to show new and experienced COSEE teachers the information learned at the COSEE:CGOM

Institute is applicable to many topics in the classroom and would allow past participants to continue to contribute to the lesson plan database. Mark likes the idea of having the opportunity to collaborate with teachers in a professional setting,-away from school.

Mark's idea of a refresher session would focus on the sharing of lessons and the many ways in which each teacher used the information since their COSEE Institute attendance. He described it as a convention where ideas are shared and where teachers can continue to be updated on the latest research in marine science. Further, Mark suggested this convention could be accomplished online, rather than in person, as long as someone was available to answer questions. He even suggested having an incentive program for teachers to participate. Mark said he would use this kind of online forum to stay more connected.

Carrie

Carrie would like to receive information via an electronic newsletter that detailed new information and the latest updates about scientific research. Carrie said she has not received any additional information about the Web site or other resources available to her since she attended the COSEE Institute. An electronic newsletter could steer her toward an interesting new lesson that had been posted on the Web site or an intriguing article about a scientists' new discoveries. Carrie called this a "scientist profile" and said it would enable her to stay current but not require an excessive amount of her time. Essentially, the electronic newsletter would provide a summary of new information available for her to use.

Carrie also mentioned she would like a follow-up session from her COSEE experience. She described a two-day workshop where she could come and offer feedback on the lessons she had created and the activities she had completed with her students. In return, she would receive updates on current scientific information and suggestions for how to extend and improve her lessons.

Ben

Ben said he would like to have a COSEE alumni meeting or refresher workshop. He said he would attend again each summer if he were allowed. Like Mark, Ben would like to be invited to attend and share his COSEE lessons with the next set of participating teachers at the COSEE Institute. Ben commented, “It’s really one of the best workshops I’ve ever been to, and I think that it would be great to present a lesson plan and say, ‘This is what I did in my class’.” Ben thinks if teachers see what other teachers have been able to do in their classroom, it would provide a feeling of confidence that they could do it, too. Having past participants return and present would allow current participants to witness the translation from field experience to classroom implementation.

Ben said an additional area of improvement could be giving teachers more time to collaborate. He thinks this could be accomplished in the follow-up session where the teachers would attend and share what they have been doing with the COSEE information. Ben said COSEE can offer the teachers an incentive for this follow-up session such as additional books or materials they can use as resources.

Lauren

Lauren said she would participate in the COSEE Institute again if it was offered. She commented she would participate even if the scientists were not part of the experience because she believes she learned so much from the other teachers who attended. She suggested offering a weekend class for past participants. In this class, teachers could attend and see what had changed since they attended the summer Institute. Lauren said it would be good to try activities other teachers had created and determine what has worked in their classrooms. Lauren also mentioned having a COSEE workshop at the Alabama Science Teachers Association or the National Science Teachers Association. She said if a refresher workshop was offered there, she thinks many teachers would take advantage of it. Lauren said she would be willing to present a lesson she had implemented with her students at one of these sessions.

Suggestions for general program enhancements. A final open-ended question allowed participants to provide additional information about their experience and suggestions for strengthening the COSEE:CGOM program. Marina, Carrie, Ben, and Lauren gave suggestions. Mark's previous suggestion about having a follow-up COSEE experience was addressed earlier as a separate section due to the large number of comments on this issue.

Marina

Marina discussed that it would be nice to explore your own topic of interest at the Institute instead of the scientists' topics. However, she said the short time period would make to difficult to model the Institute in this way. She said it may be more of a question of the personalities of the people involved that make the scientist/teacher relationship successful. Marina also mentioned she was not aware the resources accessible during the Institute would still be available to her afterward. Thus, she has not utilized them. One way to ensure teachers are using the online information is to remind them of what is available. This could be achieved by mentioning this availability in an electronic or paper newsletter sent to past participants each month. Marina would also like to be informed about new scientific discoveries and is a member of several list servers that send daily or weekly updates. The COSEE:CGOM could provide a similar service. Marina would like to have continued access to the PowerPoint® presentations on the COSEE Web site for past participants. She said even if she does not understand all of the science behind the presentation, she can get the general idea and then use that knowledge to create a lesson.

Carrie

Carrie suggested having the lesson plans searchable by topic to make it easier for teachers to use. She said she would be most likely to use the PowerPoint® presentations and the lesson plans. Carrie also suggested links to other lesson plan databases or science education sites. If the COSEE Web site was more of an all encompassing resource, she could bookmark it on her computer and would use it more frequently because it would be convenient.

Ben

Ben suggested having a teacher and a student version of the information he received in his COSEE binder. He said much of the information was very technical and it took him quite a while to alter it to use with his students. He would like a companion set of information for student use. Ben said this would have saved him a lot of work as he modified materials to make the vocabulary and readability meet his students' needs.

Ben also mentioned he would like to be able to rent or borrow equipment from the COSEE program to use with his students. He described Nansen bottles and other sampling equipment he could not afford to purchase if he wanted to conduct a field trip and have his students do field work. Ben said if there was a way to loan this type of equipment to teachers, he would appreciate it and his students would benefit.

Ben also suggested having a team-building activity on the first day of the Institute to help "break the ice" between the teachers and scientists. He said that although they all introduced themselves, the scientists kept to themselves. Ben thought some of the other teachers were too intimidated to ask questions. He laughed as he called it the "scientists are people, too" game.

Ben would like to know more about opportunities like COSEE in other parts of the country but said when he has asked about it, no one from the COSEE Institute has been able to help him. Ben would also like more information on how he could possibly participate as a master teacher at one of the COSEE Institutes or Workshops.

Additionally, Ben mentioned he would like to have more links on the COSEE Web site to relevant "real science" Web pages. He suggested having someone in charge of previewing the content of these links to ensure the information was accurate and reliable. Ben said many of the scientists at the Institute showed them Web sites that had great demonstrations but the Web sites were not in their packet of information so when he got back to his classroom, he could not find them to use with his students. Ben would trust the COSEE Web site to be a reliable source and would use it more often as a primary source if there were more links to other approved sites.

Lauren

As mentioned earlier, Lauren commented that it would be helpful to have a videoconference for the Online Institute where she could interact with the scientists during their PowerPoint® presentations. She thinks this would improve participants' understanding of the complex information the scientists presented in the slides and would allow teachers to ask questions during the presentation. Lauren also mentioned including current events in an electronic newsletter so she could immediately share the information with her students. For Lauren, having better contact with the scientists during the Online Institute was important. She wanted to be able to stop and ask them questions during the PowerPoint® presentation rather than get confused early in the presentation and feel "lost" because she missed key concepts.

Suggestions for recruiting future participants. Marina, Mark, and Ben were quick to offer suggestions concerning how to recruit teachers to future Institutes and how to keep past participants interested in attending follow-up sessions. Carrie and Lauren did not mention recruitment specifically in their interviews.

Marina

Marina mentioned the time commitment involved with attending a COSEE Institute. She said she is very selective in how she spends her summer and when she leaves her family. She thinks this is a factor for other teachers as well. When recruiting teachers for future Institutes, Marina suggested taking into consideration the time commitment for teachers. She also commented the summer is probably the best time to hold the Institute as teachers have difficulty attending professional development opportunities during the school year.

Mark

Mark also suggested offering Continuing Learning Units (CLUs) for teachers who would agree to post comments on the discussion board a few times a week in response to other teachers' lessons. He also suggested running an ad in the state science teacher association's newsletters when new lesson plans were posted on the COSEE:CGOM Web site or to congratulate a teacher for his or her efforts. Mark mentioned that "shout outs" are a popular way to commend a teacher on an inventive idea or lesson that he or she is implementing with his or her students. Mark also said that a newsletter would be a good way to publicize the COSEE Institute because so many teachers get them and then spread the news to other teachers in their school and district. Mark believes the personal testimonies of teachers who have attended the Institute in the past are the best way to attract future participants.

For Mark, earning CLUs would be a big incentive to participate in the future because in Louisiana all teachers need them. He would ultimately like to see any future

Institutes partnered with a university so teachers could earn graduate credit for attending. In addition, Mark believes that offering topics that were not covered in the previous COSEE Institutes and a resource binder with compiled lesson plans that are peer-reviewed or tested would be enough to entice past participants to attend again.

Ben

Ben said that the COSEE Institute was not very well advertised where his school is located. He actually learned about it from friend who is a teacher in Gainesville. This year, he received the information about the upcoming summer Institute but he can only participate once so he forwarded the information to the principals in his county with a personal message telling them what a great opportunity COSEE is for teachers and to please pass on the information to their science teachers. Ben suggested there has to be better way to get information to teachers.

Marina, Mark, and Ben suggested when recruiting teachers for future COSEE:CGOM Institutes, the following should be taken into consideration: (a) be aware of the time commitment by teachers and continue to work with teacher schedules to ascertain a convenient time to conduct the Institute, (b) offer continuing education credits in all states, as well as course credit as an incentive for those who attend, and (c) advertise the Institute widely and early so teachers from all districts have an opportunity to apply.

Best ways to keep in touch. Information was gathered at the conclusion of each interview concerning the best ways to stay in contact with the participants. Unanimously, participants claimed they would prefer to be contacted via e-mail because this was the easiest, fastest, and most reliable form of communication to reach them at home or school.

Marina

After her Institute experience, Marina said there was no follow-up besides the Online Institute portion and therefore she did not know what might be available to her. She is now more comfortable with using the computer and says she could easily be kept up-to-date via e-mail.

Mark

Mark would like to receive a mass e-mail at least once a month with news, lesson plans, fun educational links, and opportunities for professional development. He would like to see different teachers highlighted in this newsletter with a link to their lesson with pictures. He thinks this would encourage past participants to continue to build the kind of professional community that was present at the COSEE Institute.

Carrie

Carrie mentioned she would not mind staying in contact with COSEE personnel but it would have to be efficient communication. She is very busy in her classroom and needs to be able to retrieve a document or e-mail on the computer in-between class periods or during her preparation period. For this reason, information and contact needs to be short and to the point so she does not waste her time.

Ben

Ben stated if COSEE sent regular e-mails, he would appreciate being updated on what new things are happening with COSEE or marine science in general. If a scientist is willing to travel to the schools and share information or if there is going to be a symposium that teachers may want to attend, he would like to get this information also. Ben commented, "It's [e-mail has] been an underutilized tool with COSEE because I don't really get that kind of feedback from them." Ben thinks if COSEE were to inform him of possible upcoming events for teachers or students, he would utilize the information and take his students to participate in marine related events. Ben said it would involve having a coordinator who tracks these events and disseminates them to interested people. He would be interested in receiving an electronic newsletter with current research information, grant opportunities, a teacher corner with lesson plan ideas, and a profile of a scientist. Ben said he is the type person who really utilizes any information sent to him by a trusted source. If COSEE sent a newsletter with links to Web sites or lesson plans, he would use them.

Lauren

Lauren said she is so busy during the school year that she barely has time to answer a phone call. If she receives an e-mail, she can quickly go to the COSEE Web site and see what is new or save the e-mail for a time when she can read it thoroughly. Lauren said she would be much more likely to use the Web site if she were receiving periodic updates concerning what has been recently posted.

Discussion

After reviewing the results from both quantitative and qualitative data collection methods, each of the three research questions can be addressed in detail and answered using the information collected from participants. This section will attempt to summarize the collective information as it pertains to each research question.

Research Question 1

How do teachers perceive and use COSEE:CGOM lesson plans and/or online teaching resources and how frequently do they use them?

Lesson Plans

The survey documented teachers had different opportunities to use the COSEE lesson plans, had different resources available to them, and integrated the information they learned differently into the lesson plans they created. Further, the demographics of the participants played a key role in predicting lesson plan use as evidenced in the logistic regression analyses. Interviews with participants revealed how teachers were integrating lesson plans and COSEE:CGOM concepts into their existing curricula, what challenges they faced in creating and implementing the plans, and what factors played a role in determining the use of lesson plans.

Opportunities for Use

Teachers reported various opportunities for use of lesson plans in their classrooms as a result of: (a) their school schedules, (b) the number of science classes they taught, (c) their perceptions of which classes they believed they can use the lesson plans, and (d) the amount of time they had for preparation each week. Although differences were predicted, the survey verified the difficulty in comparing teacher use of lesson plans due to the various opportunities each teacher has to use them in the classroom. In addition, not all participants reported teaching the same grade level and science classes as when they attended the COSEE Institute which, in turn, affects their usage of the lesson plans.

In general, participants reported creating more lesson plans than they downloaded from the Web site. However, the trend observed was that participants did use the download feature. Of those lesson plans downloaded, 81.4% of the participants reported using them. Of those who reported using the plans, the greatest frequency of use of these plans was between one and two plans per participant. When reporting frequency of use of lesson plans, a larger number of teachers reported using the lesson plans once a semester, once a month, or once a semester to cover a particular topic. The frequency reported could be determined by the type of schedule the teacher is required to follow by the school. Therefore, this finding should be interpreted with caution.

However, in the interviews teachers explained it was difficult to quantify the frequency in which they used the plans for a few reasons: (a) teachers' schedules may change mid-year; (b) state curricula can change from year-to-year; (c) teachers believed they integrated COSEE concepts into already existing lesson plans and were not sure if this "counted" as a COSEE lesson plan; and (d) teachers modified existing COSEE lesson plans from the original they had created at the Institute and were unclear as to whether or not to include this when they reported frequency. Taking the data into account, it is clear there was confusion as to what qualifies as a single lesson and what is considered to be genuine lesson plan use.

Although participants reported concerns with the interpretation of this survey question, they seemed to all have answered it consistently. For example, each participant considered a lesson plan as a single topic, regardless of how many days it took them to teach that topic or concept in their classroom.

Only one variable mentioned above appeared to affect the use of lesson plans by teachers. The teachers' perception of the number of science classes in which they could use the lesson plans demonstrated high predictive value in the logistic regression. This finding was supported in the interviews where some participants reported higher levels of integration of COSEE concepts and therefore, more ways in which they could use the lessons in their classrooms.

Available Resources

Survey participants reported receiving all or most of the resources they needed to teach science (70%). The majority of participants reported having a computer in their classroom (98.4%) and having a personal teacher computer (88.5%). However, there was a broad range of differences in the number of student computers available in the teachers' classroom, with the majority of teachers having between one and four computers available for students. Of those reporting having at least one student computer, 78.3% also had Internet connections in their classrooms. Of those teachers who did not have enough student computers for each child in their class, many had access to computers in a school computer lab or their school library. Interview participants reported having the essential resources needed to complete a COSEE lesson plan with their students. The only constraints mentioned was for tools that were more specialized, i.e., box dredges or Palm Pilots®, which the participants had already either applied for grants to fund or created alternative methods for collection.

Classroom constraints cited for not utilizing the lesson plans were: not enough space in their classroom and distance from the coast being too great to take a field trip with students. These explanations reveal some teachers perceive the lesson plans be used in a field trip setting or with other extensive laboratory "set ups." Only about half of the teachers reported having a science budget (55.6%) and of those who did report having a budget, 49% had a budget of $300 or more.

Interview results suggested some teachers were unaware of the online resources available to them through the COSEE Web site. Teachers confessed not knowing the PowerPoint® presentations and lesson plans were still available to them after they had completed the Institute. Still other teachers suggested improvements to the Web site that would convince them to use it more often.

Despite the differences in available resources, it does not appear that lack of resources is hindering lesson plan use for the participants in this study. This was also verified through the logistic regression analyses results which did not find available resources to be predictive of lesson plan use.

Integration and Use of Lesson Plans

Survey results revealed a variety of ways in which teachers were using the lesson plans in their classrooms from presenting a fun topic to meeting science standards. This broad array of ways in which the plans were used was reiterated in the interviews where participants all shared unique ways in which they had chosen to present the information to students. This result verifies that teachers each understand and use their new knowledge in various ways and therefore translate that knowledge to students differently. One interviewee could see clear connections between various COSEE topics and how to incorporate them into his lessons, even without the help of other teachers. However, another teacher saw the changing state-prescribed curricula as a barrier to incorporating COSEE concepts into her classroom and thus saw few connections.

In addition to integration of COSEE concepts, use of lesson plans either created or downloaded revealed differences among participants. Less than half of the survey participants reported using the PowerPoint® presentations that complement the downloadable lesson plans. Interviews revealed most teachers modify resources to meet the needs of their students. One of the teachers interviewed mentioned he would take parts of the existing PowerPoint® presentations and create a new presentation for his students. One interviewee did not have access to a projector she could use to show a PowerPoint® presentation and so did not use them.

In general, participants reported less use of COSEE online resources. Some of this finding can be explained by the participants who did not have access to Internet in their classrooms. However, interviews revealed a lack of knowledge the resources existed. In addition, participants reported time constraints as a reason why they did not search for information on the Internet. Several good suggestions were provided by interviewees concerning ways in which the online resources might be more user-friendly. These suggestions included: (a) e-mail updates when new information is posted; (b) a search engine for lesson plans to save time finding the right lesson; (c) an electronic newsletter that highlighted current research and postings to the Web site; and (d) student versions of some of the more technical information found on the PowerPoint® presentations given by the scientists that teachers can use with their students.

Of the lesson plans either created or downloaded, participants are using more lesson plans in the Habitats and Organisms category (80.4%) in comparison to the Coastal Processes and Marine Technology categories. Interviews revealed teachers found this category "easier to teach" because students had more interest in this topic. Interview data also suggested teachers perceive that more of the science standards they have to cover are under this topic. Participants on the survey and in the interviews reported high levels of satisfaction with the: (a) ease of using the COSEE lesson plans, (b) the alignment to the state and national standards, and (c) the alignment to the *Ocean Literacy Essential Principles and Fundamental Concepts*. Participants reported a variety of methods in which they evaluated student learning of concepts in the COSEE lesson plans. Many of the participants used informal observation, projects, and comprehensive tests to determine what students had learned.

Teacher Demographics

In addition to the above mentioned factors affecting lesson plan use by participants, the logistic regression analyses revealed teacher demographic information could also predict lesson plan use. These factors were number of years teaching, grade level taught, and teacher to student ratio. Although not mentioned specifically by the interviewees, qualitative data also lends support to these quantitative findings. For example, teachers with greater teaching experience reported using more lesson plans. Interview data suggest the participants with more experience had richer reflections and gave more examples of how they had integrated COSEE concepts into their curricula.

Challenges to Lesson Plan Implementation

One teacher commented she did not use one of the lesson plans she created at the Institute because when she returned to her classroom, she could not remember the science behind the lesson to teach it to her students. Another challenge mentioned by a participant was trying to implement the lesson plans he created while they were still fresh on his mind. Teachers interviewed suggested time can be a challenge as they have limited time in which to plan their lessons during the school year. For this reason, teachers need information to be easy to understand and they need to be able to modify existing lesson plans in a timely fashion. The survey results supported time being an important factor. Results indicated teachers would use the COSEE:CGOM lesson plans available online more often if there was a search engine to help them find relevant lesson plans. Others reported they would like to receive e-mail updates when new lesson plan were posted to the Web site so they could check to see if they wanted to use them. These results suggest that teachers are looking for ways to save time when searching for new lessons to teach in their classrooms. In general, these results support the findings of Penuel, Fishman, Yamaguchi, and Gallagher (2007) that stated school schedules, budgets for equipment and materials, and time for planning and reflection are constraints that influence whether a teacher applies the new knowledge they have learned through professional development in their classroom teaching. Additionally, this supports the findings of Varelas et. al. (2005) who reported that teachers did not implement curricula in their classrooms from the apprenticeship program due to time limitations and content coverage.

A final challenge reported by an interview participant was the state curricula had changed and therefore she was not teaching the same standards in her classroom as she was when she attended the COSEE Institute. For this reason, she no longer uses some of the lesson plans she created because they do not align to the standards she is required to teach. This supports the findings of Lumpe, Haney, and Czerniak (2000) who reported that teachers need to perceive the curricula or professional development to be aligned with their district's goals in order to commit to adopting it.

Summary

It is difficult to predict lesson plan use of COSEE participants. However, this study identified several factors that are either encouraging or hindering lesson plan use by the participants in the study. Teachers who have a clear understanding of the material presented in the COSEE Institute, have help in scaffolding that new information to meet the needs of their students, and can reflect on multiple ways in which the information can be incorporated in their curricula are more likely to utilize the lesson plans as a resource both now and in the future.

Research Question 2

How do teachers value their participation in the COSEE:CGOM Institutes where they actively collaborate with research scientists, and in what ways do teachers incorporate into the science curricula knowledge gained from this partnership?

Collaboration

Results from the study indicate teachers do value their participation with scientists and believe both the scientist and the teacher learn from the experience. Interview participants identified the following as being important to the teacher-scientist partnership: (a) accessibility of scientists, (b) camaraderie with scientists, (c) mutually cognitive relationships, and (d) continued communication with scientists. Teachers also reported their frustrations about working with scientists.

Survey results indicated participants enjoyed working collaboratively with scientists in developing lesson plans (93.6%). The teachers believed the following: (a) they benefited professionally from this collaboration (95.2%); (b) the lesson plans they created in partnership with the scientists were more grounded in science (91.8%) and were a higher quality (83.9%) than what they would produce on their own; and (c) the scientists listened to what they had to say and that both parties learned from one another (85.4%). An interview participant commented she appreciated the higher level of content and challenging materials the scientists provided. This finding supports the work of Morrison and Estes (2007) which found teachers enjoyed being taught at the college level from someone with experience.

Accessibility of Scientists

Overall, interviewees believed the scientists made themselves available to the teachers and participants. The teachers were comfortable contacting the scientists at the conclusion of the Institute. Mark was honored research scientists were taking time from their busy schedules to present material to him and later mailed information for his students. This kind of network enabled Mark to know he had a university connection and source of reputable scientific information. Carrie appreciated the real world connections the scientists made for teachers throughout the entire Institute. Ben's connections with scientists have allowed his students to be involved in a sea grass re-nourishment project. Lauren did not have the same experience and believes if the scientists had been more accessible, she would have benefited more from the experience. Overall, these findings are similar to those found by Morrison and Estes (2007) who reported that the teachers "felt comfortable with the scientists and appreciated their expertise" (p. 178).

Camaraderie with Scientists

Participants in the survey rated working collaboratively with a scientist very high as mentioned above. The positive impact of this partnership was echoed in the interviews. Interviewees were impressed the scientists were "real people" and took part in the daily activities to work with the teachers including: loading and unloading the boat, eating meals, and staying in the dorms. Participants reported satisfaction in the perception the teachers and scientists were equal partners. Marina even reported she sensed the scientists were just as intimidated as she was at the beginning of the Institute and this shared experience and creation of culture brought them together in a special way. This description by participants of camaraderie with the scientists helped teachers to build what Mark called “a more personal relationship” than if the scientists had not been involved. Trust was formed between teachers and scientists and a positive rapport was developed. Even though Lauren mentioned the scientists were not as involved as she would have liked, she reported the time they did spend with her was enjoyable. All interviewees commented the scientist partnership could be compared to a friendship rather than a hierarchical relationship.

Mutually Cognitive Relationships

Survey participants reported they believed the scientists listened to what they had to say and each party learned from one another (85.4%). Interviewees expanded on this concept of mutually cognitive relationships. Mark said he was not “talked down to” and he was able to teach the scientists more about the challenges he faces in the classroom. Mark commented he really opened the eyes of one scientist who said he would never vote against increased funding for schools again. Interviewees described “bouncing ideas off” the scientists and working together to create lessons that would be applicable to students. The teachers shared pedagogical knowledge with the scientists and the scientists shared current scientific research with the teachers. Each party brought something of value to the table and participants were of the opinion this was an important aspect of their learning and the scientists’ learning. There were some areas teachers perceived the scientists may not fully understand such as: the stress teachers face when trying to meet standards, classroom pedagogy, daily classroom challenges, and the structure and function of state teacher associations. Results indicate working together in this active partnership was beneficial from the teachers’ perspective. In addition, teachers’ believed the scientists benefited equally. These results support the findings of Hawkins and Battle (1996) which determined mutually cognitive relationships allowed teacher and scientist to alternate in their role as expert to complete a complex task. In this case, the lesson plans were developed as a collaborative effort between teacher and scientist, each contributing in different, yet equally important ways. Thus, the end result was a mechanism for the scientific community to share their research with a broader audience.

Continued Communication with Scientists

The interview results were mixed for this topic. Some of the teachers reported having contact with scientists after the Institute and really appreciated the opportunity to have someone they could contact for information. Other teachers suggested that although relationships were formed at the Institute, continued communication did not occur.

Although some interviewees reported continued communication with scientists, survey results indicated the majority of teachers did not keep in touch with scientists after the Institute (56.4%). In fact, they kept in better communication via e-mail with the COSEE Instructors (60%) and their peer teachers (59.6%) than they did with the scientists (36.4%).

Frustrations Working with Scientists

One teacher expressed her frustration with her prior knowledge at the Institute. She believed some of the information given by scientists was too specific; she was "lost and could not keep up." Therefore, she could not use some of the information in her classroom because she did not retain it. Several teachers commented on the rapid pace of the information and the unfamiliar vocabulary used by the scientists at times. One interviewee commented she could not record so much information and simultaneously participate in the activities. This supports the findings of Morrison and Estes (2007) which found the speed of covering the material and the depth of the science vocabulary used by the scientists added to the teachers' frustration level. In addition, Morrison and Estes reported teachers experienced frustration when they did not feel comfortable with their own background knowledge (2007). Although teachers expressed the above frustrations, none of the interviewees saw this as a barrier to their learning.

