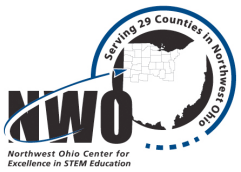
USE-IT

Uniting Science Education, Inquiry and Technology

Final Evaluation Report

May 2011



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EXECUTIVE SUMMARY

USE-IT (Uniting Science Education, Inquiry, and Technology) is a teacher professional development project designed and implemented by the Northwest Ohio Center for Excellence in STEM Education (NWO) and funded by The Martha Holden Jennings Foundation. The focus of USE-IT is on improving the quality of science and technology instruction for teachers in northwest Ohio. This was accomplished by providing professional development about the ways in which several kinds of educational technology could be used to teach science. USE-IT was developed based on five goals:

1. Expose teachers to new ways of exploring science content and effective methods of inquiry science instruction.
2. Raise teachers' comfort level in teaching science using inquiry science methods and technology software and hardware.
3. Integrate technology and science content to increase opportunities for differentiated science instruction.
4. Promote the use of research-based best practices and collaboration in science and technology teaching in northwest Ohio classrooms consistent with local, state, and national standards.
5. Increase student and teacher time with science and technology in the classroom.

USE-IT activities were evaluated regarding the success of their implementation and their impact on participating teachers. The evaluation of the project activities were guided by the following questions:

1. How successfully were the project activities implemented?
2. What is the quality of the professional development provided to the teachers?
3. To what extent do teachers implement the knowledge and resources gained during the project in their classroom?
4. What is the impact of the project activities on teachers and their teaching, including their beliefs and behaviors regarding science teaching and educational technology?

In order to answer the evaluation questions, quantitative and qualitative data were collected from the USE-IT staff and participating teachers. Session attendance data,

professional development observation data, and survey data were collected throughout the project.

The implementation of the USE-IT activities was found to be mostly successful according to the session attendance records, session descriptions, and session evaluations. The professional development sessions were also found to be valuable according to the session observations and session evaluations. The facilitators used inquiry-based methods to demonstrate and guide the exploration of several types of educational technology. In addition, the teachers' responses and comments to the session evaluation surveys demonstrated that USE-IT was successful in implementing activities that were well organized, engaging, and applicable to the teachers' classrooms.

Teachers' evaluation responses indicated that the knowledge and resources gained during the project were implemented in the teachers' classroom in different ways. Some teachers could not use the websites created during the project due to restrictions at their school. Overall, it seemed that the websites did not provide an effective venue to implement the technologies addressed during the project. However, the teachers' evaluation responses indicated that the introduction of knowledge and resources from USE-IT resulted in classroom lessons that were more interactive and student-centered.

The impact of the project was measured by teachers' responses to the Teacher Beliefs Instrument (TBI) and the Technology Attitudes and Usage Survey. The results of the TBI demonstrate that after USE-IT, teachers believed reform-based science instructional strategies to be more important, and felt more prepared to use the strategies than before the project. Teachers did not improve their self-efficacy or outcome expectancy beliefs regarding science teaching, nor did they more frequently use reform-based strategies after the project than before.

The results of the Technology Attitudes and Usage survey demonstrate that after participating in USE-IT, teachers 1) felt more self-efficacious about integrating technology in their classroom, 2) were more familiar with the technology addressed during the project, 3) used the technology addressed during the project with greater frequency, 4) felt more prepared to use the technology addressed during the project, 5) used technology integration and 21st century learning strategies with greater frequency, and 6) felt more prepared to use technology integration and 21st century learning strategies.

Throughout the project, teachers expressed their excitement and gratitude about the opportunities to learn about and use the instructional technologies that were explored during USE-IT. However, based on the project's findings, there are several considerations that should be made if the project is to be replicated in the future. The following recommendations are made based on the teachers' comments and suggestions and this author's analyses:

- Make curricular and instructional decisions regarding the content of the project based on teachers' previous experience and current needs.
- Provide more structured examples regarding the use of technology for science teaching.
- Allow teachers more time to explore the technologies that are being addressed, specifically in how they could be used in the classroom.
- Continue to allow teachers to "share out" at each of the monthly sessions.

INTRODUCTION

This report will describe the activities and findings of the USE-IT (Uniting Science Education, Inquiry, and Technology) project that ran from September 2010 to April 2011. After a brief overview of the project activities and evaluation methods, this report will describe the findings regarding the implementation and impact of the project activities on the participating teachers. This report will conclude with several recommendations for future iterations of USE-IT and similar projects.