Summary

Teachers valued the collaboration with scientists during the Institute. Not only did the scientists add to their content knowledge, but they also formed active partnerships to create classroom curricula in the form of lesson plans the teachers could use in their classrooms. When the strengths of both the teacher and scientist are valued in the learning process, the result is greater than what could be accomplished by either party alone. When partnered at the COSEE Institute, a mutually cognitive relationship develops as result of unique shared experiences and the collective formation of new knowledge. Although teachers experienced some frustrations working with the scientists, they were able to adapt to the fast pace of the Institute and walk away with meaningful experiences.

Research Question 3

How do teachers perceive their peer-teaching experience, and what do they believe each party gains from the experience?

Peer-teaching

Survey results indicated 95.4% of participants shared the information they learned at the COSEE:CGOM Institute with other teachers in their school. Additionally, 98.4% of respondents enjoyed working with their peer teachers at the Institute and 98.4% of participants believed they benefited from the collaboration they had with other teachers at the Institute. This section describes two different kinds of peer-teaching; collaboration with other COSEE teachers during and after the Institute and dissemination of COSEE concepts to peer teachers in their school districts after the Institute was completed. Interviewees reported increased sharing of knowledge with teachers in their districts, sharing of lesson plans among other teachers, and increased bonding with COSEE peer teachers.

Increased sharing and dissemination of knowledge to peers

Survey results indicated the bulk of respondents reported they had disseminated information they learned at the COSEE:CGOM Institute to their school, district, state, or nationally (80.3%). How they disseminated information was varied. The greatest number of teachers reported sharing lesson plans with other teachers (48 total responses), followed by presentations made at in-service trainings, workshops, or conferences (26 total responses).

Increased bonding with COSEE peer teachers

Although participants were not directly asked about their experiences with the other teachers who attended, some commented on how this was an important aspect of their experience. Interviewees believed this "bonding experience" speaks to the success of the Institute. Mark shared an experience he had where the teachers he met at the COSEE Institute were all concerned about their fellow teacher put in harm's way by *Hurricane Katrina*. He described how he and all of his peer teachers got in touch with her to make sure she was safe. Mark said this was a testament to the culture of the Institute because they only knew each other for two weeks but had formed a lasting bond.

In addition, participants in the interview suggested they had increased confidence in the products shared among their peers. They believed teachers trust other teachers who have tried and tested a lesson plan or have shared new knowledge they gained. These results support the findings of Garet, Porter, Desimone, Birman, and Yoon (2001) which suggested collective participation in professional development where teachers work "alongside" of one another is an effective strategy for teacher learning. Other studies suggest teacher collaboration is successful in promoting curricular implementation (Bryk & Schneider, 2002).

Summary

In general, teachers suggested their peer teachers gained new knowledge and access to quality lesson plans through this peer-teaching model. Interviewees commented past COSEE participants were the best mechanism for recruiting future teachers to the program. In addition, the participants enjoyed being able to share ideas and create lessons in groups with their peers. The professional atmosphere and positive environment allowed active partnerships to form that some participants reported continued after the Institute.

Summary of Research Questions Discussion

The combination of quantitative survey data, logistic regression analyses, and qualitative interviews helped reveal teacher perceptions of their COSEE:CGOM experience. This study suggests certain variables can predict lesson plan use by participants; the partnership formed between teacher and scientist plays a key role in the success of the Institute; and teachers value the opportunity to share what they have learned with their fellow teacher using the peer-teaching model. The final chapter details why these findings are significant, provides suggestions for strengthening the COSEE:CGOM Institutes, and gives suggestions for future research.

CHAPTER IV

SUMMARY, RECOMMENDATIONS, CONCLUSIONS,

AND FURTHER RESEARCH

Summary of Study

In this study, I was seeking answers to the following three research questions:

1. How do teachers perceive and use COSEE:CGOM lesson plans and/or online teaching resources and how frequently do they use them?
2. How do teachers value their participation in the COSEE:CGOM Institutes where they actively collaborate with research scientists, and in what ways do teachers incorporate into the science curricula knowledge gained from this partnership?
3. How do teachers perceive their peer-teaching experience, and what do they believe each party gains from the experience?

In this chapter, I review the purpose and methods of the study, discuss results, present implications, give recommendations, and provide suggestions for further research.

Purpose

The purpose of this study was to determine whether the lesson plans and curricula created through the COSEE:CGOM program (which are the products of collaboration between research scientists and teachers) were being used effectively in the classroom. The study addressed issues such as teacher perceptions of collaboration with scientists, effectiveness of COSEE:CGOM curriculum implementation in producing more ocean literate students, and teachers' varying views concerning how to successfully implement new COSEE:CGOM knowledge and concepts into their classrooms in order to improve student scientific understanding. In addition, the study examined frequency of use of COSEE:CGOM lesson plans and whether there were predictor variables that could produce a model for understanding factors hindering or enhancing lesson plan use. Further, participant perceptions of using peer-teaching as a method for disseminating COSEE:CGOM information in their districts was addressed.

Methods

A mixed methods approach was used to answer the research questions. An electronic survey was created using the online survey instrument *SurveyMonkey*. The survey was administered to 241 participants, of which 80 responded. Interviews were conducted with five teacher participants, one from each of the five Gulf states.

Survey

A participating teacher database was obtained from the COSEE:CGOM program for the five year period spanning 2003-2007. The database had the most recent information for the teachers who participated during these years. Using this database as a starting point, the teacher perceptions survey was sent electronically to 241 recipients, who attended a COSEE:CGOM Institute between 2003-2007. The e-mail consisted of a brief introduction to the research being conducted and gave a unique link to the survey for each participant. Those e-mail addresses that came back as undeliverable were updated in the database manually. The researcher printed a copy of the returned e-mail addresses, read the error codes on each, and deleted e-mail addresses that were no longer functioning from the database. Before deleting an e-mail, the researcher waited until a reminder e-mail had been sent in order to cross check the undeliverable e-mails and confirm that the-mail address did not work. Then, a new invitation to participate was sent to the teachers who did not receive the first e-mail. A reminder e-mail was sent to all possible participants and they were given at least one month to respond. An attempt was made to locate an alternate e-mail address for those e-mails that bounced back in the first round of survey invitations. A total of 241 e-mail invitations were disseminated. Of those 241 recipients, it was found 159 e-mail addresses were valid. Of the 159 valid e-mail addresses, a total of 66 participants completed the survey for an overall response rate of 41.5%. Of those 80 participants who started the survey, 66 completed it for a completion percentage of 82.5%. It was also determined some scientists were included in the original database and had to be excluded from further e-mails.

Teacher Interviews

After the online survey was completed, five teachers were selected to participate in a follow-up interview to help explain the survey results and to share their perceptions concerning the COSEE:CGOM Institute without being limited to options on the survey. Participants were selected based upon the following criteria: (a) completion of the online survey, (b) year in which they attended the COSEE:CGOM Institute, (c) state in which they attended the COSEE:CGOM Institute, (d) years of teaching experience, (e) current grade level taught, (f) response to an invitation to participate in the interview, and (g) willingness to participate.

To determine how time elapsed since attending the COSEE:CGOM Institute could effect the implementation of curricula, an effort was made to select teachers who had participated in different years. Similarly, teachers were selected from each of the five Gulf states, as they attended different Institutes and their experiences would vary. An attempt was made to select teachers with a diversity of teaching experience and varying teaching assignments (elementary, middle, and high school) to represent the array of participant backgrounds.

After the teachers were identified, the interview was made for a day and at a time that was convenient for each participant. Each interview was recorded both in analog and digital formats. After the interviews were completed, the tapes were transcribed verbatim into five separate Microsoft Word documents, one for each interview. During the interviews, detailed notes were kept identifying common themes mentioned by interviewees. These themes were used to begin the analyses of the transcripts. Beginning with the first interview, each line of transcription was read and then summarized under the appropriate theme(s) which were previously identified. When appropriate, direct quotes from the interviewee were included in the analyses. The same format and interview protocol was used for all five interviews. If a new theme emerged during the reading of the transcription, it was added in a logical place in the analyses. Then, each transcript was verified for information pertaining to the new theme.

Results

Summary of Survey Data

After the survey data were downloaded, each question was placed in a category based on whether it would be included in the logistic regression analysis (i.e., the dependent variable, one of the five independent variables), or whether the descriptive statistics would be used to answer one of the research questions. There were five groups of independent variables: (a) teacher demographics, (b) school demographics, (c) opportunities for use, (d) available resources, and (e) time elapsed (how long it has been since the teacher participated in the COSEE:CGOM program). The descriptive statistics for each of these five groups of independent variables, as well as the demographics of survey participants are summarized below.

Demographics of Survey Participants

Seventy-five percent of the respondents (57 out of 76) reported attending one COSEE:CGOM Institute. The other 25% of the respondents (19 out of 76) reported they had attended more than one COSEE:CGOM Institute. More respondents who attended the Alabama Institute (29.9%) participated in the survey than the other four states: Louisiana (27.3%), Mississippi (20.8%), Florida (14.3%), and Texas (10.4%).

Independent variable group 1: Teacher demographics. The majority of the survey respondents were Caucasian (89.1%) and were females (83.3%). However, there were other ethnicities represented in the data: African American (4.7%), American Indian/Alaska Native (3.1%), Asian/Pacific Islander (1.6%), and Hispanic (1.6%). The COSEE:CGOM Institute was designed for teachers in the middle grades. Survey results reveal there seems to be a large number of teachers attending who taught high school. In some cases, high school teachers were extended an invitation to participate in the Institute because there were not enough middle school teachers who agreed to attend. In other cases, teachers had changed grade levels and were now teaching in high school, but at the time of the Institute were teaching middle grades. This is an important statistic to report because it helps to understand the findings of the survey when the grade level taught is taken into consideration. For example, some teachers may have reported lower use of lesson plans because they have changed grade levels or are teaching different subject matter. That is, the lesson plans developed while attending the COSEE:CGOM Institute were not appropriate for the subject matter or grades taught by the teacher when the survey was completed.

Overall, there was an assorted mix of teachers with varying experiences who completed the survey. The larger percentage of teachers (26%) reported having taught between six to 11 years followed by participants reporting teaching 12-17 years (25%), zero to five years (23%), 18-23 years (18%), and more than 23 years (8%). The percentage of respondents based upon their teaching experience was presented in Figure 3.3.

The majority of the survey respondents reported having a regular or standard state certification (87.5%). Others reported holding an alternate route certification (6.3%), temporary, emergency, or provisional certification (1.6%), or certification by an accreditation body other than the state (1.6%). Two teachers reported not having a certificate in their main assignment field (3.1%). Five teachers reported they were Nationally Board certified (8.1%) while six (9.7%) reported they were currently in the certification process. The other 82.3% were not Nationally Board certified and did not report intensions of completing this process. Respondents described a broad range of science disciplines they were certified or endorsed to teach.

Independent variable group 2: School demographics. The majority of survey respondents taught in a public school district (86.2%) while a lower percentage taught in private schools (4.6%). The other 9.2% of respondents reported teaching in specialized school settings (School for the Deaf and Blind), homeschool, are no longer in the teaching profession, or are unemployed. There were differences in the number of students who were served at each individual school. The larger number of participants reported their school served between 400-599 students (36%). This was followed by participants who reported the number of students served in their schools as 1000 or greater (19%), between 800-999 (16%), between 600-799 (15%), less than 199 (8%), and between 200-399 (6%). This was displayed in Figure 3.6.

More respondents reported living in a rural area (57.8%) which was defined as greater than 25 miles from a city with a population greater than 100,000 than reported living in an urban area (42.2%) which was defined as less than 25 miles from a city with a population greater than 100,000. Finally, a larger number of respondents reported the average teacher to student ratio in their classrooms was between 1:22-1:27 (41.0%) as reported in Figure 3.7.

Independent variable group 3: Opportunities for use. The majority of respondents (73.3%) reported they were currently teaching the same grade level and same science classes (60.8%) that they were teaching when they attended the Institute. Still, 26.7% were not teaching the same grade level as they did when they attended and 39.2% were not teaching the same science classes. Figure 4.4 displays the variety of daily schedules followed in the participants' schools. Block schedules typically range from 90 minutes to two hours in length while teachers who teach in schools with six, seven, or eight periods a day may have 40 minutes to 60 minutes for a class. However, block schedules generally rotate such that each class is taught every other day while traditional six, seven, or eight period classes meet each day. There are a wide range of differences in school and district schedules making it difficult to capture all potential combinations in a survey. The larger percentage of participants reported either having a seven period day (29%) or a block schedule (27%).This was reported in Figure 3.12, as well as other schedules reported by participants.

In addition to variations in time spent teaching science, respondents also reported differences in the number and diversity of science classes they teach each semester. The larger percentage of teachers reported teaching between one to four different science classes in a semester (68%). Figure 3.13 summarized these differences in opportunities for presenting COSEE:CGOM concepts in the classroom.

Respondents were also asked how many periods a day they teach science subjects and which subjects they teach. The larger number of participants reported teaching five to six periods of science per day (36%); followed closely by those who taught science three to four periods a day (33%). The number of class periods in which teachers reported teaching science was presented in Figure 3.14.

Participants were asked how many classes they teach where they could use the COSEE:CGOM lesson plans. This question was expanded to allow participants to denote which subject areas and periods per day they believed they could use the plans. The larger number of participants reported having one subject in which they believed they could potentially use the COSEE:CGOM lesson plans (63%) while 31% reported having multiple subjects in which they could incorporate the plans. A summary of those respondents who believed they could use the lesson plans in multiple subjects versus those who believed they could use the plans in one subject or no subjects was presented in Figure 3.15.

Finally, participants were asked the amount of preparation time they had per week to plan for their classes. The differences in planning period time per week reported by respondents can be found in Figure 3.16. The majority of participants (53.7%) reported they had five or more hours per week to prepare for teaching.

Independent variable group 4: Availability of resources. Survey respondents reported receiving most or all of the resources they need from their school or district to be able to teach their classes (70%). The percentages of how participants perceived their availability of resources was presented in Figure 3.8.

Respondents reported having a computer in their classroom (95.4%) and also having a personal computer in their classroom intended for teacher use only (88.5%). When asked about computers available for student use in the classroom, there was a broader range of responses in terms of the number of computers available and with working Internet connection. The number of computers available for student use in the respondents' classrooms was reported in Figure 3.9. The majority of respondents (73.1%), regardless of what subjects they were currently teaching, had between one and four computers available for student use in their classroom.

Of the respondents who had student computers in their classroom, 78.3% also had Internet connectivity for these student computers either via a phone/cable line or wireless connection. Although some respondents did not have Internet connectivity in their classrooms for all students, there was a range of alternative locations in the schools reported by participants where students could get access to the Internet. The larger percentage of participants (71.4%) reported using a student computer lab in order to provide all students access to the Internet. Figure 3.10 outlined these alternate locations and the percentages of teachers who reported having access to them in their schools.

In terms of money available to teachers in their science classrooms, only about half of the teachers reported having a science budget (55.6%), while 31.7% reported having no budget and the other 12.7% did not know if they had a science budget. The amount of money available to teachers in their science classrooms varied. The larger percentage of teachers (33%) reported having $400 or more in their science budget.

However, 18% reported having no science budget at all. The percentages of respondents who reported the amount of money they were allotted per school year was reported in Figure 3.11.

Overall, 74.2% of respondents reported they believed they had the resources they needed to implement the COSEE:CGOM lesson plans. The 27.4% who did not believe they had the resources to implement the plans gave a list of what they would need to be able to use them: science equipment and consumable materials budget, aquariums, heaters, coolers, living labs, more technology, resources they could borrow (resource books, supplies), and water quality kits.

Independent variable group 5: Time elapsed. In order to determine if time elapsed since attending the COSEE:CGOM Institute was a factor in the use of COSEE:CGOM materials and lesson plans, each participant was asked to provide the year in which they attended the Institute. Figure 3.5 revealed for the five year period from 2003-2007, there were roughly the same number of respondents to the survey. Therefore, the survey data should be a valid representation of the participants from each of the five years.

Regression Analyses

Independent Variable Groups

These same independent variable groups were used in the logistic regression analyses. In order to run the logistic regression analyses, every answer choice under each survey question had to be coded and entered into SPSS© Version 15.0 for Windows. Those entries were achieved by downloading the condensed survey data from

SurveyMonkey in the form of an Excel spreadsheet. Each question number was then entered in a table and the consecutive coded variable number was assigned to the question (see Table 3.4). This process allowed for ease of coding from Excel spreadsheet to SPSS© data entry worksheet.

After data were coded and entered into SPSS©, a correlation matrix was produced to determine the strength and degree of relationship between the variables. The correlation matrices helped identify variables that had a positive linear relationship and therefore, were appropriate to experiment with first when building the regression model. The significant correlations in each category are summarized in Appendix F.

Regression Dependent Variable

The dependent variable (frequency of use of lesson plans) for the logistic regression analyses had to be modified from a continuous variable to a dichotomous variable. This was achieved by taking the number each teacher entered and running a frequency distribution in order to make a determination concerning where the cut off should be for high versus low frequency of use of lesson plans as reported by teachers. All cases were included in the frequency analysis of the dependent variable. Table 3.5 outlined the cumulative percent. The cut off that was determined was between zero to two lesson plans (47.5%) and three or more lesson plans (52.5%). This left a total of 28 cases in the low frequency category and 31 cases in the high frequency category. Low was coded as “1” and high was coded as “2” in SPSS©.

After coding the dependent variable, each of the individual questions asked on the survey under each of the independent groups was analyzed as a single regression against the dependent variable of frequency. The number of levels of the independent variable were recorded combined with the total number of cases included in the analysis, total missing from the analysis (unanswered), the p value of any significant predictor variables, and the prediction percentage before and after the regression variables were added. After each individual question was analyzed, the groups of questions under each independent variable were analyzed as a whole. For example, there were nine questions that fit under the "Available Resources" independent variable. After each of the nine variables was analyzed individually, they were analyzed as a group against the dependent variable (frequency). Additionally, those questions that had several levels (possible answers) were collapsed and re-analyzed against the dependent variable and again as collapsed in their group of independent variables. The results of these analyses can also be found in Table 3.6. The resulting regression analyses identified the following possible predictor variables for lesson plan use: (a) money allotted for science classroom (Money Allotted), p=0.054; (b) perceived administrative support (AdSupport), p=0.049; (c) subscription to at least one scientific or science education journal (Journals), p=0.027; (d) perceived science classes where you can use lesson plans (Sci_Cl_Use), p=0.035; and (e) number of science classes taught per day (scipdperday), p=0.024. The next step was to build a model using these predictor variables as a guide.

Building the Model

According to Peduzzi et. al. (1996), it is recommended the smaller of the classes of the dependent variable have at least 10 events per parameter in the model. Binary Logistic Regression is a large sample method that uses maximum likelihood estimation

(MLE) rather than ordinary least squares (OLS) to derive parameters. Peduzzi et. al. (1996) stated it is preferable to have 40 cases for each predictor variable (20 "yes" cases and 20 "no" cases). The reliability estimates for MLE decline when there are fewer cases for each combination of independent variables. If there are too few cases in relation to the number of variables, a solution may not be found. Therefore, when running the regression analysis, it was decided to take a conservative approach and use 50 cases (25 and 25) as the cut off for a reliable and valid predictive model.

For the first attempt at creating a model, all significant predictor variables were added to the model. This model included science classes teachers perceive they can use the lesson plans (Sci_Class_Use), science classes taught per day (scipdperday), administrative support (AdSupport), journals read by teachers (journals), money allotted for science class (MoneyAllot), and teacher to student ratio (T_Ss_Ratio). It should be noted teacher to student ratio was included because it revealed significance on one of the levels of the categorical variable. The result was a model that was 100% predictive (as compared to 65.5% predictive without adding the variables) but only included 29 cases, omitting 51 cases. This reduction was due to the small number of participant responses on the "journals" variable. Therefore, another regression was run excluding "journals" because there were too few cases. The resulting model was 73.5% predictive (as compared to 53.1% predictive without adding the variables). Still, the number of cases used in the regression was 49, just one below the determined cut off described above. In this same fashion, several other attempts were made at creating a model. These attempts are located in Table 3.6. It was determined two variables, science classes in which teachers perceive they can use the lesson plans (Sci_Class_Use) and years of teaching experience (Yrs_Teach), produced high predictive value when run in the regression together. With a total of 54 cases, the two variables combined were 79.6% predictive (as compared to 55.6% without adding the variables). Two other variables reflected significant predictive value, teacher to student ratio (T_Ss_Ratio) and grade level taught (GradeLevel). It was found by adding them to the mix, a model could be created that was 88.2% predictive (as compared to 56.9% predictive without the variables) using these four variables combined and meeting the case requirement with 51 cases. No other combinations produced this strong predictive power and the addition of other variables did not significantly enhance the predictive power of the model.

Summary of Interview Results

There were some common themes that emerged in the discussions that helped: (a) provide an overall feel for the participants' experience, (b) answer the research questions for the study, and (c) provide suggestions for change or follow-up opportunities.

Program Experience Themes

Overall program experience themes consisted of: (a) increased self-confidence, (b) increased content knowledge, (c) increased integration and reflection, (d) creation of culture, (e) relationship with peers, (f) staying current with scientific research, and (g) affordability of the Institute.

Interviewees expressed increased self-assurance and confidence in themselves and in their ability to explain and present scientific information to their students after their

COSEE:CGOM Institute experience. Participants noted their interaction with scientists in a professional setting where they were comfortable asking questions about science content gave them the confidence they needed to continue to seek other similar educational experiences.

When interviewees described their COSEE experience, it was clear they had increased their knowledge about ocean sciences. Many of the teachers detailed the ways in which they had been using this knowledge while others commented on their increased confidence as a result of enhanced content knowledge.

It was not only apparent that the interview participants had gained new knowledge and exuded increased confidence; it was also evident they had been creative in the ways they had incorporated this information in their classrooms. While some participants gave specific examples of integration of multiple subjects into lesson plans using COSEE themes, others discussed the manner in which they had reflected on the knowledge they gained and new ways to present this material to their students.

Interviewees assigned great value to the field experiences that were associated with the COSEE Institutes. They saw these opportunities for hands on learning as extremely valuable. The field experiences created a "culture" they perceived as important to the success of the Institute. This fact was a common finding among participants regardless of the state and Institute they attended.

Although participants were not directly asked about their experiences with the other teachers who attended, some teachers commented on how this was an important aspect of their experience. Interviewees believed this "bonding experience" speaks to the success of the Institute.

When asked about how they stay up-to-date on the latest scientific research, the interviewees were quick to relay a multitude of ways. Some examples include: subscribing to e-mail lists that deliver frequent science updates, television, Internet, scientific magazines, and one teacher joined her state marine educators association. However, all participants admitted staying up-to-date takes time and occasionally they are better at staying abreast of current research while other times they are not. Teachers suggested they depend upon professional development opportunities such as the COSEE:CGOM Institute to provide the latest scientific information they can "take back" and share with their students.

For many of the interviewees, cost was a major consideration in whether they would be able to attend the Institute. The participants shared their thoughts on how this affected them and how it could determine who attends future Institutes.

Research Question Themes

Research question themes included: (a) lesson plan creation and use, (b) online resources, (c) accessibility of scientists, (d) camaraderie with scientists, and (e) increased sharing of knowledge with peers.

First, interviewees were asked a variety of questions about the creation, use, and implementation of COSEE:CGOM lesson plans in their classrooms. It was evident each participant had a different experience and thus utilizes the lesson plans they created in various ways. A common theme that emerged among interviewees when discussing lesson plans, was that many of them were not teaching the same subject area or grade level now as they were when they attended the Institute. Participants reported how this affected the frequency and continued use of COSEE lesson plans.

Many of the interviewees commented on frequency relative to use of the resources that were given to them at the COSEE:CGOM Institute. Although the materials provided at each of the Institutes were different, the result for the teachers was the same: they all reported using them.

Second, participants were asked about their Online Institute experiences. When participants returned from the one week COSEE Institute, they participated in an Online Institute for an additional week. The experiences during the Online Institute were different from those of the face-to-face Institute and are reported below. The Online Discussion Board was used as a means of communication during the second portion of the Institute. Participants were given a password and user account where they would log in to review the scientists' PowerPoint® presentations and received their homework assignments. If participants had questions regarding the presentations or the homework, they were to use the discussion board to voice their concerns.

Interviewees were asked about their perceptions of the availability of scientists to help them during and after the Institute. Some participants commented on their impressions of working closely with scientists during various times of the day. Other participants discussed the continued availability of the scientists even after the Institute was completed.

Overwhelmingly, the interview participants made comments concerning the relationships that were formed with the scientists. Many of the teachers were surprised the scientists were “normal people” with whom it was easy to discuss marine related topics. Participants also expressed how they were impressed with the scientists staying in the same dorms, eating with them at meals, and helping with the loading and unloading of gear during field excursions.

Participants were given an opportunity to recall frustrations they may have encountered while working with scientists during the Institute. Interviewees reported various concerns mainly focused on the knowledge gap between novice and expert. Interview participants were able to describe shared experiences between themselves and the scientists. Most participants believed the scientists gained as much from the experience as they did. This description by participants was similar to the mutually cognitive relationships documented earlier in the literature review.

The participants were asked about their continued communication with scientists, peer teachers, and instructors after their COSEE Institute experience. The interviewees participated in different years and so the question was phrased in a way to denote any type of communication beyond the actual Institute, even if it had been a few years since that communication occurred. It was revealed the largest percentage of teachers did not stay in touch with the scientists (56.4%), but they did stay in contact with their peer teachers via e-mail (59.6%), as well as their COSEE Instructors via e-mail (60%).

Finally, participants were asked how they had shared their knowledge with their peers. One of the requirements of the COSEE:CGOM Institutes was that participants return to their school districts and share what they had learned with other teachers and administrators. The interviewees selected different methods in which to meet this requirement. For example, some teachers conducted an in-service training for other teachers at their school while one teacher reported presenting at a state science teachers association meeting.

Suggestions for Strengthening the COSEE:CGOM Institute Themes

Suggestions for strengthening the COSEE:CGOM Institute produced the following themes: (a) desire a follow-up experience to enhance professional development, (b) general program enhancements, (c) suggestions for recruiting, and (d) keeping in touch with past participants.

Without being prompted, many of the interviewees expressed an interest in a follow-up experience to the COSEE Institute. One participant mentioned he would like to participate in a COSEE Part II as a follow-up and enrichment session. He explained scientific data are always changing and evolving and it would be nice if there was a program that continued to build on the relationships and concepts formed during the original COSEE experience. He also suggested having updates on the topics covered during the original session with the addition of new themes, ideas, and concepts. In this follow-up session, he proposed bringing some of the teachers back and asking them to share how they have implemented the lesson plans and information they have learned in their classrooms. He explained this conference would help demonstrate to new and experienced teachers that the information learned at the COSEE:CGOM Institute is applicable to many topics in the classroom and would allow past participants to continue to contribute to the lesson plan database. Another participant described a two-day workshop where she could attend and share the lessons she had created and the activities she had conducted in her classroom with other teachers. In return, she would receive updates on current scientific information and suggestions for methodologies to extend and improve her lessons.

A final, open-ended question allowed participants to provide additional information concerning their experience and suggestions for strengthening the COSEE:CGOM program. One participant discussed it would be nice to explore your own topic of interest at the Institute instead of the scientists' topics. Another suggestion was to have the lesson plans searchable by topic to make it easier for teachers to use. One teacher suggested having a teacher and a student version of the information he received in his COSEE binder. He also mentioned he would like to be able to rent or borrow equipment from the COSEE program that he could use with his students. Another participant said one area of improvement could be giving the teachers more time to collaborate. He suggested having a team-building activity on the first day to help break the ice between the teachers and scientists. He also mentioned he would like to have more links on the COSEE Web site to additional Web pages sources that are relevant, reliable, and trustworthy. Finally, one teacher commented it would be helpful to have a videoconference for the Online Institute where she could interact with the scientists during their PowerPoint® presentations. She thinks a videoconference would improve the understanding of the complex information the scientists present in the slides and would allow teachers to ask questions during the duration of the presentation. She also mentioned including current events in an electronic newsletter so she could immediately share the information with her students.

Interviewees were quick to offer their advice about how to recruit teachers to future Institutes and how to keep past participants interested and willing to attend follow-up sessions. One teacher mentioned the time commitment is a big concern for teachers when they consider being involved with any type of professional development. She noted many teachers are hesitant to "give up" time with their families. Therefore, in planning for future Institutes, she suggested that during teacher recruitment participants are made aware of how their time will be well-spent. Another participant suggested offering Continuing Education Units (CEUs) for teachers who would agree to post comments on the discussion board a few times a week in response to other teachers' lessons. He also suggested running an ad in the state science teacher association's newsletters when new lesson plans were posted on the COSEE:CGOM Web site or to formally recognize the efforts of teachers who attend. Finally, one teacher said the COSEE Institute was not very well advertised in the county where his school is located and that perhaps better advertisement would yield a higher number of applicants.

At the end of each interview, participants were asked the best ways for COSEE to communicate with the participants. Unanimously, participants claimed they would prefer to be contacted via e-mail because this was the easiest, fastest, and most reliable form of communication to reach them at home and school.

Research Questions and Summary of Answers

Research Question 1

How do teachers perceive and use COSEE:CGOM lesson plans and/or online teaching resources and how frequently do they use them?

Summary. It is difficult to predict lesson plan use of COSEE participants. However, this study identified several factors that are either encouraging or hindering lesson plan use by the participants in the study. Teachers who have a clear understanding of the material presented in the COSEE Institute, have help in scaffolding that new information to meet the needs of their students, and can reflect on multiple ways in which the information can be incorporated in their curricula are more likely to utilize the lesson plans as a resource both now and in the future.

Research Question 2

How do teachers value their participation in the COSEE:CGOM Institutes where they actively collaborate with research scientists, and in what ways do teachers incorporate into the science curricula knowledge gained from this partnership?

Summary. Teachers valued the collaboration with scientists during the Institute. Not only did the scientists add to their content knowledge, but they also formed active partnerships to create classroom curricula in the form of lesson plans the teachers could use in their classrooms. When the strengths of both the teacher and scientist are valued in the learning process, the result is greater than what could be accomplished by either party alone. When partnered at the COSEE Institute, a mutually cognitive relationship develops as result of unique shared experiences and the collective formation of new knowledge. Although teachers experienced some frustrations working with the scientists, they were able to adapt to the fast pace of the Institute and walk away with meaningful experiences.

Research Question 3

How do teachers perceive their peer-teaching experience, and what do they believe each party gains from the experience?

Summary. In general, teachers suggested their peer teachers gained new knowledge and access to quality lesson plans through this peer-teaching model. Interviewees commented that past COSEE participants were the best way for recruiting future teachers to the program. In addition, the participants enjoyed being able to share ideas and create lessons in groups with their peers. The professional atmosphere and positive environment allowed active partnerships to form that some participants reported continued after the Institute.

Recommendations

After analyzing the results from both the survey and the interview portions of this study, suggestions for ways to strengthen the COSEE:CGOM program were formulated. The following section details recommendations which are based on the results of the study.

Reflection Time after Field Experiences

Teachers with more experience understand where the lesson plans can fit into classes they teach. Since COSEE:CGOM uses the same model for teaching all participants when they attend the Institutes, teachers with less experience may not be making the same connections to their classes as the more experienced teachers. It is recommended that COSEE:CGOM evaluate the instructional strategies and methods used to teach the summer participants, and modify them to suit the needs of teachers with less experience. For example, when teachers are asked to create lesson plans during the Summer Institutes, they could also be asked to reflect on the many different ways in which that lesson could be used in their classroom or in multiple subjects. This could be achieved by keeping a journal where each teacher was given time to record their lesson plan ideas after the scientist sessions. At the end of the day, teachers could share their ideas with their peers and help expand their ideas relative to where and when each lesson could be used in the classroom. By expanding the reflection time and giving guided examples, teachers have time to "digest" the information from the day and attempt to turn their new knowledge into ideas for lesson plans.

Differentiating Instruction

In addition, differentiating instruction for the teachers who attend is sound pedagogical practice. The curriculum should be based on broad concepts instead of "factoids." Otherwise, with the short time frame given to digest the information, it will be too difficult for teachers to select the main ideas and too tedious for them to translate into usable lesson plans. This does not imply the content would be "watered-down" for learners; rather, the focus of the instruction would continue to be theme-based and direct. Thus far, the COSEE:CGOM Institutes have succeeded in identifying current research themes to include in the Institute and this should be continued.

The COSEE:CGOM Institute curriculum should be differentiated in content (multiple options for digesting information), process (multiple options for making sense of the ideas), and product (multiple options for expressing what they know; U.S. Department of Education, 2008, Differentiated Instruction). The COSEE Instructors should continue to adapt their instruction to address teacher differences. The same content should be provided to all teachers at the Institutes; however, the COSEE Instructors or scientists may have to vary the degree of complexity to meet the needs of all learners. For example, a COSEE Instructor might provide scaffolding or graphic organizers for a teacher to make more complex information accessible. On the other hand, a COSEE Instructor might provide an advanced learner with complex texts, encourage them to search Web sites for answers to challenging questions, or give them more one on one time with a scientist to discuss the specifics of a topic. Having multiple ways to demonstrate what they have learned is also a sound pedagogical practice.

More Time Spent Making Meaning

One other way of achieving differentiated instruction is to offer choices of topics to teachers with tasks that are matched to their learning styles. This will also help the teachers focus on making meaning of the information they are learning. Participants will have more "buy in" because they had the freedom to select a topic that interests them. Covering information should take a backseat to making meaning of important ideas. For example, teachers are only going to digest information which is provided to them in multiple formats and repeated more than once. The "extraneous" details will be forgotten and teachers will need a way to recall some forgotten background information. In this study, teachers reported using their COSEE notebooks to help them remember the extensive background details. This is a good example of the difference between expert and novice. Due to the unfamiliarity with the subject matter coupled with the large amount of new knowledge digested by the teacher, the novice needs more time to sort through the information and organize it in a fashion that is meaningful. It is only after this process takes place that the teacher can transform new knowledge into an understandable and appropriate format with which to present it to their students. If this is the case, then there is only a certain body of knowledge teachers are retaining that can be applied immediately in their classrooms. This retention will be the information they found most interesting, the speaker(s) who were the most dynamic, or the field trip where they experienced something that changed the way they viewed a science concept. In order to increase this "useable" knowledge base for teachers, special attention must be paid to the method of delivery (lecture vs. field vs. Internet time), repetition of important concepts, and visualization tools to help teachers make sense of what they are learning. The COSEE:CGOM already uses different delivery methods to distribute information, but could always strengthen the program by devoting more time to helping teachers make meaning of the information they learn. Perhaps a multimodal perspective on making meaning would be appropriate including art as a making meaning process. The Oregon Institute of Marine Biology has a course entitled "Biological Illustration" which guides students in how to produce accurate drawings of animals and plants suitable for reference, publication, or display. This is one example of how other education programs have utilized this method of making meaning to help students determine differences in species and visually solidify in their minds unique characteristics of marine organisms. Teachers could satisfy additional standards by incorporating ocean art into their lesson plans. Other programs such as Coastal America have created art contests for students so they can use art to provide a visual expression of the importance of the ocean. Using different modes of learning allow teachers and students alike to create a more personal interpretation of scientific data. For some learners, using different modes of learning will help them retain the new information more effectively. However, if this is not modeled or encouraged at the Institute, teachers will be less likely to utilize it as an option in their classroom.

Finding Relevance

For some of the teachers interviewed, not only was “making meaning” important, but also relating new science research to real world applications was imperative. Teachers are charged with conveying information to their students and if they cannot find the relevance in the information for themselves, it is impossible for them to show their students how this will fit into a larger scientific picture. If the COSEE:CGOM Institute could go beyond the “making meaning” stage and even beyond the “real world application” stage to present a “here is what this could look like in the classroom” stage, teachers would begin to be more creative in the ways they approach the topics with their students. Although K-12 pedagogical approaches will differ from those at the post secondary level, more emphasis on translation of information to the classroom would be easy to accomplish. Brainstorming sessions between educators and scientists could create an atmosphere of shared collective knowledge concerning how to best apply the information learned for a more general audience-the students. The creation of lesson plans is a good step toward this goal, but as the survey results indicate, teachers may not use them enough to disseminate the amount of information they obtain at the COSEE Institute. In fact, many teachers reported using their new knowledge in other creative ways and integrating portions of the COSEE:CGOM information into their classrooms in ways other than use of lesson plans. If teachers are (a) using examples from their COSEE knowledge to teach concepts in their classrooms, (b) using specimens collected through their COSEE experience, (c) or even using their new knowledge of how to reflect on concepts as a result of their COSEE:CGOM experience, then teachers are still using the information they obtained at the Institute. These methods of dissemination of information are also relevant and can be effective in the classroom.

Breaking Barriers/Creating Culture

Although the COSEE:CGOM Institute has made great strides in bringing teachers and scientists together in a collaborative learning experience, future Institutes should continue to concentrate on breaking the hierarchical barriers found in the teacher-scientist relationships. The results of this study have documented teachers who are using the COSEE:CGOM lesson plans and incorporating the most ocean science related curricula into their classrooms are those who believed they were participating in an equal partnership with the scientists at the Institute. These teachers were able to bounce their ideas off each other and the scientists in order to generate unique and creative ways in which to teach ocean concepts to their students. These teachers were also quick to call a scientist during the academic year to clarify content knowledge or ask where to go for more information. In addition, these teachers also reported experiencing a "culture" surrounding their COSEE:CGOM Institute which consisted of hands on field experiences and after hours discussions and informal learning between peers and scientists.

Conclusions

As previously mentioned, few studies have addressed the long-term effects of professional teacher development in the classroom. In addition, teacher perceptions of collaboration with scientists and how this may alter their teaching has not been addressed. Further, this study capitalizes on a unique partnership and program that coincides with a national priority to create more ocean literate citizens.

Value of Modeling

The model created in this study was used to help identify predictor variables that contribute to the use or non use of lesson plans created by teachers in collaboration with scientists during the COSEE:CGOM Institutes. Although these variables would not be used to accept or deny teachers into the program, they may help identify aspects of the program that might be strengthened. The identification of these variables can help guide COSEE Instructors in their pedagogy as they develop the curricula for the Summer Institutes. In addition, the process of creating the model was also able to identify variables that do not seem to affect the frequency of use of lesson plans for the participants in the study. This information is just as important to consider. Surprisingly, the resources allotted to teachers and the number of science classes they teach per day did not have a significant impact on whether or not they used the COSEE:CGOM lesson plans. Instead, the study suggests teachers need to be able to perceive where the lesson is going to fit in their curricula and address the standards. Individual differences between teachers lead to various levels of information integration in the classroom. This finding could result in some teachers being better equipped than others to creatively integrate new information in their classrooms. Without the model approach, these particular variables would not have been fully identified, nor the role they are playing in terms of teacher use of lesson plans.

Change in Culture

Another point revealed by this study was that teachers are interested in the culture and experience of the Institute just as much, if not more, than they are the content knowledge. For teachers, the field experiences, the work "side-by-side" with scientists, and the culture created between their peers dictate to a certain degree what these participants are going to take back to the classroom. A breaking of barriers occurred that allowed some teachers to see their own contributions as something unique and valued by the scientists that they hold in high regard. During the Institute, teachers were able to break through their perceptions of the scientist stereotype in order to enhance their content knowledge. Additionally, the teachers were able to move to the next level and actually participate in a relationship with the scientists where they believed their contributions were important. This finding was described earlier in the literature by

Hawkins and Battle (1996) when they detailed the meaning of a mutually cognitive relationship. In order for real change in behavior to occur, the transformation from passive recipient of information to active participant in a partnership forming knowledge collaboratively with scientists is essential. Teachers were reporting an equal and shared appreciation for the knowledge they were receiving from the scientists and the knowledge they were imparting to the scientists. This is not traditionally how teacher professional development programs are reported. Garet, et. al. (2001) reported that active participation by teachers in professional development activities is one of the primary features that affect teacher learning. According to participants interviewed in this study, teachers generally do not perceive being included in the exchange of knowledge process during professional development programs. However, this study determined that the COSEE:CGOM Institute is making progress toward a different kind of professional development that involves learning by all parties. One interviewee noted that their COSEE:CGOM experience was unique because they were included in all parts of the Institute and it made a lasting impact on their learning.

Collaboration is Key

In a world where partnerships are encouraged and often mandated by businesses, researchers, and educators, the COSEE concept works well. Although additional longitudinal evaluation should continue to report on the overall effectiveness of the program as a whole, this study was clearly able to identify areas in which the COSEE:CGOM Institutes are making a difference. The COSEE capitalize on the opportunity to bring scientists and teachers together to collaborate on important ocean issues. From the teachers' perspectives, this is a valuable experience and one they acknowledge is unique and one they appreciate. The collaborative effort provides teachers an opportunity to bridge the gap between current research and its dissemination to their students. By working with the scientists, teachers are empowered to reflect on and integrate the most important science concepts into their existing curricula. Further research could document what value the scientists place on this shared collaboration. Several teachers in this study alluded the scientists gained a better understanding of the standards teachers have to address, as well as an appreciation for the daily challenges teachers encounter in teaching science content to their students. Further, the teachers in this study would argue the scientists have a better understanding of pedagogy as they work with teachers to find the right approach for a lesson plan that encompasses the science concepts they are trying to convey to students. Perhaps this increased pedagogical knowledge will change the way the scientists approach the classes they teach to their undergraduate students or the manner in which the scientists interact with the public when describing their research.

Further Research

Although this study was comprehensive in its purpose, analyses, and conclusions, COSEE:CGOM Principle Investigators, scientists, and teacher participants could benefit from additional research in several areas. One area to consider is the scientists' perceptions of their participation in the COSEE:CGOM Institute and how it may affect the manner in which they conduct research in the future. There are a number of questions to be addressed. Are scientists more aware of teachers' role in disseminating research to a broader audience? Are scientists more willing to participate in educational and outreach programs to share their findings with the general public? On a smaller scale, is scientist participation in the COSEE:CGOM Institute creating a paradigm shift and culture change in the way scientists perceive their roles and the roles of teachers?

Another area of further exploration is longitudinal evaluation in terms of curricular implementation. Are teachers who participate in the COSEE:CGOM Institute continuing to use the lesson plans they created? Are teachers persistent in integrating information from the Institute in their curricula? Are teachers continuing to educate students on current ocean related topics? These and other related questions are difficult to answer without further longitudinal evaluation of the program. Additionally, there are no current methods for successfully capturing data to fully answer these questions. Therefore, another area for continued research should be to create new and inventive ways for measuring the impact of programs such as the COSEE:CGOM Institute.

Additionally, it is important the model created in this study be tested on a new sample of COSEE:CGOM participants to affirm its usability and validity. Having only five years of participants, the subsequent number of respondents on the survey was just enough to build the regression model. Ideally, a subset of survey respondents would have been excerpted and used to test the validity of the model. Further, research should identify participants from the summer 2008 COSEE:CGOM Institute and collect survey data to further test the model that was created in this study.

Changes made to the COSEE:CGOM Web site were informed by the data collected from the survey in this study. After a period of time, further studies should focus on the effectiveness of those changes and whether or not the teachers are using the resources more now than before. It would also be advantageous to determine if the teachers are using the Web site in different ways, sharing the information with their peers, or referring to it in the classroom with their students.

Lastly, it would be interesting to evaluate if the lesson plans created early in the COSEE:CGOM Institute history are different from the ones created in the more recent Institutes with standards changing and more emphasis being placed on ocean literacy. Is the focus toward ocean literacy making a cultural change that can be detected in the classroom of teachers who participated in the COSEE:CGOM Institute? Further, are these classroom culture changes resulting in a behavior change by the teacher, as well as the students? It is difficult to measure these behavioral outcomes and will take more time and further research to determine if the desired goals of the National COSEE program are being achieved.

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APPENDIX A

TEACHER PERCEPTIONS OF COSEE:CGOM SURVEY

Centers for Ocean Science and Education Excellence: Central Gulf of

Online Consent Form for Survey of Teacher Perceptions of COSEE:CGOM

My name is Tracie Sempier and I am a doctoral student at Mississippi State University. I am also a Graduate Research Assistant with the Centers for Ocean Sciences and Education Excellence:Central Gulf of Mexico program (COSEE:CGOM). As part of my research I am interested in your experiences with COSEE:CGOM and how you may have used the lesson plans you created while attending one of the Institutes or Workshops. I will be using this data as part of my dissertation research. The study I have chosen is entitled "Teacher Perceptions of the Centers for Ocean Sciences Education Excellence: Central Gulf of Mexico (COSEE:CGOM) Program."

The purpose of the study is to explore (a) frequency of use of lesson plans by teachers that were created during the COSEE:CGOM programs, (b) teacher perspectives of working collaboratively with scientists to create these lesson plans, and (c) how teachers are using these lesson plans in their classroom. I will analyze the results of the online survey completed by the participants. I anticipate no risks or discomforts to you because of your participation. No tangible benefits are assigned.

If you agree to participate in this study, please complete this online survey. It should take you no more than 20 minutes. The responses you give will be kept confidential. Your name will not be connected in any way to your responses. Also, please note that these records will be held by a state entity and therefore are subject to disclosure if required by law.

If you should have any questions about this research project, do not hesitate in contacting me (Tracie Sempier) at (662) 325-0933 or by email at tat62@colled.msstate.edu. If you would like a copy of the final report, please let me know. For additional information regarding human participation in research, please feel free to contact Katherine Crowley of the MSU Regulatory Compliance Office at 662-325-8543.

Please understand that your participation is voluntary, your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled, and you may discontinue your participation at any time without penalty. In addition, you may refuse to answer any specific question.

To accept the terms of the consent to participate, please click the button labeled "Next" below.

Please print a copy of this page for your records.

Centers for Ocean Science and Education Excellence: Central Gulf of

Introduction

As a participant in the Centers for Ocean Sciences Education Excellence:Central Gulf of Mexico (COSEE:CGOM) program, we value your opinion on the formation and use of lesson plans created during the Institutes, Workshops, and Sea Scholars Programs. Please read the questions and check the box or boxes that best apply. The information you provide will be used to strengthen the COSEE:CGOM program. The survey should take no more than 20 minutes to complete. Thank you for your time and input.

1. Have you ever participated in one of the COSEE:CGOM Summer Institutes (Online and "Face to Face"), Two-Day Workshops, or Sea Scholars Programs?

◯ Yes

◯ No

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Opportunities for Use

2. Have you attended more than one COSEE:CGOM Workshop/Institute?

○ Yes

○ No

3. In which state(s) did you attend the Workshop/Institute(s)? (check all that apply)

☐ Alabama

☐ Florida

☐ Louisiana

☐ Mississippi

☐ Texas

4. At the time you attended the COSEE:CGOM Workshop/Institute(s), were you teaching the <u>same grade level</u> that you now teach?

○ Yes

○ No

5. At the time you attended the COSEE:CGOM Workshop/Institute(s), were you teaching the <u>same science classes</u> that you now teach?

○ Yes

○ No

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Opportunities for Use- Teaching Assignment Area

6. Please select the type of schedule your school currently follows.

- ◯ Block schedule (A/B schedule)
- ◯ Mixed schedule (A/B Block Mon.-Thurs., then traditional schedule with all classes on Fri.)
- ◯ Traditional schedule with six periods per day
- ◯ Traditional schedule with seven periods per day
- ◯ Other (please specify)

7. How many total different science classes do you teach each semester? (ex: If you teach Biology 2 periods of the day and Integrated Science 3 periods = 2 total different science classes each semester)

- ◯ None
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ More than 7
- ◯ It varies by semester (please explain)

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Current Teaching Schedule

8. Please check the appropriate boxes indicating the names of the science courses you currently teach and how many periods a day you teach that class.

	1	2	3	4	5	6	7	>7
Biology	○	○	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○	○	○
Earth Science	○	○	○	○	○	○	○	○
Physics	○	○	○	○	○	○	○	○
Integrated Science	○	○	○	○	○	○	○	○
Life Science	○	○	○	○	○	○	○	○
General Science	○	○	○	○	○	○	○	○
Marine Science	○	○	○	○	○	○	○	○
A.P. Biology	○	○	○	○	○	○	○	○
A.P. Chemistry	○	○	○	○	○	○	○	○
A.P. Physics	○	○	○	○	○	○	○	○
Other	○	○	○	○	○	○	○	○

(Please specify)

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Possible Lesson Plan Use

9. Please check the appropriate boxes indicating how many classes you teach where you could use COSEE:CGOM lesson plans?

	1	2	3	4	5	6	7	>7
Biology	○	○	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○	○	○
Earth Science	○	○	○	○	○	○	○	○
Physics	○	○	○	○	○	○	○	○
Integrated Science	○	○	○	○	○	○	○	○
Life Science	○	○	○	○	○	○	○	○
General Science	○	○	○	○	○	○	○	○
Marine Science	○	○	○	○	○	○	○	○
Honors Science	○	○	○	○	○	○	○	○
A.P. Biology	○	○	○	○	○	○	○	○
A.P. Chemistry	○	○	○	○	○	○	○	○
A.P. Physics	○	○	○	○	○	○	○	○
Other	○	○	○	○	○	○	○	○

(Please specify)

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Lesson Plan Use

10. How many COSEE:CGOM lesson plans did you create while attending the Workshop and/or Institute?

- ◯ None
- ◯ 1-2
- ◯ 3-4
- ◯ 5-6
- ◯ 7-8
- ◯ 9 or more

(Please specify a number)

11. How many different COSEE:CGOM lesson plans have you downloaded from the web since attending the COSEE:CGOM Workshop and/or Institute?