OVERVIEW OF USE-IT

PROJECT SUMMARY

USE-IT is a teacher professional development project designed and implemented by the Northwest Ohio Center for Excellence in STEM Education (NWO) and funded by The Martha Holden Jennings Foundation. The project was initially funded in 2009, and was funded again in 2010. The focus of USE-IT is on improving the quality of science and technology instruction for teachers in northwest Ohio. This is accomplished by providing professional development about the ways in which several kinds of educational technology can be used to teach science. The USE-IT project has four goals:

1. Expose teachers to effective methods of science and technology instruction
2. Elicit positive beliefs and behaviors about teaching using reform-based science teaching strategies and instructional technology
3. Demonstrate and encourage the integration of technology in science lessons
4. Promote the use of research-based best practices and collaboration in science and technology teaching in northwest Ohio classrooms consistent with local, state, and national standards.

The project activities included seven professional development sessions that took place once a month from September to April in conjunction with the NWO Inquiry Series, a professional development opportunity for K-12 STEM (Science, Technology, Engineering, and Mathematics) teachers, administrators, and undergraduate students in northwest

Ohio. The Inquiry Series includes several sessions regarding STEM teaching and learning that participants can choose to attend. (For more information, visit www.nwocenter.org/inquiryseries.) Teachers were recruited to participate in USE-IT via a series of e-mail blasts in September of 2010. The professional development sessions were conducted during the school year concurrently with the other sessions of the Inquiry Series.

The USE-IT sessions were facilitated by two staff members from WGTE Public Media, a public television and radio broadcasting station in Toledo, Ohio. In addition to producing and broadcasting educational programs, WGTE also regularly offers professional development in technology for teachers in northwest Ohio and southeast Michigan. In addition to the instruction provided by WGTE, several guest speakers were asked to facilitate activities about different kinds of educational technology.

EVALUATION SUMMARY

USE-IT activities were evaluated regarding the success of their implementation and their impact on participating teachers. The evaluation of the project activities were guided by the following questions:

1. How successfully were the project activities implemented?
2. What is the quality of the professional development provided to the teachers?
3. To what extent do teachers implement the knowledge and resources gained during the project in their classroom?
4. What is the impact of the project activities on teachers and their teaching, including their beliefs and behaviors regarding science teaching and educational technology?

In order to answer the evaluation questions, quantitative and qualitative data were collected from the USE-IT staff and participating teachers. Session attendance data, professional development observation data, and survey data were collected throughout the project.

Attendance data were collected at each professional development session to document the number of teachers that received professional development each month.

The evaluator conducted two professional development observations during the project. The first observation was conducted in person during the December 2010 session. The second observation was conducted via video recording during the March 2011 session.

Three on-line surveys were administered to the participating teachers. The Teacher Beliefs Instrument (TBI) and the Technology Attitudes and Usage Survey were administered before and after USE-IT (in September and April, respectively). The Inquiry Series Evaluation Survey was administered every month after the Inquiry Series. Detailed information about each on-line survey follows.

The TBI consists of two sections. (See Appendix A for the Teacher Beliefs Instrument.) The first section measures teachers' self-efficacy and outcome expectancy beliefs regarding science teaching. Some examples of items from the first section include, "I know the steps necessary to teach science concepts effectively," and "The inadequacy of a student's science background can be overcome by good teaching". The items in this section are measured on a five-point scale, with 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

The second section lists several teaching strategies and asks teachers to rate their perceptions of the importance of the strategies, their preparedness to use the strategies, and the frequency with which they use the strategies. Some examples of the teaching strategies include, "Have students make connections between science and other disciplines," and "Ask students to explain science concepts to one another". The items in this section are measured on three different four-point scales, one for each sub-scale (i.e., importance, preparedness, frequency). The measurement scales for the second section are as follows:

Frequency

1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Frequently

Importance

1 = Not Important, 2 = Somewhat Important, 3 = Important, 4 = Very Important

Preparedness

1 = Not Prepared, 2 = Somewhat Prepared, 3 = Prepared, 4 = Very Prepared

The Technology Attitudes and Usage Survey consists of three sections. The first section measures teachers' self-efficacy beliefs about using technology in the classroom. Some examples of items from this section include, "I am continually finding better ways to use technology in my classroom," and "I find it difficult to help students who have trouble using technology in my classroom". The items in this section are measured on a five-point scale, with 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