- ◯ None
- ◯ 1-2
- ◯ 3-4
- ◯ 5-6
- ◯ 7-8
- ◯ 9 or more

(Please specify a number)

12. Of the COSEE:CGOM lesson plans that you created or downloaded, have you used any of the lesson plans in your classroom?

- ◯ Yes
- ◯ No

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Lesson Plan Use

13. Of the lesson plans you created while attending the Workshop and/or Institutes, how many have you used in your classroom?

- None
- 1-2
- 3-4
- 5-6
- 7-8
- 9 or more

(Please specify a number)

14. Of the COSEE:CGOM lesson plans you downloaded, how many have you used in your classroom?

- None
- 1-2
- 3-4
- 5-6
- 7-8
- 9 or more

(Please specify a number)

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Lesson Plan Use

15. How would you characterize the frequency with which you use the COSEE:CGOM lesson plans (created or downloaded)?

- ◯ Use more than once a week
- ◯ Use once a week
- ◯ Use once every two weeks
- ◯ Use once a month
- ◯ Use once a semester
- ◯ Use once a year

16. Please indicate <u>why</u> you used these lesson plans. (check all that apply)

- ☐ To meet science standards
- ☐ To teach an ocean or coastal theme
- ☐ To teach ocean literacy
- ☐ To teach interdisciplinary subjects (math, chemistry, physics)
- ☐ To provide students with a fun topic for learning
- ☐ To teach environmental awareness/ocean conservation
- ☐ To provide students with a hands-on activity
- ☐ Other (please specify)

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Lesson Plan Themes

In earlier years, the COSEE:CGOM lesson plans were separated into multiple themes. It was suggested by the National Science Foundation to lessen the number of themes; therefore, the Co-Principal Investigators reduced the six themes to three, more broadly defined themes. This reduction in themes occurred in 2003.

17. Which of the three main themes/categories of lesson plans have you used? (check all that apply)

- [ ] Coastal Processes
- [ ] Habitats and Organisms
- [ ] Marine Technology

18. If you selected more than one theme, which one have you used the most?

- [ ] Coastal Processes
- [ ] Habitats and Organisms
- [ ] Marine Technology

19. Please briefly explain why you have used this theme the most in your classroom.

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Lesson Plan Evaluation

20. Please rate the following statements as they pertain to your use of the COSEE:CGOM lesson plans.

	Strongly Agree	Agree	Disagree	Strongly Disagree
Lesson plans were easy to understand (clear format and wording)	○	○	○	○
Lesson plans were easy to use	○	○	○	○
Lesson plans were aligned to the National Science Education Standards	○	○	○	○
Lesson plans were aligned to the Ocean Literacy Essential Principles and Fundamental Concepts	○	○	○	○
Lesson plans were aligned with State Science Education Standards	○	○	○	○

21. In what ways have you evaluated student learning after implementing the COSEE:CGOM lesson plans? (check all that apply)

- ☐ Pre and posttests
- ☐ Projects (individual or group)
- ☐ Informal observations of students and asked them questions
- ☐ Comprehensive test at the end of the lesson/unit
- ☐ Not evaluated student learning of COSEE:CGOM lesson plans
- ☐ Other (please specify)

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Opportunities for Use: PowerPoint

22. Some of the lesson plans come with PowerPoint presentations you can download. Have you ever used this resource?

- Yes
- No

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Powerpoint Use

23. How many <u>times per year</u> have you used the PowerPoint presentations in your classroom?

- None
- 1-3 times
- 4-6 times
- 7-9 times
- More than 9 times

24. Of the PowerPoint presentations you have used, how many have you used <u>more than once</u>?

- None of them
- 1-3
- 4-6
- 7-9
- More than 9

25. Were the PowerPoint slides you downloaded user-friendly?

- Yes
- No

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Future Use

26. If you have never used COSEE:CGOM lesson plans in your classroom, do you think this is a resource you could use in your classroom in the future?

- Yes
- No

Please explain

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Science Inquiry

27. Do you use the process of inquiry to teach science in your classroom?

- ◯ Yes
- ◯ No
- ◯ Not sure

28. If "Yes", please briefly explain how you include inquiry in your lessons.

29. How many school hours do you have designated as preparation time per week?

- ◯ None
- ◯ Less than 1
- ◯ 1-2
- ◯ 3-4
- ◯ 5
- ◯ More than 5

Introduced to COSEE Components

30. How did you find out about the following? (check all that apply)

	COSEE:CGOM Summer Institutes	COSEE:CGOM Lesson Plans	COSEE:CGOM PowerPoint presentation	Online Discussion Board
Another teacher told me about it	☐	☐	☐	☐
Found it while surfing the web	☐	☐	☐	☐
Learned of it while attending a conference	☐	☐	☐	☐
During the COSEE:CGOM Institute itself	☐	☐	☐	☐
Other	☐	☐	☐	☐

(Please specify)

31. Have you disseminated COSEE:CGOM information to your school, your district, your state, or nationally?

○ Yes

○ No

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Dissemination of Information

32. In which of the following ways have you disseminated COSEE:CGOM information to your school, your district, your state, or nationally? (check all that apply)

- [ ] Inservice, workshop, or other professional development at the school in which I teach
- [ ] Shared lesson plans with my fellow teachers
- [ ] Made a presentation at a conference where I showcased the work I did with my students using the COSEE:CGOM lesson plans that I created
- [ ] Traveled to other schools and shared the lesson plans I created
- [ ] Sent COSEE:CGOM lesson plans electronically to fellow teacher either in my school or elsewhere
- [ ] Not disseminated the COSEE:CGOM information to anyone in my school district
- [ ] Other (please specify)

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Frequency of Use

33. Do you plan to use COSEE:CGOM lesson plans in the future?

- Yes
- No

34. How many COSEE:CGOM lesson plans have you used at least once?

Number of lesson plans you have used at least once.

35. How many COSEE:CGOM lesson plans do you plan to use in the 2008-2009 school year?

- None
- 1-2
- 3-4
- 5-6
- 7-8
- 9 or more (please specify a number)

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Preferred Way to Access Lesson Plans

36. I would be more likely to use the COSEE:CGOM lesson plans in the future if: (check all that apply)

- [ ] There was a search engine to help me find relevant lesson plans
- [ ] The COSEE:CGOM lesson plans were linked to other lesson plan databases
- [ ] I was sent an e-mail update when new lesson plans were added to the web page
- [ ] I was able to add my own lesson plans after attending the Institute or Workshop
- [ ] I think the current format is fine and does not need change
- [ ] Other (please specify)

37. If a search engine was created to help navigate the COSEE:CGOM lesson plans, I would prefer to search by: (check all that apply)

- [ ] Theme (Coastal Processes, Habitats and Organisms, Marine Technology)
- [ ] Subject Area (Biology, Chemistry, Earth Science)
- [ ] Grade Level (elementary, middle school/junior high, high school)
- [ ] Institute/Workshop (by state)
- [ ] National Standards
- [ ] State Standards
- [ ] Ocean Literacy Essential Principles and Fundamental Concepts
- [ ] Other (please specify)

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Available Resources

38. Which of the following statements most accurately describes how well your school system provides the instructional materials and other resources you need to teach your class?

- ◯ Receive all the resources I need.
- ◯ Receive most of the resources I need.
- ◯ Receive few of the resources I need.
- ◯ I don't receive any of the resources I need.

39. Do you have a computer in your classroom?

- ◯ Yes
- ◯ No

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Computer Use

40. As the teacher in the classroom, do you have a personal computer that is designated for your use only and not intended for student use?

- ◯ Yes, with Internet access
- ◯ Yes, but no Internet access
- ◯ No

41. How many computers in your room are available for student use?

- ◯ 1 Computer
- ◯ 2-4 Computers
- ◯ 5-7 Computers
- ◯ 8-10 Computers
- ◯ 11-13 Computers
- ◯ 14-16 Computers
- ◯ More than 16 Computers

42. Do you have Internet connectivity in your classroom for the student computer (s)? (at least one student computer connected to the Internet or a wireless connection)

- ◯ Yes
- ◯ No

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Internet Connectivity

43. Where do you have to go to get Internet access for all of your students in your classroom? (check all that apply)

- [ ] Remain in the classroom
- [ ] Library
- [ ] Student Computer Lab
- [ ] Another teacher's room
- [ ] I do not have the option of using the Internet with my students at my school
- [ ] No location on site that can accommodate all students in my classroom
- [ ] Other (please specify)

44. Does your school have a science budget?

- ( ) Yes
- ( ) No
- ( ) I don't know

45. Approximately how much money per school year are you allotted for your science classroom?

- ( ) None
- ( ) $1-$99
- ( ) $100-$199
- ( ) $200-$299
- ( ) $300-$399
- ( ) $400 or more, please specify amount

46. In your opinion, do you have the resources necessary to implement the COSEE:CGOM lesson plans?

- ( ) Yes
- ( ) No (please explain what you would need to implement them)

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Time Elapsed

47. Select the year(s) in which you attended the COSEE:CGOM Workshop or Institute:

- ☐ 2007
- ☐ 2006
- ☐ 2005
- ☐ 2004
- ☐ 2003
- ☐ 2002
- ☐ 2001

48. Would you attend a COSEE:CGOM Workshop or Institute in the future?

- ○ Yes
- ○ No

49. Please explain why you would or would not attend a COSEE:CGOM Workshop or Institute in the future.

50. Would you have the financial resources and administrator support to attend another COSEE:CGOM Workshop or Institute?

- ○ Yes
- ○ No (please explain)

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Collaboration with Scientists and Peers

51. I have kept in touch in the following ways with one or more of the participants in the Workshop or Institute. (check all that apply)

	Via the online discussion board	Via e-mail	Did not keep in touch
Scientists	☐	☐	☐
Peer Teachers	☐	☐	☐
COSEE:CGOM Instructors	☐	☐	☐
Other	☐	☐	☐

(Please specify)

52. Please answer the following questions by checking the box that best describes your response.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I enjoyed working collaboratively with the research scientists in developing lesson plans.	○	○	○	○
I benefited professionally from working collaboratively with the research scientists at the COSEE:CGOM Workshop or Institute.	○	○	○	○
I believe that the lesson plans I created are based on the most recent scientific research.	○	○	○	○
The lesson plans I created collaboratively with the scientists/researchers are of a stronger quality than if I had produced them on my own.	○	○	○	○
I found it difficult to communicate with the scientists/researchers.	○	○	○	○
I would seek assistance from these scientists/researchers in the future.	○	○	○	○
I believe I would have created better lesson plans without help/input from the scientists/researchers.	○	○	○	○
I believe the scientists/researchers listened to what I had to say and we learned from each other.	○	○	○	○

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Collaboration with Scientists and Teachers

53. Please answer the following questions by checking the box that best describes your response.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I have shared the information I learned in the COSEE:CGOM Workshop or Institute with other teachers in my school.	○	○	○	○
I enjoyed working with other teachers at the COSEE:CGOM Workshop or Institute.	○	○	○	○
I benefited from the collaboration with other teachers at the Workshop or Institute and prefer this method of learning.	○	○	○	○

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School Demographics

In order to better understand the size of your school and where it is located, please select the answer that best applies to your school.

54. Do you teach in a public or private school?

- ◯ Public
- ◯ Private
- ◯ Other (please specify)

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Public School District

55. In which school district do you teach?

56. Please select the approximate number of students that your public school district serves.

	Select one
Total # of students served in school district	

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Private School

57. What is the name of the private school at which you teach?

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Students Served

58. Please select the approximate number of students that your individual school serves.

	Select One
Total # of students served in your school	

59. How many students at your school are in the grade that you primarily teach?

Number of students in the grade you primarily teach

60. Which of the following best describes where your school is located?

- Urban (less than 25 miles from a city with a population greater than 100,000)
- Rural (greater than 25 miles from a city with a population greater than 100,000)

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Urban School

61. Which of the following best describes the population size of your urban city?

- Less than 10,000
- 10,000-50,000
- 50,000-100,000
- 100,000-250,000
- Greater than 250,000 (please specify)

Rural School

62. Which of the following best describes the population size of your <u>rural town or city</u>?

- ◯ Less than 1,000
- ◯ 1,000-20,000
- ◯ 20,000-40,000
- ◯ 40,000-60,000
- ◯ 60,000-80,000
- ◯ More than 80,000 (please specify)

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Teacher to Student Ratio

63. What is the average teacher to student ratio in the science classes you teach?

- ◯ 1:9 or less (one teacher for every 1 to 9 students or less)
- ◯ Between 1:10 and 1:15 (one teacher for every 10 to 15 students)
- ◯ Between 1:16 and 1:21 (one teacher for every 16 to 21 students)
- ◯ Between 1:22 and 1:27 (one teacher for every 22 to 27 students)
- ◯ Between 1:28 and 1:33 (one teacher for every 28 to 33 students)
- ◯ Between 1:34 and 1:39 (one teacher for every 34 to 39 students)
- ◯ Greater than 1:39 (one teacher for every 40 or more students)

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Teacher Demographics

Your answer to the following demographic questions will help give a better understanding of the distinctive teaching situation in which you work and the characteristics that are unique to you.

64. What is your gender?

- Female
- Male

65. Please select the word that best describes your ethnicity.

- American Indian/Alaska Native
- Asian/Pacific Islander
- Black
- Hispanic
- White
- Other (please specify)

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Teacher Demographics

66. Counting this year, how many years in total (include part-time teaching) have you taught at either the elementary or secondary level?

- ◯ 2 years or less
- ◯ 3-5 years
- ◯ 6-8 years
- ◯ 9-11 years
- ◯ 12-14 years
- ◯ 15-17 years
- ◯ 18-20 years
- ◯ 21-23 years
- ◯ 24-26 years
- ◯ 27 years or more

67. What grade level do you currently teach? (Please only select one)

- ◯ Elementary School
- ◯ Middle School/Junior High
- ◯ High School
- ◯ Other (please specify)

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Teacher Demographics

There are teachers from many states who attend the COSEE:CGOM Program. In the following questions, I am trying to determine what type of a teaching license you have from your state. Rather than list all of the different types for the various states, please select the category that best describes your teaching license.

68. In which state do you currently reside?

69. What type of teaching certificate do you have in this state in your main assignment field?
(please check only one)

- Regular or standard state certificate
- Probationary state certificate
- Alternate route certificate
- Temporary, provisional, or emergency state certification
- Certification by an accreditation body other than the state
- I don't have a certificate in my main assignment field

Please explain

70. What science discipline(s) are you certified/endorsed to teach? (check all that apply)

- Biology, A.P. Biology
- Chemistry, A.P. Chemistry
- Physics, A.P. Physics
- Earth Science
- Integrated Science/General Science
- Environmental Science
- Marine Science
- Other (please specify)

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Teacher Demographics

71. Are you Nationally Board Certified?

- ◯ Yes
- ◯ No
- ◯ Currently in the certification process

72. Please check all professional teacher organizations in which you are currently an active member.

- ☐ AACE (Association for the Advancement of Computing in Education)
- ☐ NCTE (National Council of Teachers of English)
- ☐ NCTM (National Council of Teachers of Mathematics)
- ☐ NCSS (National Council for the Social Sciences)
- ☐ NEA (National Education Association)
- ☐ NMEA (National Marine Educators Association)
- ☐ NSTA (National Science Teachers Association)
- ☐ Other (please specify)

Teacher Demographics

73. What is the highest academic degree you hold?

- ◯ High school diploma
- ◯ Associate's degree/vocational certification
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ Education Specialist's or professional diploma based on at least one year's work past Master's degree
- ◯ Doctorate (Ed.D. or Ph.D.)
- ◯ Other (please specify)

74. Do you have a current subscription to any of the following scientific or science education journals?

- ☐ *American Biology Teacher*
- ☐ *Discover*
- ☐ *International Journal of Science Education*
- ☐ *Journal of Research in Science Teaching*
- ☐ *Journal of Science Education and Technology*
- ☐ *Nature*
- ☐ *Science*
- ☐ *Scientific American*
- ☐ *Science Teacher*
- ☐ *The Electronic Journal of Science Education*
- ☐ *The Journal of Science Teacher Education*
- ☐ *The Science Educator*
- ☐ Other (please specify)

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Staying Current

75. Is it difficult for you to stay current with the latest science research?

- Yes
- No

76. Is it difficult for you to <u>find time</u> to stay current with the latest science research?

- Yes
- No

77. Do you believe it is difficult to interpret findings of the latest scientific research?

- Yes
- No

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Final Submission

Click "done" to submit your survey results. You will be redirected to the COSEE:CGOM web site once submission is complete. Thank you for your time!

APPENDIX B

E-MAIL INVITATION TO PARTICIPATE IN SURVEY

E-mail Invitation to Participate in Survey

To: [Email]

From: tat62@colled.msstate.edu

Subject: Past COSEE Participants Survey

Body: Hello [FirstName] [LastName],
My name is Tracie Sempier and I am a doctoral student at Mississippi State University. I am also a Graduate Research Assistant with the Centers for Ocean Sciences and Education Excellence:Central Gulf of Mexico Program (COSEE:CGOM). As part of my research I am interested in your experiences with COSEE:CGOM and how you may have used the lesson plans you created while attending one of the Institutes or Workshops. I will be using this data as part of my dissertation research.
The survey should take less than 20 minutes and your response would be greatly appreciated.

Here is a link to the survey:
http://www.surveymonkey.com/s.aspx

This link is uniquely tied to this survey and your email address, please do not forward this message.

Thanks for your participation!

Please note: If you do not wish to receive further emails from us, please click the link below, and you will be automatically removed from our mailing list.
http://www.surveymonkey.com/optout.aspx

APPENDIX C

INTERVIEW PROTOCOL AND QUESTIONS

Protocol of topics for interviews/conversations

For Selected Teachers

Background

Previous teaching experiences

Current teaching assignment

Participation in the COSEE:CGOM program

Creation of lesson plans

Collaboration with research scientists

Dissemination of information learned at the COSEE:CGOM workshop

Future plans to use/not use the COSEE:CGOM lesson plans

Online discussion board use

Suggestions for improving lesson plans/Web site search engine for accessing the lesson plans

Conversation Questions for Selected COSEE:CGOM Participants

Category	Sample Interview Question
Lesson Plans:	Was your school district, school, principal, and superintendent supportive of your decision to attend the
• Implementation	COSEE:CGOM Institute?
• Ease of Use	Have they helped you to share what you have learned with other teachers? How?
• Support from School	In your classroom, what is occurring with these COSEE:CGOM lesson plans? Are there other ways in
• Support from District	which you picture yourself using the lesson plans in the future?
	When you think about the ocean as a theme for teaching science concepts, how excited are you about the idea?
	Do you believe there is a better theme for teaching the same concepts? Please explain your response.
	Some have argued it is important to have the most current information and research in science available when teaching in order to meet the standards. What is your position on this?
	When you were in the summer workshop, how difficult was it to create a lesson plan during the summer, field test it, and then implement it in your classroom when the school year began?
	Were you able to remember all that you learned in the summer and convey that to your students in the fall? Was some of knowledge lost because it was not as fresh on your mind?

Collaboration with Scientists	What did it mean to you to work with research scientists in the COSEE:CGOM program? What did you take away from the experience of working with a scientist(s)? What was frustrating about working with the scientist(s)? What do you think the scientist(s) learned from the experience? Have you been in contact with any of the scientists since your COSEE:CGOM experience (e.g., in person, by phone, or via e-mail)? Do you think you would enroll in another COSEE experience in the future if this collaboration with scientists was offered to you? What if the scientists were not part of the professional development program? Was the vocabulary used by the scientists easy to understand? Do you have a better understanding of how to interpret scientific findings as a result of your COSEE:CGOM attendance? Please explain your response. What would improve communication and collaboration between scientists and teachers?
Peer-teaching	How should using these lesson plans be taught in teacher training courses? Do you believe other teachers have been receptive to the presentations you have made relative to the enhanced content knowledge and increased teaching strategies you provided them concerning the COSEE:CGOM program?

	Do you know if any of the teachers participating in your professional development presentations have used any of the COSEE:CGOM lesson plans in their classrooms?
	If the COSEE:CGOM lesson plans have been used by your colleagues, have they asked for your assistance in implementing the plans?
	What are your thoughts on the effectiveness of peer-teaching? Is there a better way to share this information?

APPENDIX D

VARIABLE CODING

Survey Topic	Variable Name	Values
Frequency Variable 1	Frequency	1.00=Low (0-3 plans) 2.00=High (4 or more plans)
Frequency Variable 2	Freq2	1.00 = "Low (0-2 plans)" 2.00 = "High (3 or more plans)"
Instructional Materials	InstrMat	1.00 = "Receive all" 2.00 = "Receive most" 3.00 = "Receive few" 4.00 = "Don't receive any"
Computer(s) in Classroom	Computer	1.00= "yes" 2.00 = "no"
Designated Teacher Computer in Classroom	TComputer	1.00 = "yes, with Internet access" 2.00 = "yes, but no Internet access" 3.00 = "no"
Designated Student Computer(s) in Classroom	SsCompRm	1.00 = "1 computer" 2.00 = "2-4 computers" 3.00 = "5-7 computers" 4.00 = "8-10 computers" 5.00 = "11-13 computers" 6.00 = "14-16 computers" 7.00 = "More than 16 computers"
Student Computers have Internet Access	SsInternet	1.00= "yes" 2.00 = "no"
Do all students have Internet access	AllSsAccess	1.00 = "yes; in classroom" 2.00 = "no; not in classroom"
Science Budget	SciBudget	1.00 = "yes" 2.00 = "no" 3.00 = "I don't know"
Money allotted for teacher use from science budget	MoneyAllot	1.00 = "none" 2.00 = "$1-$99" 3.00 = "$100-$199" 4.00 = "$200-$299" 5.00 = "$300-$399" 6.00 = "$400 or more"
Resources to implement lesson plans in classroom	ResImplemt	1.00 = "yes" 2.00 = "no"
Time elapsed since attending the Institute	TimeElapsed	1.00 = "2007" 2.00 = "2006" 3.00 = "2005" 4.00 = "2004" 5.00 = "2003" 6.00 = "2002" 7.00 = "2001"

		8.00 = "attended multiple years"
Receive administrative support to attend the Institute	Adm_Support	1.00 = "yes" 2.00 = "no"
Teach in a public or private school	Pub_Private	1.00 = "Public" 2.00 = "Private" 3.00 = "Other"
Number of students served in district	SsServed	1.00 = "Less than 199" 2.00 = "200-399" 3.00 = "400-599" 4.00 = "600-799" 5.00 = "800-999" 6.00 = "1000 or greater"
Number of students in the grade you teach	Ss_in_grade	Continuous variable
Live in a urban or rural location	Location	1.00 = "urban" 2.00 = "rural"
Teacher to student ratio	T_Ss_Ratio	1.00 = "1:9 or less" 2.00 = "1:10-1:15" 3.00 = "1:16-1:21" 4.00 = "1:22-1:27" 5.00 = "1:28-1:33" 6.00 = "1:34-1:39" 7.00 = "Greater than 1:39"
Teacher gender	T_gender	1.00 = "female" 2.00 = "male"
Teacher ethnicity	T_ethnicity	1.00 = "AI/AN" 2.00 = "Asian/PI" 3.00 = "Black" 4.00 = "Hispanic" 5.00 = "White" 6.00 = "Other"
Number of years teaching	Year_Teach	1.00 = "2 years or less" 2.00 = "3-5 years" 3.00 = "6-8 years" 4.00 = "9-11 years" 5.00 = "12-14 years" 6.00 = "15-17 years" 7.00 = "18-20 years" 8.00 = "21-23 years" 9.00 = "24-26 years" 10.00 = "27 years or more"
Grade level you teach	GradeLevel	1.00 = "elementary school"

		2.00 = "middle school/junior high" 3.00 = "high school" 4.00 = "other"
State in which you reside	StateReside	1.00 = "Alabama" 2.00 = "Florida" 3.00 = "Louisiana" 4.00 = "Mississippi" 5.00 = "Texas" 6.00 = "Other"
Teacher certification	T_certificate	1.00 = "regular or standard license" 2.00 = "probationary state certificate" 3.00 = "alternate route certification" 4.00 = "temporary, emergency, or provisional certification" 5.00 = "certification other than by state" 6.00 = "no certificate in main assignment field"
Are you certified in the discipline you are teaching	Disc_Cert_T	1.00 = "yes" 2.00 = "no"
Are you Nationally Board certified	NatlBoard	1.00 = "yes" 2.00 = "no" 3.00 = "currently in the certification process"
Member of professional teacher organization(s)	T_organiz	1.00 = "yes" 2.00 = "no"
Highest academic degree you hold	T_degree	1.00 = "High school diploma" 2.00 = "Associate's degree/vocational certification" 3.00 = "Bachelor's degree" 4.00 = "Master's degree" 5.00 = "Ed. specialists or work past Master's" 6.00 = "Doctorate degree" 7.00 = "Other"
Current subscription to scientific or science education journals	Journals	1.00 = "yes" 2.00 = "no"
Attended more than one Institute	Attend_Mult	1.00 = "yes" 2.00 = "no"
State in which you attended Institute	State_Attend	1.00 = "Alabama" 2.00 = "Florida" 3.00 = "Louisiana"

		4.00 = "Mississippi" 5.00 = "Texas" 6.00 = "More than 1 state"
Are you teaching the same grade now as you were when you attended the Institute	T_Same_Grade	1.00 = "yes" 2.00 = "no"
Are you teaching the same science classes now as you were when you attended the Institute	Same_Sci_Class	1.00 = "yes" 2.00 = "no"
Schedule your school follows	Schedule	1.00 = "Block" 2.00 = "Mixed" 3.00 = "Traditional 7 pd" 4.00 = "Traditional 6 pd" 5.00 = "Other"
Total different science classes you teach each semester	Diff_Sci_Class	1.00 = "None" 2.00 = "1-4" 3.00 = "5 or more" 4.00 = "varies by semester"
Science classes you teach	Sci_Class_Teach	Continuous variable
Science classes in which you can use the lesson plans you created	Sci_Cl_Use	1.00 = "Yes, multiple subjects" 2.00 = "No, only 1 subject or less"
Have you used any of the PowerPoint® presentations that come with the lesson plans	PPs_used	1.00 = "yes" 2.00 = "no"
Times per year you have used the PowerPoint® presentations	PP_xyr_used	1.00 = "None" 2.00 = "1-3 times" 3.00 = "4-6 times" 4.00 = "7-9 times" 5.00 = "More than 9 times"
How many have you used more than once	PPMultUse	1.00 = "None of them" 2.00 = "1-3" 3.00 = "4-6" 4.00 = "7-9" 5.00 = "More than 9"
Were the PowerPoint® slides user-friendly	PP_user_friendly	1.00 = "yes" 2.00 = "no"
Preparation time per week	PrepTime_Week	1.00 = "None" 2.00 = "Less than 1 hour" 3.00 = "1-2 hours"

		4.00 = "3-4 hours" 5.00 = "5 hours" 6.00 = "More than 5 hours"
How do you keep in touch with the scientists	KIT_Scientist	1.00 = "Discussion Board" 2.00 = "E-mail" 3.00 = "Did not KIT"
How do you keep in touch with your peer teachers	KIT_Peers	1.00 = "Discussion Board" 2.00 = "E-mail" 3.00 = "Did not KIT"
How do you keep in touch with the COSEE:CGOM Instructors	KIT_Instructors	1.00 = "Discussion Board" 2.00 = "E-mail" 3.00 = "Did not KIT"
Time elapsed since attending #2	TimeElap_2	1.00 = "attended 2005-2007" 2.00 = "attended 2001-2004" 3.00 = "attended multiple years"
Science periods per day	scipdperday	Continuous variable
Instructional materials #2	InstrMat_2	1.00 = "Receive most or all" 2.00 = "Receive few or none"
Student computers in classroom #2	Ss_Comp_Rm_2	1.00 = "only 1 Ss computer in room" 2.00 = "more than 1 Ss computer in room"
Money allotted for science classroom #2	MoneyAllot_2	1.00 = "$0-$299" 2.00 = "$300 or more"
Students served in your school #2	Ss_Served_2	1.00 = "0-599" 2.00 = "600 or more"
Teacher to student ratio #2	T_Ss_Ratio_2	1.00 = "1:9-1:21" 2.00 = "1:22-1:27" 3.00 = "1:28 or greater"
Years of teaching experience #2	Yr_Teach_2	1.00 = "1-11 years" 2.00 = "12 or more years"
Nationally Board certified #2	NatlBoard2	1.00 = "yes" 1.50 = "currently pursuing" 2.00 = "no"

APPENDIX E

EXPANDED SURVEY RESULTS

Centers for Ocean Science and Education Excellence: Central Gulf of Mexico Survey

1. Have you ever participated in one of the COSEE:CGOM Summer Institutes (Online and "Face to Face"), Two-Day Workshops, or Sea Scholars Programs?

	Response Percent	Response Count
Yes	98.7%	78
No	1.3%	1
answered question		79
skipped question		1

2. Have you attended more than one COSEE:CGOM Workshop/Institute?

	Response Percent	Response Count
Yes	25.0%	19
No	75.0%	57
answered question		76
skipped question		4

3. In which state(s) did you attend the Workshop/Institute(s)? (check all that apply)

	Response Percent	Response Count
Alabama	29.9%	23
Florida	14.3%	11
Louisiana	27.3%	21
Mississippi	20.8%	16
Texas	10.4%	8
answered question		77
skipped question		3

4. At the time you attended the COSEE:CGOM Workshop/Institute(s), were you teaching the <u>same grade level</u> that you now teach?	Response Percent	Response Count
Yes	73.3%	55
No	26.7%	20
answered question		75
skipped question		5

5. At the time you attended the COSEE:CGOM Workshop/Institute(s), were you teaching the <u>same science classes</u> that you now teach?	Response Percent	Response Count
Yes	60.8%	45
No	39.2%	29
answered question		74
skipped question		6

6. Please select the type of schedule your school currently follows.	Response Percent	Response Count
Block schedule (A/B schedule)	20.5%	15
Mixed schedule (A/B Block Mon.-Thurs., then traditional schedule with all classes on Fri.)	0.0%	0
Traditional schedule with six periods per day	16.4%	12
Traditional schedule with seven periods per day	27.4%	20
Other (please specify)	35.6%	26
answered question		73
skipped question		7

Question 6 "Other" Responses

	Comment Text	Response Date
1.	rotating schedule	Sun, 2/3/08 10:41 AM
2.	I have presently moved to elementary education and have1 class all day long	Wed, 1/30/08 6:13 PM
3.	Florida Sea Grant Extension Agent	Tue, 1/22/08 10:31 PM
4.	8 periods per day	Mon, 1/21/08 11:40 PM
5.	traditional schedule with eight periods per day	Sun, 1/20/08 4:43 PM
6.	I was teaching middle, but am now in elementary.	Tue, 1/15/08 2:56 PM
7.	4x4 block	Tue, 1/15/08 2:36 PM
8.	Traditional schedule with 8 periods per day	Tue, 1/15/08 1:13 PM
9.	block schedule with science double-blocked: 70 minutes every day	Sun, 1/6/08 12:21 PM
10.	Four class periods a day consisting of the following subjects: Math, Science/Social Studies, Reading, Language	Sat, 1/5/08 1:33 PM
11.	traditional with 8 periods	Sun, 12/23/07 10:31 PM
12.	Our team of teacher make our own schedule for the week according to our needs.	Sat, 12/22/07 1:00 PM
13.	departmentalized in elementary 5th grade	Mon, 12/17/07 1:08 PM
14.	Everyday Block schedule- no alternating during the week	Fri, 12/14/07 8:21 AM
15.	4day schedule	Mon, 12/10/07 11:24 AM
16.	homeschool and 4H volunteer leader for grades k-12	Thu, 11/15/07 5:51 AM
17.	Montessori setting. The students decide when to attend science lab during the week.	Tue, 11/13/07 3:10 PM
18.	8 periods 50 min long	Mon, 11/12/07 11:44 PM
19.	There are six regular periods for me each day. These are not necessarily the same for every grade in my building. I teach 2 different grade levels daily and I teach 2 other grade levels on a weekly schedule.	Mon, 11/12/07 10:52 PM
20.	3 periods per day	Sun, 11/11/07 8:42 PM
21.	I am currently not teaching	Sat, 11/10/07 9:33 PM
22.	I now teach at the local community college	Fri, 11/9/07 12:57 PM
23.	As a college prof, my schedule varies -- but I usually teach 2 marine science classes each semester.	Fri, 11/9/07 10:52 AM
24.	four days a week with 62 min classes for 7 periods a day	Fri, 11/9/07 9:42 AM
25.	Optional school. Two sessions per day with morning and afternoon students.	Fri, 11/9/07 9:42 AM
26.	I work with schools as they come to the science center	Fri, 11/9/07 9:34 AM

7. How many total different science classes do you teach each semester? (ex: If you teach Biology 2 periods of the day and Integrated Science 3 periods = 2 total different science classes each semester)	Response Percent	Response Count
None	13.7%	10
1	23.3%	17
2	27.4%	20
3	13.7%	10
4	4.1%	3
5	6.8%	5
6	0.0%	0
7	2.7%	2
More than 7	0.0%	0
It varies by semester (please explain)	8.2%	6
	answered question	73
	skipped question	7

Question 7 "Other" Responses

	Comment Text	Response Date
1.	I teach math, not science; 6 periods	Tue, 1/15/08 6:39 PM
2.	I teach integrated curriculum at Brown Barge Middle so I do not always teach a science class.	Sat, 12/22/07 1:00 PM
3.	I get new students each semester for Forensics. i teach Physical Science all year and Biology all year.	Thu, 11/15/07 6:52 PM
4.	depends on projects that 4H is working on	Thu, 11/15/07 5:51 AM
5.	Since we are a small school, If I have 4 kids in Environmental Science, then that course will be added to my load. Right now, I have 5 different sciences.	Sat, 11/10/07 6:56 AM
6.	I work with 6000 students each year	Fri, 11/9/07 9:34 AM

8. Please check the appropriate boxes indicating the names of the science courses you currently teach and how many periods a day you teach that class.									
	1	2	3	4	5	6	7	>7	Response Count
Biology	33.3% (4)	**41.7% (5)**	0.0% (0)	0.0% (0)	25.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	12
Chemistry	**50.0% (2)**	**50.0% (2)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	4
Earth Science	26.7% (4)	**33.3% (5)**	13.3% (2)	0.0% (0)	20.0% (3)	0.0% (0)	6.7% (1)	0.0% (0)	15
Physics	**60.0% (3)**	20.0% (1)	20.0% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	5
Integrated Science	**33.3% (3)**	11.1% (1)	**33.3% (3)**	22.2% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	9
Life Science	15.4% (2)	30.8% (4)	**38.5% (5)**	0.0% (0)	15.4% (2)	0.0% (0)	0.0% (0)	0.0% (0)	13
General Science	**41.7% (5)**	8.3% (1)	8.3% (1)	8.3% (1)	8.3% (1)	25.0% (3)	0.0% (0)	0.0% (0)	12
Marine Science	**50.0% (5)**	10.0% (1)	20.0% (2)	0.0% (0)	20.0% (2)	0.0% (0)	0.0% (0)	0.0% (0)	10
A.P. Biology	**100.0% (3)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	3
A.P. Chemistry	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
A.P. Physics	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Other	**36.8% (7)**	31.6% (6)	15.8% (3)	5.3% (1)	5.3% (1)	5.3% (1)	0.0% (0)	0.0% (0)	19
								(Please specify)	32
								answered question	**62**
								skipped question	**18**

Question 8 “Other” Responses

	Comment Text	Response Date
1.	space science	Sun, 2/3/08 10:42 AM
2.	Environmental Science	Tue, 1/29/08 1:22 PM
3.	anatomy & physiology	Mon, 1/28/08 9:51 PM
4.	none: no longer teaching	Tue, 1/22/08 10:31 PM
5.	8th grade physical science, academic competitions (science based)	Thu, 1/17/08 11:20 PM
6.	physical science	Thu, 1/17/08 9:29 PM
7.	8th grade math (I integrate science into my lesson plans and collaborate with the science teacher.)	Tue, 1/15/08 6:40 PM
8.	Biology II 1 block	Tue, 1/15/08 2:37 PM
9.	I am no longer teaching. I am a graduate student at the University of Southern Mississippi, Environmental Biology. I am currently working on my masters with work in aquatic entomolgy, focusing on Chironomidae	Wed, 1/9/08 12:40 PM
10.	None- I teach math only.	Sat, 1/5/08 1:34 PM
11.	my one other on 7 class setup is technology	Wed, 12/26/07 9:13 AM
12.	Language Arts/ Reading 6th grade	Tue, 12/25/07 12:47 PM
13.	none	Sun, 12/23/07 10:32 PM
14.	At this time we are not offering the Oceans curriucum. We will be teaching Environmentality this year in the spring. Oceans will be taught next year.	Sat, 12/22/07 1:01 PM
15.	aquatic biology	Wed, 12/19/07 1:01 AM
16.	Introduction to Physical Science	Sat, 12/15/07 9:51 AM
17.	Forensic Science	Fri, 12/14/07 8:21 AM
18.	Forensics	Thu, 11/15/07 6:52 PM
19.	integrated global warming study	Thu, 11/15/07 5:52 AM
20.	Environmental Science	Wed, 11/14/07 1:05 PM
21.	physical science 6th grade	Tue, 11/13/07 6:50 PM
22.	Technology education	Tue, 11/13/07 11:13 AM
23.	Environmental Sci (2) Forensic Science (1)	Mon, 11/12/07 11:45 PM
24.	Elementary Science 4th grade - 2 classes daily. Elementary Science 5th grade - 2 classes daily. Two weekly science enrichment classes for 2nd grade and 2 weekly science enrichment classes for 3rd grade.	Mon, 11/12/07 10:56 PM
25.	5th grade science	Sun, 11/11/07 8:42 PM
26.	Environmental Science and Horticulture/aquaculture	Sat, 11/10/07 6:58 AM
27.	Physical Science	Fri, 11/9/07 4:41 PM
28.	Physical Science and Environmental Science	Fri, 11/9/07 3:57 PM
29.	Intro to college biology, part I and part II	Fri, 11/9/07 12:59 PM
30.	7 classes of Environmental and 7 classes of Physical Science	Fri, 11/9/07 9:44 AM

31. 9th grade physical science 2 classes and Environmental Science 2 classes — Fri, 11/9/07 9:43 AM

32. I work in all areas and it changes daily — Fri, 11/9/07 9:35 AM

9. Please check the appropriate boxes indicating how many classes you teach where you could use COSEE:CGOM lesson plans?

	1	2	3	4	5	6	7	>7	Response Count
Biology	**41.7% (5)**	**41.7% (5)**	0.0% (0)	0.0% (0)	16.7% (2)	0.0% (0)	0.0% (0)	0.0% (0)	12
Chemistry	**50.0% (1)**	**50.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	2
Earth Science	20.0% (3)	**33.3% (5)**	13.3% (2)	0.0% (0)	20.0% (3)	6.7% (1)	6.7% (1)	0.0% (0)	15
Physics	**57.1% (4)**	28.6% (2)	14.3% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	7
Integrated Science	**54.5% (6)**	0.0% (0)	27.3% (3)	18.2% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	11
Life Science	20.0% (3)	26.7% (4)	**40.0% (6)**	0.0% (0)	13.3% (2)	0.0% (0)	0.0% (0)	0.0% (0)	15
General Science	**50.0% (6)**	8.3% (1)	8.3% (1)	0.0% (0)	8.3% (1)	16.7% (2)	8.3% (1)	0.0% (0)	12
Marine Science	**58.3% (7)**	8.3% (1)	16.7% (2)	0.0% (0)	16.7% (2)	0.0% (0)	0.0% (0)	0.0% (0)	12
Honors Science	**100.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1
A.P. Biology	**100.0% (3)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	3
A.P. Chemistry	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
A.P. Physics	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Other	**64.7% (11)**	17.6% (3)	11.8% (2)	0.0% (0)	5.9% (1)	0.0% (0)	0.0% (0)	0.0% (0)	17
(Please specify)									22
answered question									**66**
skipped question									**14**

	Comment Text	Response Date
1.	Environmental Science	Tue, 1/29/08 1:22 PM
2.	not teaching	Tue, 1/22/08 10:32 PM
3.	Physical science	Thu, 1/17/08 9:30 PM
4.	I work with TREE (teaching responsible earth educatio) follow-up.	Wed, 1/16/08 9:11 PM
5.	I can use it to share with the teachers I mentor, in the computer lab where I create lessons for my school and share with the science lab teacher.	Tue, 1/15/08 7:58 PM

6.	physical science	Wed, 1/9/08 12:27 PM
7.	None	Sat, 1/5/08 1:34 PM
8.	Very little in reading or language arts	Tue, 12/25/07 12:47 PM
9.	7th grade technology class	Sun, 12/23/07 10:32 PM
10.	Next year hopefully.	Sat, 12/22/07 1:02 PM
11.	aquatic bioloby	Wed, 12/19/07 1:01 AM
12.	the problem is the question of "how many" at a given time	Thu, 11/15/07 5:52 AM
13.	Environmental Science	Wed, 11/14/07 1:06 PM
14.	Technology education	Tue, 11/13/07 11:14 AM
15.	Elementary Science 4th grade - 2 classes daily. Elementary Science 5th grade - 2 classes daily. Two weekly science enrichment classes for 2nd grade and 2 weekly science enrichment classes for 3rd grade.	Mon, 11/12/07 10:56 PM
16.	5th grade science	Sun, 11/11/07 8:43 PM
17.	Advance Physical Science	Fri, 11/9/07 4:42 PM
18.	Environmental Science	Fri, 11/9/07 3:57 PM
19.	College biology, part II	Fri, 11/9/07 12:59 PM
20.	physical science 2 classes & environmental science 2 classes	Fri, 11/9/07 9:45 AM
21.	7 classes of Environmental	Fri, 11/9/07 9:44 AM
22.	I work in all areas and it changes daily	Fri, 11/9/07 9:35 AM

Question 9 “Other” Responses

10. How many COSEE:CGOM lesson plans did you create while attending the Workshop and/or Institute?

	Response Percent	Response Count
None	4.2%	3
1-2	**33.8%**	24
3-4	21.1%	15
5-6	25.4%	18
7-8	7.0%	5
9 or more	8.5%	6
(Please specify a number)		2
answered question		71
skipped question		9

11. How many different COSEE:CGOM lesson plans have you downloaded from the web since attending the COSEE:CGOM Workshop and/or Institute?

	Response Percent	Response Count
None	**36.6%**	26
1-2	31.0%	22
3-4	9.9%	7
5-6	7.0%	5
7-8	8.5%	6
9 or more	7.0%	5
(Please specify a number)		0
answered question		71
skipped question		9

Question 10 "Specify a Number" Responses

Comment Text	Response Date
1. 36	Wed, 1/2/08 2:15 PM
2. Enough for 6 weeks	Wed, 11/21/07 5:22 PM

12. Of the COSEE:CGOM lesson plans that you created or downloaded, have you used any of the lesson plans in your classroom?

	Response Percent	Response Count
Yes	81.4%	57
No	18.6%	13
answered question		70
skipped question		10

13. Of the lesson plans you created while attending the Workshop and/or Institutes, how many have you used in your classroom?

	Response Percent	Response Count
None	0.0%	0
1-2	57.1%	32
3-4	26.8%	15
5-6	12.5%	7
7-8	3.6%	2
9 or more	0.0%	0
(Please specify a number)		2
answered question		56
skipped question		24

Question 13 "Specify a Number" Responses

Comment Text	Response Date
1. I don't recall. It has been over 4 years since I attended. I have since	Tue, 1/15/08 2:57 PM

been widowed, changed jobs and moved to another county.

2. 4 Wed, 11/14/07 3:31 PM

14. Of the COSEE:CGOM lesson plans you downloaded, how many have you used in your classroom?	Response Percent	Response Count
None	31.6%	18
1-2	**36.8%**	21
3-4	17.5%	10
5-6	5.3%	3
7-8	5.3%	3
9 or more	3.5%	2
(Please specify a number)		1
answered question		**57**
skipped question		**23**

15. How would you characterize the frequency with which you use the COSEE:CGOM lesson plans (created or downloaded)?	Response Percent	Response Count
Use more than once a week	1.8%	1
Use once a week	5.5%	3
Use once every two weeks	7.3%	4
Use once a month	23.6%	13
Use once a semester	**38.2%**	21
Use once a year	23.6%	13
answered question		**55**
skipped question		**25**

Question 14 “Specify a Number” Responses

	Comment Text	Response Date
1.	3	Wed, 11/14/07 3:31 PM

16. Please indicate <u>why</u> you used these lesson plans. (check all that apply)	Response Percent	Response Count
To meet science standards	70.2%	40
To teach an ocean or coastal theme	61.4%	35
To teach ocean literacy	49.1%	28
To teach interdisciplinary subjects (math, chemistry, physics)	36.8%	21
To provide students with a fun topic for learning	68.4%	39
To teach environmental awareness/ocean conservation	**75.4%**	43
To provide students with a hands-on activity	70.2%	40
Other (please specify)	7.0%	4
	answered question	**57**
	skipped question	**23**

17. Which of the three main themes/categories of lesson plans have you used? (check all that apply)	Response Percent	Response Count
Coastal Processes	73.2%	41
Habitats and Organisms	**80.4%**	45
Marine Technology	25.0%	14
	answered question	**56**
	skipped question	**24**

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Question 16 "Other" Responses

Comment Text	Response Date
1. I used them during the last school year (06-07) when I taught	Sat, 1/5/08 1:37 PM

	science to provide students with a hands-on activity.	
2.	quality lessons with integrated technology, integrated math/science (mine)	Mon, 12/17/07 1:23 PM
3.	Integrate the use of tech	Tue, 11/13/07 11:15 AM
4.	Because it is important to my students to understand the wetlands in which they live.	Fri, 11/9/07 9:48 AM

Question 19 Responses

	Comment Text	Response Date
1.	We spend one week down at the beach with our students and I took my classes on an extra field trip to a bay/seagrass environment.	Fri, 2/15/08 2:01 PM
2.	It goes with our Biomes unit	Sun, 2/3/08 10:44 AM
3.	students come from all over Florida and experience different habitats and see different organisms.....	Tue, 1/29/08 1:24 PM
4.	hands on; easy to use	Tue, 1/22/08 10:33 PM
5.	This theme relates well to Biology.	Sun, 1/20/08 4:46 PM
6.	Organisms and their habitats seem to grab student interest more so than many other topics.	Thu, 1/17/08 11:23 PM
7.	fits with objective	Thu, 1/17/08 9:32 PM
8.	I mainly deal with Life science	Tue, 1/15/08 9:43 PM
9.	It was a better fit for the topics I needed to cover, it allowed for differentiated instruction for my students.	Tue, 1/15/08 8:02 PM
10.	Our lesson plans are tied to Florida's Red Tide.	Tue, 1/15/08 6:42 PM
11.	It applies to all subjects I teach/taught.	Tue, 1/15/08 5:09 PM
12.	It fits elementary standards the most.	Tue, 1/15/08 2:58 PM
13.	It covers more of the GLE's we are required to teach.	Tue, 1/15/08 2:39 PM
14.	Fits my curriculum best	Tue, 1/15/08 1:14 PM
15.	It connected with a lesson on habitats and organisms	Wed, 1/9/08 12:31 PM
16.	This theme lends itself well to all aspects of the science that I teach.	Wed, 1/9/08 12:26 PM
17.	It required the most in-depth coverage in our curriculum.	Sat, 1/5/08 1:38 PM
18.	While teaching sixth grade, I really did not have the right curricula that I needed to adequately teach about the ocean and world biomes, and of course, I would rather have up to date information as far as our coasts and how much it is in jeopardy as far as pollution.	Wed, 1/2/08 2:18 PM
19.	The theme of "Habitats and Organisms" is addressed more because of the subject area requirment.	Sun, 12/30/07 11:20 AM
20.	I can tie this theme in with some of the language arts/reading lessons I'm currently teaching. Please note that I moved from teaching general education to teaching special education the year following my COSSEE training. I no longer teach science.	Tue, 12/25/07 12:51 PM

21.	It fits perfectly witht he curriculum and state standards. Middle school kids are very interested in organisms.	Sat, 12/22/07 1:04 PM
22.	I use this theme the most in my classroom because I teach about land loss and Louisiana's coastline.	Thu, 12/20/07 1:21 AM
23.	Alot of my students are not aware of all the organisms in the ocean. Use to introduce marine ecosystems.	Wed, 12/19/07 10:30 PM
24.	It blends in with life sciences.	Mon, 12/17/07 1:40 PM
25.	It fits most closely with the Florida 8th grade science standards I need to apply.	Mon, 12/17/07 1:24 PM
26.	Interests of students and things going on around that time, involving weather, and how areas would be affected.	Mon, 12/17/07 1:10 PM
27.	To provide additional information to topics I am currently teaching	Mon, 12/10/07 11:26 AM
28.	It most closely aligns with my standards.	Tue, 11/20/07 2:23 PM
29.	I have used all areas quite a bit. We are now spending more time studying habitats and organisms.	Fri, 11/16/07 11:58 AM
30.	It works best with the comprehensive curriculum.	Thu, 11/15/07 6:53 PM
31.	It is the most readily adaptable theme to many subjects	Thu, 11/15/07 5:54 AM
32.	It works well with the subject matter I teach.	Wed, 11/14/07 3:36 PM
33.	it is most relevant to the topics that i teach at grade 5	Tue, 11/13/07 6:52 PM
34.	I have aproblem with down load lesson plans and other material from the internet.	Tue, 11/13/07 11:16 AM
35.	Habitats are part of hour comprehensive curriculum, as well as coastal processes	Mon, 11/12/07 11:50 PM
36.	This usually fits my focus.	Mon, 11/12/07 11:00 PM
37.	5th grade science TEKS include food chains/webs and adaptation for increase of survival.	Sun, 11/11/07 8:45 PM
38.	Habitat and organisms is a state course of study objective.	Sat, 11/10/07 9:36 PM
39.	Because living oganisims interest students the most and that subject helps me draw them into the other subjects and disciplines.	Sat, 11/10/07 7:01 AM
40.	I teach integrated science and this is what we have covered so far. I will get to habitats and organisms later in the year.	Fri, 11/9/07 9:24 PM
41.	fits better with the class I am teaching at the present time	Fri, 11/9/07 4:44 PM
42.	I taught elementary school and they are interested in the cool critters that live in the ocean.	Fri, 11/9/07 2:48 PM
43.	ecosystem organisms interdependance and stewardship	Fri, 11/9/07 2:46 PM
44.	This is a large part of the curriculum of the course.	Fri, 11/9/07 1:03 PM
45.	I cover two chapters in environmental science that I use about habitats and organisms.	Fri, 11/9/07 10:04 AM
46.	This is where I am at in my GLEs for my classes. I plan to use as many as I can fit into the curriculum. I wish I could teach only these lessons, but I have to cover all of the standards.	Fri, 11/9/07 9:50 AM
47.	To teach area students about wetlands	Fri, 11/9/07 9:37 AM