The second section lists several instructional technologies and asks teachers to rate a) how *familiar* they are with the technology, b) how *frequently* they use the technology, and c) how *prepared* they feel using the technology. Some examples of the instructional technologies included in this section are Google sites, Professional Learning Networks, and Skype. The items in this section are measured on three different four-point scales, one for each sub-scale (i.e., familiarity, frequency, and preparedness). The measurement scales for the second section are as follows:

Familiarity

1 = Not Familiar, 2 = Somewhat Familiar, 3 = Familiar, 4 = Very Familiar

Frequency

1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Frequently

Preparedness

1 = Not Prepared, 2 = Somewhat Prepared, 3 = Prepared, 4 = Very Prepared

The third section lists several strategies to integrate technology and 21st century learning into the classroom. Teachers are asked to rate how *frequently* they use the strategies, and how *prepared* they feel to use the strategies. Some examples of items from this section include, "Have students use technology to complete collaborative learning tasks," and "Facilitate learning activities that foster 21st century skills". The items in this section are measured on two different four-point scales that correspond to the scales used for the frequency and preparedness sub-scales of the second section (see the box above). (See Appendix B for the Technology Attitudes and Usage Survey.)

The Inquiry Series Evaluation Survey consists of several items that measure teachers' perceived value of the Inquiry Series session they attended. (See Appendix C for the Inquiry Series Evaluation Survey.) The items are measured on a four-point scale, with 1 = Disagree, 2 = Somewhat Disagree, 3 = Somewhat Agree, and 4 = Agree. Some examples of the items include, "The session was engaging," and "The content/information presented during the session was valuable to me".

EVALUATION FINDINGS

How successfully were the project activities implemented?

The extent to which the project activities were successfully implemented was determined by analyzing data collected from project registration information, the session attendance sheets and professional development session descriptions. For the purposes of this report, successful project implementation consists of: 1) enrolling 24 science teachers from various northwest Ohio school districts, 2) providing seven professional development sessions that are attended by at least 90% of the participating teachers, and 3) providing professional development about several types of educational technology and 21st century skills. This definition of implementation is meant to be superficial in that it does not address the quality or impact of the project – those issues are addressed by the remaining evaluation questions. The definition is only meant to provide guidelines for determining the extent to which the project activities were carried out as initially planned.

The initial recruiting efforts were successful and resulted in the enrollment of 24 teachers from northwest Ohio at the start of the project. However, six teachers dropped out (stopped coming or never attended) over the course of the project. Two additional teachers were enrolled during the project to replace the teachers that dropped out. Therefore, by the end of the project, there were only 20 teachers actively enrolled in the project. Throughout the project, some teachers were technically still enrolled but were not attending professional development sessions; these teachers were not counted in the total enrollment numbers used for evaluation. Teachers were considered no longer actively enrolled on the first day that they stopped attending. For example, one teacher attended

the first three sessions, but did not come to the remaining sessions. Therefore, the total enrollment number, starting with the fourth session, is one less than before as a result of this teachers' withdrawal. Because of the removal and addition of several teachers throughout the project, active enrollment varied, with a low of 18 and a high of 22. Based on this information, it can be concluded that the enrollment aspect of the project was not successfully implemented, and future iterations of USE-IT should include safeguards against attrition.

Although the project staff had some difficulty keeping 24 teachers enrolled in the project, the teachers who remained enrolled throughout the project were from the targeted population of northwest Ohio science teachers, thereby meeting part of the enrollment objective. The 20 teachers who ultimately enrolled in USE-IT represented 10 different northwest Ohio public school districts, with 20% coming from Toledo Public Schools, a high-need urban school district. Most teachers taught grades K – 8, with 40% teaching one or more early elementary (K-4) grades and 50% teaching one or more middle elementary (5-8) grades. Only two of the teachers taught in a high school. Most (85%) of the teachers taught science, and many teachers taught other subjects as well, including math, language arts, and social studies.

The percentage of teachers in attendance at each professional development session was calculated by dividing the number of attending teachers by the total number of actively enrolled teachers. Table 1 illustrates the attendance numbers for each professional development session during the project. The attendance numbers demonstrate that the teachers who were actively enrolled in the project frequently attended the professional development sessions. The average percentage of teachers in attendance was 91.6%, which meets the 90% attendance objective set forth in the USE-IT evaluation plan.

Table 1. USE-IT Enrollment and Attendance

Month	Teachers Actively Enrolled	Teachers in Attendance	% of Teachers in Attendance
September	22	22	100
October	21	20	95
November	20	20	100
December	18	15	83
January	19	18	95
February	20	19	95
March	20	17	85
April	20	16	80
		Average % Attendance	91.6%

The professional development session descriptions provided by WGTE demonstrate that throughout the project, teachers received professional development about several different types of educational technology and 21st century skills. Therefore, this aspect of project implementation was successful. Table 2 includes a description of each professional development session.