18. If you selected more than one theme, which one have you used the most?	Response Percent	Response Count
Coastal Processes	20.8%	10
Habitats and Organisms	**77.1%**	37
Marine Technology	4.2%	2
	answered question	**48**
	skipped question	**32**

19. Please briefly explain why you have used this theme the most in your classroom.	Response Count
	47
answered question	**47**
skipped question	**33**

20. Please rate the following statements as they pertain to your use of the COSEE:CGOM lesson plans.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Rating Average	Response Count
Lesson plans were easy to understand (clear format and wording)	39.3% (22)	**58.9% (33)**	1.8% (1)	0.0% (0)	3.38	56
Lesson plans were easy to use	30.9% (17)	**65.5% (36)**	3.6% (2)	0.0% (0)	3.27	55
Lesson plans were aligned to the National Science Education Standards	45.3% (24)	**54.7% (29)**	0.0% (0)	0.0% (0)	3.45	53
Lesson plans were aligned to the Ocean Literacy Essential Principles and Fundamental Concepts	**51.1% (24)**	48.9% (23)	0.0% (0)	0.0% (0)	3.51	47
Lesson plans were aligned with State Science Education Standards	33.3% (18)	**64.8% (35)**	1.9% (1)	0.0% (0)	3.31	54
					answered question	**57**
					skipped question	**23**

21. In what ways have you evaluated student learning after implementing the COSEE:CGOM lesson plans? (check all that apply)

	Response Percent	Response Count
Pre and posttests	36.8%	21
Projects (individual or group)	57.9%	33
Informal observations of students and asked them questions	**78.9%**	45
Comprehensive test at the end of the lesson/unit	52.6%	30
Not evaluated student learning of COSEE:CGOM lesson plans	8.8%	5
Other (please specify)	1.8%	1
	answered question	**57**
	skipped question	**23**

22. Some of the lesson plans come with PowerPoint presentations you can download. Have you ever used this resource?

	Response Percent	Response Count
Yes	46.4%	32
No	**53.6%**	37
	answered question	**69**
	skipped question	**11**

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Question 21 "Other" Responses

Comment Text	Response Date
1. Student response using interactive technology	Tue, 1/15/08 6:43 PM

23. How many times per year have you used the PowerPoint presentations in your classroom?	Response Percent	Response Count
None	3.2%	1
1-3 times	**58.1%**	18
4-6 times	19.4%	6
7-9 times	3.2%	1
More than 9 times	16.1%	5
answered question		**31**
skipped question		**49**

24. Of the PowerPoint presentations you have used, how many have you used more than once?	Response Percent	Response Count
None of them	16.1%	5
1-3	**64.5%**	20
4-6	12.9%	4
7-9	0.0%	0
More than 9	6.5%	2
answered question		**31**
skipped question		**49**

25. Were the PowerPoint slides you downloaded user-friendly?	Response Percent	Response Count
Yes	**96.8%**	30
No	3.2%	1
answered question		**31**
skipped question		**49**

26. If you have <u>never</u> used COSEE:CGOM lesson plans in your classroom, do you think this is a resource you could use in your classroom in the future?

	Response Percent	Response Count
Yes	100.0%	24
No	0.0%	0
Please explain		3
answered question		**24**
skipped question		**56**

27. Do you use the process of inquiry to teach science in your classroom?

	Response Percent	Response Count
Yes	80.6%	54
No	4.5%	3
Not sure	14.9%	10
answered question		**67**
skipped question		**13**

28. If "Yes", please briefly explain <u>how</u> you include inquiry in your lessons.

	Response Count
	42
answered question	**42**
skipped question	**38**

Question 26 "Please explain" Responses

Comment Text	Response Date
1. depending on which grade I am placed in next year. I am at a different school this year than when I attended COSEE.	Wed, 1/30/08 6:16 PM

2.	might use them in a nature camp	Tue, 1/22/08 10:36 PM
3.	I tend to create my lesson plans from scratch, but I do use other sources as inspiration	Wed, 11/21/07 5:23 PM

Question 28 "Describe how you include inquiry in your lessons" Responses

	Comment Text	Response Date
1.	Sometimes, I allow the students to handle, study, experiment and then I teach the lesson.	Fri, 2/15/08 2:03 PM
2.	Mostly hands on	Sun, 2/3/08 10:45 AM
3.	I review background info with them and then ask them to analyze info and then synthesize what can be done with that info	Tue, 1/29/08 1:27 PM
4.	We are using AMSTI materials this year with the lessons divided into different inquiry lessons.	Mon, 1/28/08 9:53 PM
5.	Open ended labs...	Mon, 1/21/08 11:48 PM
6.	Use it often in the lab.	Sun, 1/20/08 4:56 PM
7.	Students are posed with a problem and must generate a testable hypothesis for labs.	Fri, 1/18/08 2:09 PM
8.	Once a base of knowledge about the topic is established, the students are given an activity to allow them to use what was learned to solve a problem.	Thu, 1/17/08 11:25 PM
9.	I give minimal background information to students before allowing them to begin an investigation, for instance in frog dissection, the students were given a list of strutures to locate and identify but they were free to do this in any order that they chose and to focus longer on what interested them.	Wed, 1/16/08 7:52 PM
10.	I use a constructivist philosophy of teaching/learning in my classroom.	Wed, 1/16/08 9:06 AM
11.	Project based performance	Tue, 1/15/08 9:45 PM
12.	I always introduce a new topic with a hands-on, no-right-answer lab so students can learn to appreciate that process, not product can be important.	Tue, 1/15/08 5:12 PM
13.	I start with the students doing a hands-on activity to introduce concepts. This reactivates prior knowledge and gives a framework from which one can develop vocabulary and concepts.	Tue, 1/15/08 3:00 PM
14.	Introduce open ended topics - follow marine-related news stories all semester - projects - hands on lessons and data collection	Tue, 1/15/08 1:17 PM
15.	opening up a field of conversation with Q & A	Wed, 1/9/08 12:44 PM
16.	Inquiry is used in every lesson to prepare for state testing and science fair projects	Wed, 1/9/08 12:33 PM
17.	Most lessons are open ended and provide opportunity for the students to use inquiry.	Wed, 1/9/08 12:28 PM
18.	Students create their own labs and collect and analyze data depending on the topic of study.	Sun, 1/6/08 12:26 PM
19.	When I taught science last year I incorporated experiments that led students to ask questions that would lead to discovery of concepts.	Sat, 1/5/08 1:41 PM

20.	Usually, the students were given a question or problem in which they could solve, by inquiry	Wed, 1/2/08 2:21 PM
21.	I encourage and nurture inquiry skills from the first day of class. Too many students are so use to learning just notes or lessons out of the book. It's a challange sometimes to get the students to loose the fear of exploring the unknown without official printed guidelines. I thing inquiry is a skill that should be more enforced in our classes before we produce a majority of un-thinkers and lazy spoon-fed students in our society. If you read this please respond to me. I want to know if I am the only teacher that voices this opinion or if I have just lost my mind. I guess you can see that this is an area of teaching science that I feel a strong passion for teaching.	Sun, 12/30/07 11:26 AM
22.	I don't currently teach science.	Tue, 12/25/07 12:52 PM
23.	Most experiements that we do I use a series of questions to get students involved and thinking about cause and effect.	Sat, 12/22/07 1:07 PM
24.	Pre-lesson activities and authentic assessments to help students construct knowledge in their own ways and alleviate misconceptions in knowledge.	Mon, 12/17/07 1:26 PM
25.	I do not teach science at this time.	Mon, 12/17/07 1:11 PM
26.	Student discovery centered	Sat, 12/15/07 9:52 AM
27.	Most of my units in marine science are lab intensive, and almost all units begin with a lab forcing students to make hypothesese based on their prior understanding or misconceptions. This exposes students to the concept an their background knowledge prior to getting new information from me or a textbook	Wed, 11/21/07 5:25 PM
28.	Varies depending on current level of inquiry and specific topic / activity, but students ask questions to guide the learning process	Tue, 11/20/07 2:27 PM
29.	I include inquiry in every lab activity my students complete and in questioning sequences.	Sat, 11/17/07 3:47 PM
30.	Through demonstrations, labs, projects, portfolios, and webquests.	Thu, 11/15/07 6:55 PM
31.	Raise a controversial question and explore answers through research, observation and discussion	Thu, 11/15/07 5:56 AM
32.	i have the students develop their own questions related to a topic of interest. then write and implement their own investigations.	Tue, 11/13/07 6:54 PM
33.	I provide my students an opportunity to take ownership in their lab activities. After a class discussion, which leads to questions about the content, students develop tests that can answer those questions.	Sat, 11/10/07 10:18 PM
34.	KWL charts to find out what the students already know prior to the lesson and after the lesson. Also our discussion lead to other questions that we research on the internet.	Sat, 11/10/07 9:38 PM
35.	I ususally introduce our units as environmental situations or dilemmas and allow the process to unfold as students break into teams and research the subject. In this manner students naturally follow inquiry throughout the situation.	Sat, 11/10/07 7:04 AM
36.	Discovery Labs	Fri, 11/9/07 9:03 PM

37.	Student centered lab investigations	Fri, 11/9/07 3:59 PM
38.	modified or guided inquiry with experiments	Fri, 11/9/07 2:48 PM
39.	I will often present a demonstration, object, or slide show to introduce a topic. Then the students are asked for observations and insights which are guided toward the lesson.	Fri, 11/9/07 1:08 PM
40.	I like to have the students think about an idea, create a testable questions, develop an investigation, and test it. As they develop their test, they find out changes that need to be made or even new hypothesis that come up, and adjust the test or question. It teaches them to think and do science with minimal direction from me. They do, not redo science. It is difficult for them to do this, however, because they have not been exposed to inquiry very much. They are not strong at the process. Sometimes I have to go back and have them relook at some of the parts because they are clueless as how to write up the lab reports to really display what they learned. This is the area in which I am learning. I am creating guidelines of how to write up the lab report with guiding questions to help them write their observations, inferences, and discoveries using appropriate vocabulary. Sometimes I think that they are enjoying the hands-on and thinking, but they are not always relating it to the necessary content. When it comes to paper and pencil, they can not preform as well as I know they understand what they experienced. If I asked them face to face about the project, they could tell me more than they can write about on paper. I'm still working this out.	Fri, 11/9/07 9:59 AM
41.	Every thing we do at the science center is hands aon and inquiry based	Fri, 11/9/07 9:39 AM
42.	Science Notebook Question Hypothesis Plannining/procedure Results What I Learned New Question	Fri, 11/9/07 9:07 AM

29. How many school hours do you have designated as preparation time per week?		
	Response Percent	Response Count
None	4.5%	3
Less than 1	7.5%	5
1-2	10.4%	7
3-4	23.9%	16
5	22.4%	15
More than 5	**31.3%**	21
	answered question	**67**
	skipped question	**13**

30. How did you find out about the following? (check all that apply)					
	COSEE:CGOM Summer Institutes	COSEE:CGOM Lesson Plans	COSEE:CGOM PowerPoint presentation	Online Discussion Board	Response Count
Another teacher told me about it	**92.6% (25)**	11.1% (3)	7.4% (2)	3.7% (1)	27
Found it while surfing the web	**63.6% (7)**	9.1% (1)	27.3% (3)	0.0% (0)	11
Learned of it while attending a conference	**54.2% (13)**	50.0% (12)	33.3% (8)	8.3% (2)	24
During the COSEE:CGOM Institute itself	21.7% (10)	**91.3% (42)**	67.4% (31)	63.0% (29)	46
Other	**72.2% (13)**	11.1% (2)	22.2% (4)	27.8% (5)	18
				(Please specify)	19
				answered question	**65**
				skipped question	**15**

Question 30 "Please specify" Responses

	Comment Text	Response Date
1.	DISL sent me information	Sun, 2/3/08 10:46 AM
2.	Letter & application was sent to the school I taught at last year.	Wed, 1/30/08 6:18 PM
3.	just now through this survey	Tue, 1/29/08 1:28 PM
4.	e-mail	Mon, 1/21/08 11:50 PM
5.	Team meetings for alternative certification program (LRCE)	Fri, 1/18/08 2:10 PM
6.	Didn't know about online discussion board	Wed, 1/16/08 9:06 AM
7.	DISL	Tue, 1/15/08 9:45 PM
8.	I learned about it from my principal at the school I was at during that time.	Sat, 1/5/08 1:43 PM
9.	A notice was sent to my school district.	Sun, 12/30/07 11:29 AM
10.	4H mailings to volunteers	Thu, 11/15/07 5:57 AM
11.	Mail out	Wed, 11/14/07 3:39 PM
12.	just found out about them. glad to know they are downloadable now.	Tue, 11/13/07 6:55 PM
13.	Learned from the GCRL & the JL Scott MEC & A staff	Mon, 11/12/07 11:04 PM
14.	I was invited to the very first one at Dauphin Island Sea Lab	Sat, 11/10/07 9:39 PM
15.	I was asked to attend by during another trip down to DISL	Fri, 11/9/07 4:51 PM
16.	this survey	Fri, 11/9/07 2:48 PM
17.	Dauphin Island website	Fri, 11/9/07 1:09 PM
18.	I got an e-mail	Fri, 11/9/07 10:01 AM
19.	Dauphon Island Sea Lab	Fri, 11/9/07 9:08 AM

31. Have you disseminated COSEE:CGOM information to your school, your district, your state, or nationally?		Response Percent	Response Count
Yes		80.3%	53
No		19.7%	13
	answered question		66
	skipped question		14

32. In which of the following ways have you disseminated COSEE:CGOM information to your school, your district, your state, or nationally? (check all that apply)		Response Percent	Response Count
Inservice, workshop, or other professional development at the school in which I teach		48.1%	26
Shared lesson plans with my fellow teachers		88.9%	48
Made a presentation at a conference where I showcased the work I did with my students using the COSEE:CGOM lesson plans that I created		20.4%	11
Traveled to other schools and shared the lesson plans I created		14.8%	8
Sent COSEE:CGOM lesson plans electronically to fellow teacher either in my school or elsewhere		37.0%	20
Not disseminated the COSEE:CGOM information to anyone in my school district		0.0%	0
Other (please specify)		3.7%	2
	answered question		54
	skipped question		26

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Question 32 "Other" Responses

	Comment Text	Response Date
1.	shared information with fellow teachers at my school	Mon, 1/28/08 9:54 PM

2. e-mails, brought back relevent information to hand out to teachers Fri, 11/9/07 10:02 AM

33. Do you plan to use COSEE:CGOM lesson plans in the future?	Response Percent	Response Count
Yes	90.8%	59
No	9.2%	6
answered question		65
skipped question		15

34. How many COSEE:CGOM lesson plans have you used at least once?	Response Average	Response Total	Response Count
Number of lesson plans you have used at least once.	4.17	246	59
answered question			59
skipped question			21

35. How many COSEE:CGOM lesson plans do you plan to use in the 2008-2009 school year?	Response Percent	Response Count
None	16.9%	11
1-2	29.2%	19
3-4	27.7%	18
5-6	9.2%	6
7-8	7.7%	5
9 or more (please specify a number)	9.2%	6
answered question		65
skipped question		15

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Question 34 "Number of lesson plans you have used at least once" Responses

	Comment Text	Response Date
1.	2	Fri, 2/15/08 2:05 PM
2.	3	Sun, 2/3/08 10:46 AM
3.	15	Wed, 1/30/08 6:24 PM
4.	6	Tue, 1/29/08 1:28 PM
5.	1	Mon, 1/28/08 9:55 PM
6.	2	Tue, 1/22/08 10:37 PM
7.	3	Sun, 1/20/08 4:57 PM
8.	0	Fri, 1/18/08 2:10 PM
9.	4	Thu, 1/17/08 11:27 PM
10.	1	Thu, 1/17/08 9:37 PM
11.	0	Wed, 1/16/08 7:53 PM
12.	2	Wed, 1/16/08 9:06 AM
13.	1	Tue, 1/15/08 9:46 PM
14.	6	Tue, 1/15/08 8:06 PM
15.	1	Tue, 1/15/08 6:45 PM
16.	2	Tue, 1/15/08 5:54 PM
17.	14	Tue, 1/15/08 5:16 PM
18.	1	Tue, 1/15/08 2:43 PM
19.	3	Tue, 1/15/08 1:18 PM
20.	2	Wed, 1/9/08 12:35 PM
21.	8	Wed, 1/9/08 12:29 PM
22.	1	Sun, 1/6/08 12:28 PM
23.	2	Sat, 1/5/08 1:44 PM
24.	25	Wed, 1/2/08 2:23 PM
25.	10	Sun, 12/30/07 11:39 AM
26.	9	Wed, 12/26/07 9:18 AM
27.	2	Tue, 12/25/07 12:54 PM
28.	6	Sat, 12/22/07 1:11 PM
29.	4	Wed, 12/19/07 10:32 PM
30.	7	Mon, 12/17/07 1:27 PM
31.	3	Mon, 12/17/07 1:12 PM
32.	2	Sat, 12/15/07 9:53 AM
33.	2	Mon, 12/10/07 11:32 AM
34.	0	Wed, 11/21/07 5:26 PM
35.	8	Tue, 11/20/07 2:29 PM
36.	0	Sat, 11/17/07 3:48 PM

37.	8	Thu, 11/15/07 6:55 PM
38.	3	Thu, 11/15/07 5:57 AM
39.	3	Wed, 11/14/07 4:11 PM
40.	9	Wed, 11/14/07 3:39 PM
41.	0	Wed, 11/14/07 1:08 PM
42.	3	Tue, 11/13/07 6:55 PM
43.	7	Tue, 11/13/07 11:19 AM
44.	12	Mon, 11/12/07 11:06 PM
45.	3	Sat, 11/10/07 10:18 PM
46.	0	Sat, 11/10/07 9:40 PM
47.	5	Sat, 11/10/07 7:05 AM
48.	2	Fri, 11/9/07 9:04 PM
49.	5	Fri, 11/9/07 4:51 PM
50.	0	Fri, 11/9/07 4:00 PM
51.	4	Fri, 11/9/07 2:49 PM
52.	8	Fri, 11/9/07 2:48 PM
53.	2	Fri, 11/9/07 1:10 PM
54.	0	Fri, 11/9/07 10:50 AM
55.	2	Fri, 11/9/07 10:29 AM
56.	2	Fri, 11/9/07 10:03 AM
57.	5	Fri, 11/9/07 9:40 AM
58.	3	Fri, 11/9/07 9:08 AM
59.	2	Fri, 11/9/07 6:21 AM

Question 35 "Please specify a number" Responses

	Comment Text	Response Date
1.	I do not teach science any more	Wed, 1/16/08 9:15 PM
2.	25	Wed, 1/2/08 2:23 PM
3.	10	Sun, 12/30/07 11:39 AM
4.	Not sure the number. I have to be told next year that I will be teaching the Oceans Stream. See Brown Barge Middle on the internet to understand how we work.	Sat, 12/22/07 1:11 PM
5.	It depends on the courses I teach.	Fri, 11/16/07 12:07 PM
6.	12	Tue, 11/13/07 6:55 PM

36. I would be more likely to use the COSEE:CGOM lesson plans in the future if: (check all that apply)

	Response Percent	Response Count
There was a search engine to help me find relevant lesson plans	50.8%	33
The COSEE:CGOM lesson plans were linked to other lesson plan databases	32.3%	21
I was sent an e-mail update when new lesson plans were added to the web page	47.7%	31
I was able to add my own lesson plans after attending the Institute or Workshop	9.2%	6
I think the current format is fine and does not need change	12.3%	8
Other (please specify)	13.8%	9
	answered question	65
	skipped question	15

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Question 36 "Please specify" Responses

Comment Text	Response Date
1. I don't think I've explored them enough to have an opinion.	Fri, 2/15/08 2:06 PM

2.	don't know; don't look at it much anymore	Tue, 1/22/08 10:38 PM
3.	COSEE Lesson Plans correlated directly with the Louisiana science curricula.	Wed, 1/16/08 9:06 AM
4.	I am retired and answered as if teaching	Tue, 1/15/08 5:17 PM
5.	Less technology--not all schools have access to computers, internet, etc	Tue, 1/15/08 3:02 PM
6.	I teach science classes again.	Sat, 1/5/08 1:45 PM
7.	if I taught science	Mon, 12/17/07 1:14 PM
8.	If I were teaching something other than Intro to Physical Science for 8th grade	Sat, 12/15/07 9:54 AM
9.	Be available for every type of systems	Tue, 11/13/07 11:20 AM

Question 37 "Please specify" Responses

	Comment Text	Response Date
1.	Also by a specific topic	Sat, 1/5/08 1:45 PM

37. If a search engine was created to help navigate the COSEE:CGOM lesson plans, I would prefer to search by: (check all that apply)	Response Percent	Response Count
Theme (Coastal Processes, Habitats and Organisms, Marine Technology)	66.2%	43
Subject Area (Biology, Chemistry, Earth Science)	49.2%	32
Grade Level (elementary, middle school/junior high, high school)	**76.9%**	50
Institute/Workshop (by state)	3.1%	2
National Standards	15.4%	10
State Standards	46.2%	30
Ocean Literacy Essential Principles and Fundamental Concepts	7.7%	5
Other (please specify)	1.5%	1
	answered question	**65**
	skipped question	**15**

38. Which of the following statements most accurately describes how well your school system provides the instructional materials and other resources you need to teach your class?	Response Percent	Response Count
Receive all the resources I need.	12.5%	8
Receive most of the resources I need.	**57.8%**	37
Receive few of the resources I need.	18.8%	12
I don't receive any of the resources I need.	10.9%	7
	answered question	**64**
	skipped question	**16**

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39. Do you have a computer in your classroom?	Response Percent	Response Count
Yes	95.4%	62
No	4.6%	3
	answered question	65
	skipped question	15

40. As the teacher in the classroom, do you have a personal computer that is designated for your use only and not intended for student use?	Response Percent	Response Count
Yes, with Internet access	88.5%	54
Yes, but no Internet access	0.0%	0
No	11.5%	7
	answered question	61
	skipped question	19

41. How many computers in your room are available for student use?	Response Percent	Response Count
1 Computer	40.4%	21
2-4 Computers	32.7%	17
5-7 Computers	15.4%	8
8-10 Computers	1.9%	1
11-13 Computers	3.8%	2
14-16 Computers	1.9%	1
More than 16 Computers	3.8%	2
	answered question	52
	skipped question	28

42. Do you have Internet connectivity in your classroom for the student computer(s)? (at least one student computer connected to the Internet or a wireless connection)	Response Percent	Response Count
Yes	78.3%	47
No	21.7%	13
answered question		60
skipped question		20

43. Where do you have to go to get Internet access for <u>all of your students</u> in your classroom? (check all that apply)	Response Percent	Response Count
Remain in the classroom	22.2%	14
Library	30.2%	19
Student Computer Lab	**71.4%**	45
Another teacher's room	4.8%	3
I do not have the option of using the Internet with my students at my school	1.6%	1
No location on site that can accommodate all students in my classroom	4.8%	3
Other (please specify)	11.1%	7
answered question		63
skipped question		17

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Question 43 "Other" Reponses

Comment Text	Response Date
1. portable taptop lab	Fri, 2/15/08 2:07 PM

2.	wireless lab in classroom (it travels)	Sun, 2/3/08 10:49 AM
3.	each student has their own laptop and has access to wireless net	Tue, 1/29/08 1:31 PM
4.	don't teach	Tue, 1/22/08 10:39 PM
5.	don't teach	Tue, 1/22/08 10:39 PM
6.	laptop computers borrowed from the media center	Wed, 1/16/08 7:55 PM
7.	Lab cart with 20 lap tops with wireless internet shared in the school.	Sun, 12/30/07 11:44 AM
8.	smartboard	Tue, 11/13/07 6:58 PM

Question 45 "Please specify amount" Responses

	Comment Text	Response Date
1.	can receive more than $400	Tue, 1/29/08 1:31 PM
2.	500.00	Mon, 1/28/08 9:57 PM
3.	800	Mon, 1/21/08 11:54 PM
4.	500	Tue, 1/15/08 9:48 PM
5.	1500	Tue, 1/15/08 5:55 PM
6.	$2000	Tue, 1/15/08 1:20 PM
7.	1000-1500	Wed, 1/9/08 12:30 PM
8.	1200.00	Wed, 12/26/07 9:20 AM
9.	$500teacher allocation/I don't teach science	Tue, 12/25/07 12:57 PM
10.	500	Wed, 12/19/07 10:35 PM
11.	$525	Fri, 12/14/07 8:25 AM
12.	4,000.00	Mon, 12/10/07 11:33 AM
13.	525	Sat, 11/17/07 3:50 PM
14.	525.00	Fri, 11/16/07 12:15 PM
15.	$1000	Mon, 11/12/07 11:10 PM
16.	Students pay lab fee of $25 each	Fri, 11/9/07 4:02 PM
17.	$500	Fri, 11/9/07 1:14 PM
18.	3000 for all sciences 500 each about	Fri, 11/9/07 10:09 AM
19.	560.00	Fri, 11/9/07 6:22 AM

Question 46 "Please explain what you would need to implement them" Responses

	Comment Text	Response Date
1.	Not sure	Mon, 1/21/08 11:54 PM
2.	science equipment and a consumable materials budget	Wed, 1/16/08 9:06 AM
3.	Some materials are consumables and must be purchased each time. I do not have all of the necessary equipment.	Tue, 1/15/08 8:11 PM
4.	I buy what I need with my personal funds. It would be nice to	Sun, 12/30/07 11:44 AM

	have aquiriums, heaters, coolers, food, salts and other water additives, living labs, and a more technology creating friendly area.	
5.	We often don't have enough equipment for all 3 grade level teachers to complete a lab on the same day.	Wed, 12/19/07 10:35 PM
6.	I have a very limited computer/science lab.	Mon, 12/17/07 1:46 PM
7.	I pay them out of my pocket for all three of the 8th grade classrooms - I am dept head	Mon, 12/17/07 1:29 PM
8.	I need a lab with basic equipment.	Fri, 11/16/07 12:15 PM
9.	Location is a major drawback and the resources availible.	Thu, 11/15/07 6:57 PM
10.	resources that would be borrowable - resource books, supplies	Tue, 11/13/07 6:58 PM
11.	I am not really sure of the answer for this one	Mon, 11/12/07 11:10 PM
12.	equipment	Sat, 11/10/07 9:43 PM
13.	While I LOVE the lessons and themes we developed, Travel to the seashore is a najor cost expeditiure for us. Even though we are within 80 miles of the coast, a trip would cost me well over $400.	Sat, 11/10/07 7:08 AM
14.	The list would be way to long to detail but I honestly don't have the room or the equipment for many of the activities	Fri, 11/9/07 4:53 PM
15.	No resources	Fri, 11/9/07 10:40 AM
16.	Hurricane Rita distroyed our school and we have not replaced any of our science equipment. I have only 1 water quality kit and am writing grants to obtain more. We are working toward more equipment.	Fri, 11/9/07 10:09 AM
17.	It is up to me or the science center to fund the lessons	Fri, 11/9/07 9:43 AM

44. Does your school have a science budget?

	Response Percent	Response Count
Yes	**55.6%**	35
No	31.7%	20
I don't know	12.7%	8
	answered question	**63**
	skipped question	**17**

45. Approximately how much money <u>per school year</u> are you allotted for your science classroom?

	Response Percent	Response Count
None	17.9%	10
$1-$99	7.1%	4
$100-$199	12.5%	7
$200-$299	12.5%	7
$300-$399	16.1%	9
$400 or more, please specify amount	**33.9%**	19
	answered question	**56**
	skipped question	**24**

46. In your opinion, do you have the resources necessary to implement the COSEE:CGOM lesson plans?

	Response Percent	Response Count
Yes	**74.2%**	46
No (please explain what you would need to implement them)	27.4%	17
	answered question	**62**
	skipped question	**18**

47. Select the year(s) in which you attended the COSEE:CGOM Workshop or Institute:	Response Percent	Response Count
2007	17.9%	12
2006	**22.4%**	15
2005	20.9%	14
2004	19.4%	13
2003	19.4%	13
2002	6.0%	4
2001	6.0%	4
answered question		**67**
skipped question		**13**

48. Would you attend a COSEE:CGOM Workshop or Institute in the future?	Response Percent	Response Count
Yes	**90.8%**	59
No	10.8%	7
answered question		**65**
skipped question		**15**

49. Please explain why you would or would not attend a COSEE:CGOM Workshop or Institute in the future.	Response Count
	56
answered question	**56**
skipped question	**24**

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Question 49 "Explain why you would or would not attend in the future" Responses

	Comment Text	Response Date
1.	Good teachers continue to build on their foundation and need to	Fri, 2/15/08 2:08 PM

be reminded of good ideas. They also need to practice things they've forgotten to be better teachers.

2.	The workshops and hands-on experience were invaluable.	Wed, 1/30/08 6:29 PM
3.	I love the idea of having hand-out activities and the interaction with marine scientists!!!!	Tue, 1/29/08 1:32 PM
4.	If it could be scheduled and if it fit my current teaching requirements.	Mon, 1/28/08 9:59 PM
5.	no longer teach in the classroom; I actually help teach part of the Florida institute	Tue, 1/22/08 10:40 PM
6.	I learned SOOOOO much! Great Workshop	Mon, 1/21/08 11:56 PM
7.	The people are great. Enjoyable learning atmosphere.	Sun, 1/20/08 5:00 PM
8.	Thw workshop was extremely informative and provided me with a better understanding of ocean sciences. The lessons were helpful, but the field experience was outstanding. I believe the field experience has helped me to be a better science teacher.	Fri, 1/18/08 2:15 PM
9.	Would like to keep up to date on COSEE resources.	Thu, 1/17/08 11:31 PM
10.	more education, keep updated on latest information & studies	Thu, 1/17/08 9:41 PM
11.	It was the most fun, rewarding experience that I could ever experience while learning.	Wed, 1/16/08 9:17 PM
12.	I felt the workshop was beneficial for me in terms of increasing my knowledge of ocean science.	Wed, 1/16/08 7:56 PM
13.	My personal growth and development.	Wed, 1/16/08 9:07 AM
14.	The homework assignments are ridiculously hard. Teachers should also have the whole summer to do them, and never two a week.	Tue, 1/15/08 9:50 PM
15.	I enjoyed the hands on activities and the field experience I gained. I enjoyed working with the scientists and other teachers.	Tue, 1/15/08 8:14 PM
16.	I enjoyed the hands on activities and the field experience I gained. I enjoyed working with the scientists and other teachers.	Tue, 1/15/08 8:14 PM
17.	Were treated unprofessionally and patronized by the staff.	Tue, 1/15/08 6:48 PM
18.	i enjoyed myself	Tue, 1/15/08 5:56 PM
19.	I enjoyed interacting with other teachers and sharing information and ideas.	Tue, 1/15/08 5:19 PM
20.	I enjoyed it and learned a lot. I have changed levels, so would like to go so that I can hone the lessons to fit better with where I am currently teaching.	Tue, 1/15/08 3:04 PM
21.	I am not sure if I would. I did enjoy the workshop and learned a lot, however I no longer teach Environmental Science and there are only a few GLE's that are relevant to the COSSEE program	Tue, 1/15/08 2:46 PM
22.	new topics, new locations	Tue, 1/15/08 1:22 PM
23.	Very informative and great learning experience	Wed, 1/9/08 12:48 PM
24.	I would not attend one at this time because my subject matter has changed and I have been more interested in workshops pertaining to it	Wed, 1/9/08 12:39 PM

25.	COSEE was a great experience. Content was great and the implementation was well done.	Wed, 1/9/08 12:31 PM
26.	I thought the information given at the workshop really helped in my education of the Gulf-coast area.	Sun, 1/6/08 1:07 PM
27.	It was a great learning experience for me and helped me to expand my scientific thinking/knowledge base.	Sat, 1/5/08 1:49 PM
28.	I was able to receive alot of useful information and lessons to teach with, it was very motivating also	Wed, 1/2/08 2:29 PM
29.	I learned so much about unifying and connecting the information with the world as a whole. We live in a land-locked area and it helped me to find resources I needed to teach the importance of our oceans and waters to my students along with letting them experience ways to see first hand how the oceans effects their every day life.	Sun, 12/30/07 11:48 AM
30.	I am working on a masters during the summer right now. Would use the cosee opertunities much more after that is finished this summer (07)	Wed, 12/26/07 9:22 AM
31.	I no longer teach science.	Tue, 12/25/07 12:58 PM
32.	COSEE provided me with a lot of books and lessons to take back and use and I do use them when I teach Oceans. I would very much like to take an updated version.	Sat, 12/22/07 1:14 PM
33.	It's an intense week of developing a lesson to incorporate in our curriculum that does not exactly specify oceanography.	Wed, 12/19/07 10:37 PM
34.	Very hands-on and interesting.	Mon, 12/17/07 1:47 PM
35.	We had some bad experiences related to our post-COSEE experience related to the way our assignments and granting of credit was handled. This was unfortunate since the material was so valuable and our time AT the face-to-face was FABULOUS.	Mon, 12/17/07 1:31 PM
36.	It is not applicable to what I am teaching.	Mon, 12/17/07 1:15 PM
37.	I would love to attend another COSEE workshop if I get to teach Biology, its great for that course...anything but physical science b/c COSEE does not really apply to that.	Sat, 12/15/07 9:56 AM
38.	The COSEE I attended was one of the first ones if not the first one and I think they were working the problems out. I have heard they are better and teachers are able to work with scientist in their labs instead of just viewing a powerpoint about their research.	Fri, 12/14/07 8:27 AM
39.	Gain new knowledge	Mon, 12/10/07 11:34 AM
40.	Amazing workshops! I learn so much in a small amount of time and it is stuff I can actually use in my class. Working in the field and with real scientists is an invaluable experience for teachers.	Tue, 11/20/07 2:33 PM
41.	I want to attend COSEE in Texas, Mississippi, and Florida.	Fri, 11/16/07 12:16 PM
42.	I would like a refresher on everything and a chance to apply more of the themes/ideas.	Thu, 11/15/07 6:58 PM
43.	It was extremely informative, well-taught, hands-on - demonstrating how to actually teach a subject, energizing to me as a teacher	Thu, 11/15/07 6:00 AM

44.	I loved every minute of it. I learned many things about the coastal environment that I could intergrate into my lesson's.	Wed, 11/14/07 3:42 PM
45.	i learned a lot at the workshops. I also enjoyed meeting the professors and other science teachers from the state. I gained information on topics that were not readily available to me in Central louisiana.	Tue, 11/13/07 7:00 PM
46.	The networking is wonderful and extremely helpful. The information received is designed by teachers for teachers	Mon, 11/12/07 11:57 PM
47.	Every workshop I have taken through USM/GCRL has deepened my science background education. They have widened my scope of activities, tools and depth of knowledge. Rich, rich educational and field experiences. I have loved meeting, working with and learning from the wide range of knowledgeable, reputable scientists and other professionals.	Mon, 11/12/07 11:14 PM
48.	Working with scientists and other teachers to enhance curriculum not onl helped me write activities and lessons, but learn content as well.	Sat, 11/10/07 10:22 PM
49.	COSEE workshops were the best, most informed, hands-on workshop I have ever attended. I received alot of material to disseminate. It was very useful.	Sat, 11/10/07 9:45 PM
50.	I would love to attend anthoer COSEE WOrkshop. I have never learned so much or developed such contacts at any other institute or in service.	Sat, 11/10/07 7:09 AM
51.	Great up to date info, scientifically based	Fri, 11/9/07 10:20 PM
52.	I would if the presentation manner was changed. I didn't learn much from the professors who talked to us about themselves. It would have been more useful if they would have shared activities or ideas with us to better prepare students. The scientist did not collarborate with us to help produce lesson plans. We were required to do it on our own. I did enjoy the field work.	Fri, 11/9/07 4:06 PM
53.	I love learning about the ocean!	Fri, 11/9/07 2:48 PM
54.	The experiences provided by COSSEE are invaluable. This allows me to relate more personally the topics that I present to the students.	Fri, 11/9/07 1:17 PM
55.	I would love to attend if my health permits. I am recovering from cancer at this time but look forward to getting back into the swing of things.	Fri, 11/9/07 10:42 AM
56.	I have found Cosee very useful and I learn something new every time	Fri, 11/9/07 10:36 AM
57.	I was in heaven. The workshop was very intense with long days, but the experience was so rich. I worked side-by-side with real scientist. I saw that what I was doing was not just classroom science, but real science. It doesn't alway work the first time, and you don't always know what is happening. It takes more tries and time to put things together. Everyday people with a passion can do science and make a difference in their communitites. I enjoy learning and hunger for ways to make relevent information easy to acquire and fun to explore. I really felt like I was on an intense vacation. I would go to as many as you would have me attend.	Fri, 11/9/07 10:15 AM

50. Would you have the financial resources and administrator support to attend another COSEE:CGOM Workshop or Institute?		Response Percent	Response Count
Yes		**65.6%**	42
No (please explain)		34.4%	22
		answered question	**64**
		skipped question	**16**

51. I have kept in touch in the following ways with one or more of the participants in the Workshop or Institute. (check all that apply)	Via the online discussion board	Via e-mail	Did not keep in touch	Response Count
Scientists	9.1% (5)	36.4% (20)	**56.4% (31)**	55
Peer Teachers	1.8% (1)	**59.6% (34)**	38.6% (22)	57
COSEE:CGOM Instructors	1.8% (1)	**60.0% (33)**	38.2% (21)	55
Other	0.0% (0)	9.1% (1)	**90.9% (10)**	11
			(Please specify)	5
			answered question	**64**
			skipped question	**16**

Question 50 "Please explain" Responses

	Comment Text	Response Date
1.	I would need an interpreter to help facilitate communication since	Tue, 1/29/08 1:32 PM

	I am deaf.	
2.	Possibly...transportation is expensive	Mon, 1/21/08 11:56 PM
3.	I would have administrator support, but not the financial resources.	Wed, 1/16/08 9:07 AM
4.	The administrative support is there but not the financial resources.	Tue, 1/15/08 8:14 PM
5.	The administrative support is there but not the financial resources.	Tue, 1/15/08 8:14 PM
6.	The county is small. I would have administrative support, but not the financial resources.	Tue, 1/15/08 3:04 PM
7.	We no longer have grant supplements	Wed, 1/9/08 12:39 PM
8.	district would pay if the workshop was very affordable	Sun, 1/6/08 1:07 PM
9.	I did not pay for the institute, I actually received a stipend, so that is the only way I would be able to attend, because I do work normally during the summer	Wed, 1/2/08 2:29 PM
10.	We have more restrictions on our workshop attendence off-campus.	Sun, 12/30/07 11:48 AM
11.	Our school would not pay for my being in a Cosee project	Wed, 12/26/07 9:22 AM
12.	I no longer teach science.	Tue, 12/25/07 12:58 PM
13.	Not sure about financing the trip.	Sat, 12/22/07 1:14 PM
14.	The budget is divided between the 3 grades levels and a major portion is spent for TAKS.	Wed, 12/19/07 10:37 PM
15.	Our school does not have those resources readily available.	Mon, 12/17/07 1:47 PM
16.	Possibly - but it is not a priority because of our experiences - though in another place - possibly.	Mon, 12/17/07 1:31 PM
17.	Our school is very limited on funds for professional development	Fri, 12/14/07 8:27 AM
18.	maybe	Wed, 11/14/07 4:14 PM
19.	adminstrator support but not financial resources	Tue, 11/13/07 7:00 PM
20.	I paid for my attendance to COSSE, however I did not received any stipend from COSSE.	Tue, 11/13/07 11:23 AM
21.	not sure	Fri, 11/9/07 2:52 PM
22.	I have retired but I am still working in science areas.	Fri, 11/9/07 2:48 PM
23.	I'm not sure; with our situation, we have to share all we have. It depends on the cost involved. I may have to be personally responsible for it.	Fri, 11/9/07 10:15 AM

Question 51 "Please specify" Responses

	Comment Text	Response Date
1.	Some I see at conferences.	Tue, 1/15/08 8:16 PM
2.	Telephone calls and postal services.	Sun, 12/30/07 11:50 AM
3.	For a while I did keep in touch. Once in a while I get something	Sat, 12/22/07 1:17 PM

from the director. He sent me some posters about a year ago.

4. Problems with the web site Tue, 11/13/07 11:24 AM

5. talked with them at conferences we both attended Fri, 11/9/07 10:17 AM

52. Please answer the following questions by checking the box that best describes your response.						
	Strongly Agree	Agree	Disagree	Strongly Disagree	Rating Average	Response Count
I enjoyed working collaboratively with the research scientists in developing lesson plans.	**60.3% (38)**	33.3% (21)	4.8% (3)	1.6% (1)	3.52	63
I benefited professionally from working collaboratively with the research scientists at the COSEE:CGOM Workshop or Institute.	**71.4% (45)**	23.8% (15)	3.2% (2)	1.6% (1)	3.65	63
I believe that the lesson plans I created are based on the most recent scientific research.	**49.2% (30)**	42.6% (26)	6.6% (4)	1.6% (1)	3.39	61
The lesson plans I created collaboratively with the scientists/researchers are of a stronger quality than if I had produced them on my own.	**45.2% (28)**	38.7% (24)	12.9% (8)	3.2% (2)	3.26	62
I found it difficult to communicate with the scientists/researchers.	5.0% (3)	13.3% (8)	28.3% (17)	**53.3% (32)**	1.70	60
I would seek assistance from these scientists/researchers in the future.	**41.0% (25)**	**41.0% (25)**	14.8% (9)	3.3% (2)	3.20	61
I believe I would have created better lesson plans without help/input from the scientists/researchers.	3.4% (2)	3.4% (2)	36.2% (21)	**56.9% (33)**	1.53	58
I believe the scientists/researchers listened to what I had to say and we learned from each other.	**54.8% (34)**	30.6% (19)	11.3% (7)	3.2% (2)	3.37	62
					answered question	**64**
					skipped question	**16**

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53. Please answer the following questions by checking the box that best describes your response.						
	Strongly Agree	Agree	Disagree	Strongly Disagree	Rating Average	Response Count
I have shared the information I learned in the COSEE:CGOM Workshop or Institute with other teachers in my school.	38.5% (25)	**56.9% (37)**	3.1% (2)	1.5% (1)	3.32	65
I enjoyed working with other teachers at the COSEE:CGOM Workshop or Institute.	**61.5% (40)**	36.9% (24)	1.5% (1)	0.0% (0)	3.60	65
I benefited from the collaboration with other teachers at the Workshop or Institute and prefer this method of learning.	**65.6% (42)**	32.8% (21)	1.6% (1)	0.0% (0)	3.64	64
					answered question	**65**
					skipped question	**15**

54. Do you teach in a public or private school?		Response Percent	Response Count
Public		**86.2%**	56
Private		4.6%	3
Other (please specify)		9.2%	6
		answered question	**65**
		skipped question	**15**

55. In which school district do you teach?		Response Count
		53
	answered question	**53**
	skipped question	**27**

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Question 54 "Please specify" Responses

Comment Text	Response Date
1. When I attended COSEE I taught at a private school; now I am in	Wed, 1/30/08 6:36 PM

public school.

2.	Florida School for the Deaf and the Blind	Tue, 1/29/08 1:34 PM
3.	no longer formally teaching	Tue, 1/22/08 10:42 PM
4.	I am not teaching at this time but I did teach at a private institution	Wed, 1/9/08 12:50 PM
5.	homeschool and 4H	Thu, 11/15/07 6:01 AM
6.	not employed at the moment	Sat, 11/10/07 9:47 PM

Question 55 "In which school district do you teach" Responses

	Comment Text	Response Date
1.	Bay District Florida	Fri, 2/15/08 2:31 PM
2.	Hoover City Schools	Sun, 2/3/08 10:51 AM
3.	Cleburne County	Wed, 1/30/08 6:37 PM
4.	Florida school for the deaf and the Blind	Tue, 1/29/08 1:34 PM
5.	calhoun county	Mon, 1/28/08 10:03 PM
6.	Tupelo Public Schools	Sun, 1/20/08 5:02 PM
7.	Oneonta City Schools	Thu, 1/17/08 11:33 PM
8.	baldwin	Thu, 1/17/08 9:44 PM
9.	I do not teach at this time.	Wed, 1/16/08 9:18 PM
10.	Escambia County Florida	Wed, 1/16/08 8:01 PM
11.	Ascension Parish School Board	Wed, 1/16/08 9:08 AM
12.	Talladega County School System	Tue, 1/15/08 9:52 PM
13.	Pasco	Tue, 1/15/08 8:17 PM
14.	Ascension	Tue, 1/15/08 5:57 PM
15.	Pascagoula	Tue, 1/15/08 5:21 PM
16.	Flagler	Tue, 1/15/08 3:06 PM
17.	St Mary Parish	Tue, 1/15/08 2:48 PM
18.	Mountain Brook City Schools	Tue, 1/15/08 1:24 PM
19.	St. James	Wed, 1/9/08 12:42 PM
20.	Jackson County School District- St. Martin Schools	Sat, 1/5/08 1:52 PM
21.	Gadsden City System	Wed, 1/2/08 2:31 PM
22.	Yazoo County School District	Sun, 12/30/07 11:52 AM
23.	Center Point Ind. School District	Wed, 12/26/07 9:25 AM
24.	Escambia	Sat, 12/22/07 1:18 PM
25.	spring	Wed, 12/19/07 10:39 PM
26.	DeSoto Middle School Arcadia, FL	Mon, 12/17/07 1:34 PM
27.	Jasper City Schools	Mon, 12/17/07 1:16 PM

28. Opp City Schools	Sat, 12/15/07 9:57 AM
29. Baldwin County	Fri, 12/14/07 8:29 AM
30. Community college	Mon, 12/10/07 11:36 AM
31. Austin ISD	Tue, 11/20/07 2:40 PM
32. Baldwin County Public School System	Fri, 11/16/07 12:19 PM
33. Livingston Parish	Thu, 11/15/07 6:59 PM
34. Miami-Dade	Thu, 11/15/07 6:02 AM
35. monroe	Wed, 11/14/07 4:17 PM
36. Lamar	Wed, 11/14/07 3:44 PM
37. Hale County	Wed, 11/14/07 1:16 PM
38. avoyelles	Tue, 11/13/07 7:02 PM
39. Caddo	Mon, 11/12/07 11:58 PM
40. Rapides	Sat, 11/10/07 10:23 PM
41. none	Sat, 11/10/07 9:48 PM
42. Marion	Sat, 11/10/07 7:11 AM
43. Terrebonne Parish	Fri, 11/9/07 10:22 PM
44. Scottsboro City Schools	Fri, 11/9/07 4:55 PM
45. Muscle Shoals City	Fri, 11/9/07 4:08 PM
46. Athens City	Fri, 11/9/07 2:58 PM
47. Eanes	Fri, 11/9/07 2:50 PM
48. Colbert County	Fri, 11/9/07 1:21 PM
49. Rapides Parish	Fri, 11/9/07 10:43 AM
50. Caddo and Bossier Parish	Fri, 11/9/07 10:38 AM
51. Cameron Parish	Fri, 11/9/07 10:19 AM
52. Vestavia Hills	Fri, 11/9/07 9:13 AM
53. OCS	Fri, 11/9/07 6:24 AM

Question 57 "Name of the private school at which you teach" Responses

Comment Text	Response Date
1. St. Michael	Wed, 1/9/08 12:32 PM
2. Kenneth B. Clark Academy	Tue, 11/13/07 11:25 AM
3. Lamar Elementary	Mon, 11/12/07 11:17 PM

56. Please select the approximate number of students that your public school district serves.						
Select one						
	Less than 1,000	1,000-2,999	3,000-4,999	5,000-6,999	7,000-8,999	9 g
Total # of students served in school district	9.3% (5)	16.7% (9)	16.7% (9)	14.8% (8)	7.4% (4)	35
						answered
						skipped

57. What is the name of the private school at which you teach?		
		Response Count
		3
	answered question	3
	skipped question	77

58. Please select the approximate number of students that your individual school serves.						
Select One						
	Less than 199	200-399	400-599	600-799	800-999	10 gre
Total # of students served in your school	8.1% (5)	6.5% (4)	**35.5% (22)**	14.5% (9)	16.1% (10)	19.4
						answered q
						skipped q

59. How many students at your school are in the grade that you primarily teach?				
		Response Average	Response Total	Response Count
Number of students in the grade you primarily teach		300.81	18650	62
			answered question	62
			skipped question	18

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Question 59 "Number of students in the grade you primarily teach" Responses