The quality of the professional development provided to the teachers was determined by analyzing data collected from the professional development observations and the Inquiry Series Evaluation surveys.

The evaluator observed two professional development sessions (the December and March sessions) during the project. The objectives for the professional development sessions, as outlined in the USE-IT evaluation plan, were: 1) Session facilitators demonstrate how several forms of instructional technology can be used in science lessons, 2) Session facilitators demonstrate best practices in science and technology teaching through hands-on, inquiry-based professional development sessions, and 3) Professional development sessions are aligned to state and national standards. The quality of the professional development sessions was therefore determined based on these objectives.

During both of the observed professional development sessions, the facilitators effectively demonstrated the use of the educational technology that was being taught during that session. The facilitators demonstrated the use of the technology in two ways.

Table 2. Descriptions of the USE-IT professional development sessions

Month	Topic	Description
September	Integrating 21st Century Skills and Google Tools	Create your own iGoogle page and Google site to promote communication and collaboration among teachers, students, and parents.
October	Movie Making	Use student-created media to support learning goals and provide a real-world connection to classroom concepts! Each attendee receives a Flip Video Cam and we will help you craft a lesson that incorporates video and some of the other resources from past sessions.
November	Various Technology Topics	Teachers attended the NWO Symposium, which included dozens of educational technology sessions that the teachers could choose to attend.
December	More Google Site Extensions & Skype	Continue expanding your Google Site, integrate new media and build upon content and skills gained during previous sessions. Discover how you can turn your computer into an in-class video conference unit and connect your students to the world using Skype, a free download.
January	Google Docs: Collaboration in the Classroom	Word processing in the cloud! Using transferable skills, you will learn how to create documents and quizzes that are accessible to you and your students 24/7. Learn how to collaborate, making the Google Docs suite a natural for teacher to student or peer to peer collaboration.
February	Professional Learning Networks (PLNs)	Learn how to collect and organize information from your favorite teaching and learning sources and have them come to you through the use of RSS feeds and Google Reader, and your iGoogle page.
March	Google Earth	Like a video game and a search engine rolled into one, Google Earth lets you grab, spin and zoom down into any place on Earth. Explore the content rich layers in Google earth, discover special features, and learn how students can create their own tours.
April	Bringing It All Together	Showcase how you have integrated tech in your teaching. All attendees will share lessons learned and walk away with ideas, strategies and collaborative tools to continue engaging students with technology.

First, using the digital projector, the facilitators gave a mini-lecture about the features of the technology. The facilitators used PowerPoint slides and live computer demonstrations (the teachers could see what was happening on the facilitators' computer) to illustrate the features of the technologies and how they are used. Secondly, when teachers were given

"time to play" with the technology on their own computers, the facilitators walked around the room answering questions and walking teachers through certain aspects of the technology.

What is the quality of the professional development provided to the teachers?

Although the facilitators did successfully demonstrate the use of educational technology in general, there were not many in-depth demonstrations of how to use the technology in *science.* During the Google Earth session (March 2011), the facilitator mentioned several science topics for which Google Earth could be used (e.g., astronomy, ecology), but did not demonstrate or explain *how* Google Earth might be used to teach those science topics. During the Skype session (December 2010), there were no explicit connections made to science. Earlier in the Skype session, however, when teachers were "sharing out", a few teachers explained (and even showed on the projection screen) how they used their Flip Cams (which were given to teachers at the October session) to teach science. One teacher had video recorded students talking about science experiments, and another teacher had asked students to video record their outdoor investigation of biotic and abiotic objects.

Both of the observed professional development sessions were facilitated using inquiry-based, hands-on teaching methods. After learning about the basic features of the technology, teachers were given opportunities to explore the technology on their own. The facilitators guided some of the exploration, asking teachers to complete short tasks regarding particular aspects of the technology. Some of the exploration, on the other hand, was unstructured in that teachers could explore and use the technology however they wished. The facilitators also encouraged collaboration and communication among the teachers, who were often overheard discussing and explaining the technology to each other during exploration time.

The professional development sessions included content that was aligned to many Ohio Technology standards in grades 3 through 8, including the nature of technology, technology and society interaction, technology for productivity applications, and technology and communication applications. The content was also aligned to one scientific

inquiry standard, specifically the benchmark that requires students to "Organize and evaluate observations, measurements and other data to formulate inferences and conclusions". However, since science is supposed to be a major part of USE-IT, considerations should be made in the future to address more science standards.