Comment Text	Response Date

1.	400	Fri, 2/15/08 2:31 PM
2.	325	Sun, 2/3/08 10:52 AM
3.	75	Wed, 1/30/08 6:38 PM
4.	200	Tue, 1/29/08 1:35 PM
5.	100	Mon, 1/28/08 10:03 PM
6.	70	Mon, 1/21/08 11:59 PM
7.	500	Sun, 1/20/08 5:03 PM
8.	240	Fri, 1/18/08 2:18 PM
9.	90	Thu, 1/17/08 11:33 PM
10.	400	Thu, 1/17/08 9:45 PM
11.	300	Wed, 1/16/08 8:01 PM
12.	400	Wed, 1/16/08 9:08 AM
13.	130	Tue, 1/15/08 9:53 PM
14.	800	Tue, 1/15/08 8:19 PM
15.	350	Tue, 1/15/08 6:50 PM
16.	200	Tue, 1/15/08 5:57 PM
17.	200	Tue, 1/15/08 5:22 PM
18.	90	Tue, 1/15/08 3:07 PM
19.	110	Tue, 1/15/08 2:49 PM
20.	325	Tue, 1/15/08 1:24 PM
21.	30	Wed, 1/9/08 12:51 PM
22.	65	Wed, 1/9/08 12:43 PM
23.	100	Wed, 1/9/08 12:32 PM
24.	250	Sun, 1/6/08 1:17 PM
25.	250	Sat, 1/5/08 1:54 PM
26.	160	Wed, 1/2/08 2:31 PM
27.	150	Sun, 12/30/07 11:52 AM
28.	45	Wed, 12/26/07 9:26 AM
29.	150	Tue, 12/25/07 1:00 PM
30.	500	Sat, 12/22/07 1:19 PM
31.	127	Wed, 12/19/07 10:40 PM
32.	110	Mon, 12/17/07 1:49 PM
33.	350	Mon, 12/17/07 1:34 PM
34.	21	Mon, 12/17/07 1:17 PM
35.	105	Sat, 12/15/07 9:58 AM
36.	200	Fri, 12/14/07 8:29 AM
37.	40	Mon, 12/10/07 11:36 AM

38. 350	Tue, 11/20/07 2:40 PM
39. 270	Sat, 11/17/07 3:52 PM
40. 120	Fri, 11/16/07 12:19 PM
41. 679	Thu, 11/15/07 6:59 PM
42. 20	Thu, 11/15/07 6:02 AM
43. 150	Wed, 11/14/07 4:17 PM
44. 75	Wed, 11/14/07 3:45 PM
45. 50	Wed, 11/14/07 1:16 PM
46. 70	Tue, 11/13/07 7:02 PM
47. 30	Tue, 11/13/07 11:26 AM
48. 25	Mon, 11/12/07 11:59 PM
49. 33	Mon, 11/12/07 11:18 PM
50. 635	Sat, 11/10/07 10:24 PM
51. 0	Sat, 11/10/07 9:48 PM
52. 55	Sat, 11/10/07 7:12 AM
53. 125	Fri, 11/9/07 10:22 PM
54. 215	Fri, 11/9/07 4:56 PM
55. 160	Fri, 11/9/07 4:08 PM
56. 250	Fri, 11/9/07 3:02 PM
57. 80	Fri, 11/9/07 2:50 PM
58. 300	Fri, 11/9/07 10:44 AM
59. 6500	Fri, 11/9/07 10:38 AM
60. 90	Fri, 11/9/07 10:19 AM
61. 50	Fri, 11/9/07 9:13 AM
62. 360	Fri, 11/9/07 6:25 AM

Question 61 “Please specify” Responses

Comment Text	Response Date
1. 1 million	Tue, 1/15/08 1:24 PM
2. 750,000	Sun, 1/6/08 1:17 PM
3. about 500,000	Sat, 12/22/07 1:20 PM
4. 4 million	Wed, 12/19/07 10:40 PM
5. 650,000	Tue, 11/20/07 2:41 PM
6. Miami	Thu, 11/15/07 6:02 AM
7. I don't know - Austin	Fri, 11/9/07 2:51 PM

60. Which of the following best describes where your school is located?			
		Response Percent	Response Count
Urban (less than 25 miles from a city with a population greater than 100,000)		42.2%	27
Rural (greater than 25 miles from a city with a population greater than 100,000)		**57.8%**	37
	answered question		**64**
	skipped question		**16**

61. Which of the following best describes the population size of your urban city?			
		Response Percent	Response Count
Less than 10,000		3.7%	1
10,000-50,000		18.5%	5
50,000-100,000		**33.3%**	9
100,000-250,000		18.5%	5
Greater than 250,000 (please specify)		25.9%	7
	answered question		**27**
	skipped question		**53**

62. Which of the following best describes the population size of your rural town or city?	Response Percent	Response Count
Less than 1,000	8.3%	3
1,000-20,000	**50.0%**	18
20,000-40,000	19.4%	7
40,000-60,000	19.4%	7
60,000-80,000	2.8%	1
More than 80,000 (please specify)	0.0%	0
	answered question	**36**
	skipped question	**44**

63. What is the average teacher to student ratio in the science classes you teach?	Response Percent	Response Count
1:9 or less (one teacher for every 1 to 9 students or less)	4.9%	3
Between 1:10 and 1:15 (one teacher for every 10 to 15 students)	9.8%	6
Between 1:16 and 1:21 (one teacher for every 16 to 21 students)	19.7%	12
Between 1:22 and 1:27 (one teacher for every 22 to 27 students)	**41.0%**	25
Between 1:28 and 1:33 (one teacher for every 28 to 33 students)	24.6%	15
Between 1:34 and 1:39 (one teacher for every 34 to 39 students)	0.0%	0
Greater than 1:39 (one teacher for every 40 or more students)	0.0%	0
	answered question	**61**
	skipped question	**19**

64. What is your gender?	Response Percent	Response Count
Female	83.3%	55
Male	16.7%	11
answered question		66
skipped question		14

65. Please select the word that best describes your ethnicity.	Response Percent	Response Count
American Indian/Alaska Native	3.1%	2
Asian/Pacific Islander	1.6%	1
Black	4.7%	3
Hispanic	1.6%	1
White	89.1%	57
Other (please specify)	0.0%	0
answered question		64
skipped question		16

66. Counting this year, how many years in total (include part-time teaching) have you taught at either the elementary or secondary level?

	Response Percent	Response Count
2 years or less	6.2%	4
3-5 years	**16.9%**	11
6-8 years	15.4%	10
9-11 years	10.8%	7
12-14 years	10.8%	7
15-17 years	13.8%	9
18-20 years	6.2%	4
21-23 years	12.3%	8
24-26 years	1.5%	1
27 years or more	6.2%	4
	answered question	65
	skipped question	15

67. What grade level do you currently teach? (Please only select one)

	Response Percent	Response Count
Elementary School	14.1%	9
Middle School/Junior High	**42.2%**	27
High School	35.9%	23
Other (please specify)	7.8%	5
	answered question	64
	skipped question	16

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Question 67 "Please specify" Responses

Comment Text	Response Date
1. work as a Sea Grant extension agent	Tue, 1/22/08 10:43 PM

2. community college	Mon, 12/10/07 11:37 AM
3. none	Sat, 11/10/07 9:49 PM
4. Junior College	Fri, 11/9/07 1:23 PM
5. 8-12	Fri, 11/9/07 10:21 AM

Question 68 "In which state do you currently reside?' Responses

	Comment Text	Response Date
1.	Florida	Fri, 2/15/08 2:33 PM
2.	Alabama	Wed, 1/30/08 6:42 PM
3.	Florida	Tue, 1/29/08 1:36 PM
4.	alabama	Mon, 1/28/08 10:04 PM
5.	Florida	Tue, 1/22/08 10:44 PM
6.	TX	Tue, 1/22/08 12:01 AM
7.	MS	Sun, 1/20/08 5:05 PM
8.	Louisiana	Fri, 1/18/08 2:21 PM
9.	Alabama	Thu, 1/17/08 11:35 PM
10.	AL	Thu, 1/17/08 9:47 PM
11.	louisiana	Wed, 1/16/08 9:20 PM
12.	Florida	Wed, 1/16/08 8:02 PM
13.	Louisiana	Wed, 1/16/08 9:10 AM
14.	Alabama	Tue, 1/15/08 9:54 PM
15.	Florida	Tue, 1/15/08 8:21 PM
16.	Florida	Tue, 1/15/08 6:51 PM
17.	Louisiana	Tue, 1/15/08 5:58 PM
18.	Mississippi	Tue, 1/15/08 5:23 PM
19.	Florida	Tue, 1/15/08 4:01 PM
20.	LA	Tue, 1/15/08 2:51 PM
21.	Alabama	Tue, 1/15/08 1:25 PM
22.	Mississipppi	Wed, 1/9/08 12:52 PM
23.	Louisiana	Wed, 1/9/08 12:46 PM
24.	Louisiana	Wed, 1/9/08 12:34 PM
25.	texas	Sun, 1/6/08 1:21 PM
26.	Mississippi	Sat, 1/5/08 1:59 PM
27.	Alabama	Wed, 1/2/08 2:33 PM
28.	Mississippi	Sun, 12/30/07 11:54 AM
29.	Texas	Wed, 12/26/07 9:27 AM
30.	Alabama	Tue, 12/25/07 1:02 PM

31.	Florida	Sat, 12/22/07 1:22 PM
32.	TX	Wed, 12/19/07 10:41 PM
33.	Mississippi	Mon, 12/17/07 1:53 PM
34.	Florida	Mon, 12/17/07 1:36 PM
35.	AL	Mon, 12/17/07 1:18 PM
36.	Alabama	Sat, 12/15/07 9:59 AM
37.	Alabama	Fri, 12/14/07 8:31 AM
38.	MS	Mon, 12/10/07 11:37 AM
39.	Texas	Tue, 11/20/07 2:43 PM
40.	Alabama	Sat, 11/17/07 3:54 PM
41.	Alabama	Fri, 11/16/07 12:20 PM
42.	Louisiana	Thu, 11/15/07 7:01 PM
43.	Florida	Thu, 11/15/07 6:04 AM
44.	Florida	Wed, 11/14/07 4:19 PM
45.	mississippi	Wed, 11/14/07 3:46 PM
46.	alabama	Wed, 11/14/07 1:17 PM
47.	louisiana	Tue, 11/13/07 7:04 PM
48.	NEW YORK	Tue, 11/13/07 11:27 AM
49.	Louisiana	Tue, 11/13/07 12:00 AM
50.	Mississippi	Mon, 11/12/07 11:22 PM
51.	Louisiana	Sat, 11/10/07 10:26 PM
52.	Alabama	Sat, 11/10/07 9:49 PM
53.	Florida	Sat, 11/10/07 7:13 AM
54.	Louisiana	Fri, 11/9/07 10:23 PM
55.	Alabama	Fri, 11/9/07 4:57 PM
56.	Alabama	Fri, 11/9/07 4:09 PM
57.	Alabama	Fri, 11/9/07 3:11 PM
58.	Texas	Fri, 11/9/07 2:52 PM
59.	Alabama	Fri, 11/9/07 1:24 PM
60.	Louisiana	Fri, 11/9/07 10:45 AM
61.	Louisiana	Fri, 11/9/07 10:41 AM
62.	LA	Fri, 11/9/07 10:22 AM
63.	Alabama	Fri, 11/9/07 9:14 AM
64.	AL	Fri, 11/9/07 6:26 AM

Question 69 “Please explain” Responses

Comment Text	Response Date

1.	I am working on a 5th year program presently. In the private school where I taught, you did not have to have certification.	Wed, 1/30/08 6:42 PM
2.	Ph.D.	Mon, 12/10/07 11:37 AM
3.	certificate (K-12) in music is expired, teach homeschool and 4H	Thu, 11/15/07 6:04 AM
4.	National Board Certified Teacher	Sat, 11/10/07 10:26 PM

68. In which state do you currently reside?		
		Response Count
		64
	answered question	64
	skipped question	16

69. What type of teaching certificate do you have in this state in your main assignment field? (please check only one)			
		Response Percent	Response Count
Regular or standard state certificate		87.5%	56
Probationary state certificate		0.0%	0
Alternate route certificate		6.3%	4
Temporary, provisional, or emergency state certification		1.6%	1
Certification by an accreditation body other than the state		1.6%	1
I don't have a certificate in my main assignment field		3.1%	2
		Please explain	4
	answered question		64
	skipped question		16

70. What science discipline(s) are you certified/endorsed to teach? (check all that apply)	Response Percent	Response Count
Biology, A.P. Biology	**50.8%**	32
Chemistry, A.P. Chemistry	23.8%	15
Physics, A.P. Physics	15.9%	10
Earth Science	42.9%	27
Integrated Science/General Science	**50.8%**	32
Environmental Science	42.9%	27
Marine Science	30.2%	19
Other (please specify)	31.7%	20
	answered question	**63**
	skipped question	**17**

71. Are you Nationally Board Certified?	Response Percent	Response Count
Yes	8.1%	5
No	**82.3%**	51
Currently in the certification process	9.7%	6
	answered question	**62**
	skipped question	**18**

Question 70 "Please specify" Responses

	Comment Text	Response Date
1.	i am elementary, so nothing specific	Sun, 2/3/08 10:54 AM

2.	SPED	Wed, 1/16/08 9:20 PM
3.	mathematics 5-8	Tue, 1/15/08 6:51 PM
4.	Elementary	Tue, 1/15/08 4:01 PM
5.	I am not specifically endorsed to teach science, my certificate allows me to teach grades K-8, which means I could teach general Science in those grade levels.	Sat, 1/5/08 1:59 PM
6.	Elementary sixth grade	Wed, 1/2/08 2:33 PM
7.	Elementary	Tue, 12/25/07 1:02 PM
8.	Integrated Curriculum and gifted	Sat, 12/22/07 1:22 PM
9.	K-6	Mon, 12/17/07 1:36 PM
10.	Elementary	Mon, 12/17/07 1:18 PM
11.	Forensic Science	Fri, 12/14/07 8:31 AM
12.	Any science 6-12	Tue, 11/20/07 2:43 PM
13.	Social Studies 7-12	Thu, 11/15/07 7:01 PM
14.	see above	Thu, 11/15/07 6:04 AM
15.	Technology and Spanish Language	Tue, 11/13/07 11:27 AM
16.	Elementary Science	Mon, 11/12/07 11:22 PM
17.	General Physical Science	Fri, 11/9/07 4:57 PM
18.	All sciences	Fri, 11/9/07 4:09 PM
19.	Physical	Fri, 11/9/07 10:45 AM
20.	1-8 elementary, businsess	Fri, 11/9/07 10:22 AM

Question 72 "Please specify" Responses

	Comment Text	Response Date
1.	American Educators Association	Thu, 1/17/08 9:47 PM
2.	FAST	Tue, 1/15/08 4:01 PM
3.	NABT	Tue, 1/15/08 1:25 PM
4.	Science teachers of Texas (CAST)	Sun, 1/6/08 1:21 PM
5.	Mississippi Science Teachers Association	Sun, 12/30/07 11:55 AM
6.	MS science teachers association	Mon, 12/17/07 1:54 PM
7.	Delta Kappa Gamma	Mon, 12/17/07 1:36 PM
8.	Miss. Science Teachers, Miss. Academy of Science	Mon, 12/10/07 11:38 AM
9.	LSTA	Thu, 11/15/07 7:01 PM
10.	LSTA, LTCM, APEL, LEA	Tue, 11/13/07 7:04 PM
11.	Miss. Assoc. of Professional Educators; SAME; and Miss. Science Teachers Assoc.	Mon, 11/12/07 11:24 PM
12.	LSTA	Fri, 11/9/07 10:23 PM
13.	ASTA	Fri, 11/9/07 3:12 PM

72. Please check all professional teacher organizations in which you are currently an active member.	Response Percent	Response Count
AACE (Association for the Advancement of Computing in Education)	0.0%	0
NCTE (National Council of Teachers of English)	1.9%	1
NCTM (National Council of Teachers of Mathematics)	3.8%	2
NCSS (National Council for the Social Sciences)	1.9%	1
NEA (National Education Association)	39.6%	21
NMEA (National Marine Educators Association)	24.5%	13
NSTA (National Science Teachers Association)	**67.9%**	36
Other (please specify)	26.4%	14
	answered question	53
	skipped question	27

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73. What is the highest academic degree you hold?	Response Percent	Response Count
High school diploma	0.0%	0
Associate's degree/vocational certification	0.0%	0
Bachelor's degree	33.8%	22
Master's degree	**49.2%**	32
Education Specialist's or professional diploma based on at least one year's work past Master's degree	6.2%	4
Doctorate (Ed.D. or Ph.D.)	3.1%	2
Other (please specify)	7.7%	5
	answered question	**65**
	skipped question	**15**

Question 73 "Please specify" Responses

	Comment Text	Response Date
1.	BS + 40 grad. hrs.	Tue, 1/15/08 5:24 PM
2.	working on masters	Tue, 1/15/08 2:52 PM
3.	M.S. and M. A. Ed.	Tue, 1/15/08 1:27 PM
4.	almost finished with masters in integrated science	Wed, 12/26/07 9:28 AM
5.	MA +30	Fri, 11/9/07 10:46 AM

Question 74 "Please specify" Responses

	Comment Text	Response Date
1.	Audobon	Fri, 2/15/08 2:34 PM
2.	Current (NMEA's publication)	Tue, 1/29/08 1:37 PM
3.	National Geographic Popular Science, Scientific American	Sat, 12/22/07 1:23 PM
4.	use the library	Mon, 12/10/07 11:38 AM
5.	BioScience	Fri, 11/16/07 12:22 PM
6.	Eutopia, technoloogy weeks	Tue, 11/13/07 11:28 AM
7.	none	Fri, 11/9/07 10:46 AM

74. Do you have a current subscription to any of the following scientific or science education journals?	Response Percent	Response Count
American Biology Teacher	8.3%	3
Discover	**52.8%**	19
International Journal of Science Education	0.0%	0
Journal of Research in Science Teaching	2.8%	1
Journal of Science Education and Technology	5.6%	2
Nature	11.1%	4
Science	5.6%	2
Scientific American	22.2%	8
Science Teacher	27.8%	10
The Electronic Journal of Science Education	2.8%	1
The Journal of Science Teacher Education	2.8%	1
The Science Educator	8.3%	3
Other (please specify)	19.4%	7
	answered question	**36**
	skipped question	**44**

75. Is it difficult for you to stay current with the latest science research?	Response Percent	Response Count
Yes	**58.5%**	38
No	41.5%	27
	answered question	**65**
	skipped question	**15**

76. Is it difficult for you to find time to stay current with the latest science research?		
	Response Percent	Response Count
Yes	75.4%	49
No	24.6%	16
	answered question	65
	skipped question	15

77. Do you believe it is difficult to interpret findings of the latest scientific research?		
	Response Percent	Response Count
Yes	36.9%	24
No	63.1%	41
	answered question	65
	skipped question	15

APPENDIX F

SUMMARY OF SIGNIFICANT CORRELATIONS BY INDEPENDENT VARIABLE

AND SIGNIFICANT CORRELATIONS IN THE DATA

Summary of Significant Correlations for Independent Variable Groups

Independent Variable	Significant Pearson Correlation	Explanation
Teacher Demographics	Frequency of Lesson Plan Use and Years of Teaching Experience r =.295, n=57, p<.05	More teaching experience was associated with higher frequency of lesson plan use.
	Frequency of Lesson Plan Use and Grade Level Taught r = -.319, n=56, p<.05	Teaching a higher grade level was associated with lower frequency of use of lesson plans.
	Teachers' Degree and Years of Teaching Experience r = .270, n=65, p<.05	Greater teaching experience was associated with higher levels of teacher education as defined by the number of degrees that teacher holds.
	Frequency of Lesson Plan Use and Science Journals r=-.401, n=33, p<.05	Teachers who use lesson plans more frequently subscribe to a larger number of scientific or science education journals.
	Discipline(s) Certified to Teach and Grade Level Taught r= -.268, n=62, p<.05	The higher the grade level that the teacher teaches is associated with a larger number of areas in which they are endorsed.
School Demographics	Administrative Support and Frequency of Lesson Plan Use r=.267, n=57, p<.05	Teachers who perceived having strong support from their administrators to attend the COSEE:CGOM Institute were associated with those teachers who reported higher frequency of use of lesson plans.
	Type of School (Public vs. Private) and Number of Students Served r=-.371, n=62, p<.01	Public schools had a strong association with larger number of students served
	Number of Students Served and Students Served in Each Grade r=.286, n=61, p<.05	The larger the number of students reported in each grade was associated with a larger number of students reported per grade level.
	Type of School (Public vs. Private) and Teacher to Student Ratio r=-.474, n=61, p<.01	Private schools had significant association with having a lower teacher to student ratio.
	Teacher to Student Ratio and Students Served in Each Grade	The larger the number of students per teacher strongly correlated

	r=.332, n=59, p<.05	with the larger number of students served in the grade.
Available Resources	Computer in Room and Instructional Materials r=.285, n=64, p<.05	Teachers who reported that they had at least one computer in their room also reported they had the instructional materials they needed for their classroom.
	All Students Have Access to a Computer and Number of Student Computers in the Room r=-363, n=51, p<.01	Teachers who reported having enough computers in the classroom for all students strongly correlated with teachers reporting larger number of student computers in their room.
	Resources to Implement and Instructional Materials r=.477, n=61, p<.01	Teachers who reported having the resources to implement lesson plans were associated with perceptions of receiving all or most of the instructional materials they needed.
	All Students Have Access to a Computer and Students Have Access to the Internet r=.279, n=59, p<.05	Teachers who reported having student access to computers in their room had a positive linear relationship with teachers who reported having access to the Internet for student computers.
	Money Allotted for Classroom and Science Budget r=-.348, n=56, p<.01	Teachers who reported having a science budget had a positive linear relationship with teachers who reported a larger amount of money allotted for their classroom.
Opportunities for Use	Teaching Same Science Classes and Teaching the Same Grade r=.633, n=74, p<.01	Teachers who reported teaching the same science classes(s) now that they taught when they attended the COSEE:CGOM Institute had a strong correlation with those teachers who reported teaching the same grade.
	Frequency of Lesson Plan Use and Science Classes Use r=-.289, n=56, p<.05	Teachers who reported using the lesson plans more frequently were strongly associated with teachers who reported being able to use the lesson plans in more than one class they taught.
	State Attended and PowerPoint®	Teachers who attended a

	Use r=-.283, n=68, p<.05	COSEE:CGOM Institute in more than one state also reported using at least one PowerPoint® presentation.
	Science Classes Taught and Different Science Classes r=.239, n=70, p<.05	Those teachers who reported teaching a larger number of science classes also reported a larger number of different science classes taught.
	Science Classes Taught and Science Classes Use r=-.326, n=68, p<.01	Teachers who reported teaching larger numbers of science classes also reported being able to use the COSEE:CGOM lesson plans in multiple classes.
	PowerPoint® Multiple Use and PowerPoint® Use r=.660, n=31, p<.01	Teachers that reported using the PowerPoint® presentations more than one time, also reported using them more times per year.
Time Elapsed	Frequency of Lesson Plan Use and Time Elapsed None found	The length of time since the participant attended the COSEE:CGOM Institute was not related to teacher frequency of use of lesson plans in the classroom.

Significant Correlations in the Data

	Freq2	Years Teaching	National Board	Public vs. Private	Students in Grade	Instructional Materials	Science Budget	Teaching Same Grade	State Attended	Used PP Multiple Times
Years Teaching	.295*									
Grade Level	-.319*									
National Board		-.292*								
Teacher's Degree		.270*								
Teacher's Certificate			.288*							
Students Served				-.371*	.286*					
Teacher:Student Ratio				-.474**						
Computer						.285*				
Resources to Implement						.477**				
Money Allotted							-.348**			
Same Science Class								.633**		
PowerPoint® presentations Used									-.283*	
Times per year PP Used										.660**

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

APPENDIX G

ALIGNMENT OF RESEARCH QUESTIONS WITH

SURVEY AND INTERVIEW QUESTIONS

Alignment of Research Questions with Survey and Interview Questions

Research Question	Survey # used to answer research question	Data Analysis Procedure	Interview protocol section used to answer research question	Data Analysis Procedure
1) How do teachers perceive and use COSEE:CGOM lesson plans and/or online teaching resources and how frequently do they use them?	9, 10, 13, 15, 16, 17, 18, 19, 20, 21, 26, 33, 34, 35, 46, 47, 48, 49, 50	Frequency calculated from answers to survey; assigned high or low-logistic regression analysis; list purposes used	Lesson plans implementation, ease of use, support from school, and support from district sections	List answers to interview questions; collect archival data
Online teaching resources portion of question 1	11,12, 14, 22, 23, 24, 25, 36, 37, 39, 40, 41, 42, 43,	Analyses of online resources survey items; logistic regression for Likert scale items	Lesson plans and online discussion board sections	Collect archival data with presentations teachers have used; summarize teacher responses to interview questions
2) How do teachers value their participation in the COSEE:CGOM Institutes where they actively collaborate with research scientists, and in what ways do teachers incorporate into the science curricula knowledge gained from this partnership?	51, 52, 74, 75, 76, 77	Logistic regression for Likert scale items; listing of answers to survey questions	Collaboration with scientists section	List answers to interview questions; archival data to support answers (sample lesson plans, evaluation)

Research Question	Survey # used to answer research question	Data Analysis Procedure	Interview protocol section used to answer research question	Data Analysis Procedure
3) How do teachers perceive their peer-teaching experience, and what do they believe each party gains from the experience?	31, 32, 51, 53, 72	Logistic regression for Likert scale items; list answers from survey	Peer-teaching section	List answers from interview questions; collect information about professional development in-service