The quality of the professional development was also determined by the teachers' responses on the Inquiry Series Evaluation surveys. The teachers were asked to complete the survey after each Inquiry Series session, resulting in a total of seven sets of teacher survey responses. The average response rate (calculated by dividing the number of responses by the total attendance) for the evaluation surveys was 81.7%. Mean scores were calculated for each survey item for each professional development session. Table 3 includes the teachers' combined survey responses to the Inquiry Series Evaluation surveys.

Table 3. Mean survey scores for each USE-IT professional development session

Survey Item	Month							Total Mean
	Sept. (n=25)	Oct. (n=17)	Dec. (n=12)	Jan. (n=21)	Feb. (n=13)	March (n=12)	April (n=11)	
The session was engaging	3.84	3.94	3.83	3.76	3.78	3.83	4.00	3.85
The content/information presented during the session was valuable to me	3.84	4.00	3.75	3.81	3.75	3.75	4.00	3.84
I learned something new from the session	3.96	3.94	3.83	3.81	3.75	4.00	4.00	3.90
I will incorporate the content/information from the session into my classroom lessons	3.90	4.00	3.83	3.71	3.67	3.92	3.91	3.85
Attending the session made me feel more excited about teaching science, technology, engineering, and/or math	3.39	3.87	3.91	3.78	3.46	4.00	4.00	3.77
Total	3.79	3.95	3.83	3.77	3.68	3.90	3.98	3.84

Note: 1 = Disagree, 2 = Somewhat Disagree, 3 = Somewhat Agree, 4 = Agree

Teachers' qualitative responses on the Inquiry Series Evaluation surveys were thematically analyzed using ATLAS.ti software. The themes that were identified in the survey data supported the observational data regarding the quality of the professional development sessions. The teachers perceived USE-IT to be valuable in terms of its

applicability to their classroom. Many teachers wrote about their plans to use the technology addressed during USE-IT in their classroom:

> *I found the USE-IT session to be very informative, and I want to incorporate all the new information into my own classroom.*
>
> *I'm pretty excited to use my FlipCam in the classroom.*
>
> *I loved the information on Skype! I hadn't thought of using it in my classes but will now!*
>
> *I loved the sharing of documents with Google documents, but was thrilled to learn about the questionnaire feature – I'll be using that right away!*
>
> *I love learning new technology and the way we can incorporate it into the classroom.*

The teachers' responses also indicated that the teachers liked the format of the sessions, with the facilitators modeling the use of the technology before the teachers were given time to try the technology on their own. Several teachers mentioned the benefits of the guidance provided by the facilitators, given the teachers' lack of experience with the technology being addressed.

There were contrasting views, however, regarding the appropriate pace of instruction. Some teachers thought the pace was comfortable, some reportedly wanted the facilitators to slow down, and others wanted the facilitators to speed up, or at least be given the opportunity to go ahead without having to wait for others to "catch up". Perhaps in future iterations of USE-IT, teachers' previous technology experience should be taken into consideration when planning the professional development sessions. The range of teacher perceptions is represented in the following examples:

> *I'm not very tech savvy. I appreciate the pace of the lesson and that someone was there to help me.*
>
> *The pace is very slow. Many teachers have some computer background to be able to spend more time working and less time listening to directions repeated.*
>
> *Pace was very good.*

One aspect of the professional development that the teachers perceived to be particularly valuable was the sharing of information and experiences among colleagues. A large portion of the last professional development session was devoted to "sharing out" about the teachers' experiences during the year. Many teachers wrote about the benefits provided by this practice, and suggested that more "share out" time should be incorporated into the project.

> *Seeing what other teachers were thinking and their challenges was helpful. We could problem solve together.*
>
> *The colleague share was the most helpful. More of this would be appreciated.*
>
> *I think it would be valuable to have "share out" time each week, and allow different people to share their favorite websites and tech ideas.*

To what extent do teachers implement the knowledge and resources gained during the project in their classroom?

The extent to which teachers implemented the knowledge and resources from USE-IT in their classroom was determined by analyzing data collected from the teachers' project website (Google site) and the Inquiry Series Evaluation Surveys, particularly the survey administered in April. This particular survey included two open-ended items (in addition to the "standard" Inquiry Series Evaluation survey items) regarding teachers' perceptions of the impact of USE-IT on their teaching, and the extent to which they used the knowledge and resources gained during the project in their classroom.

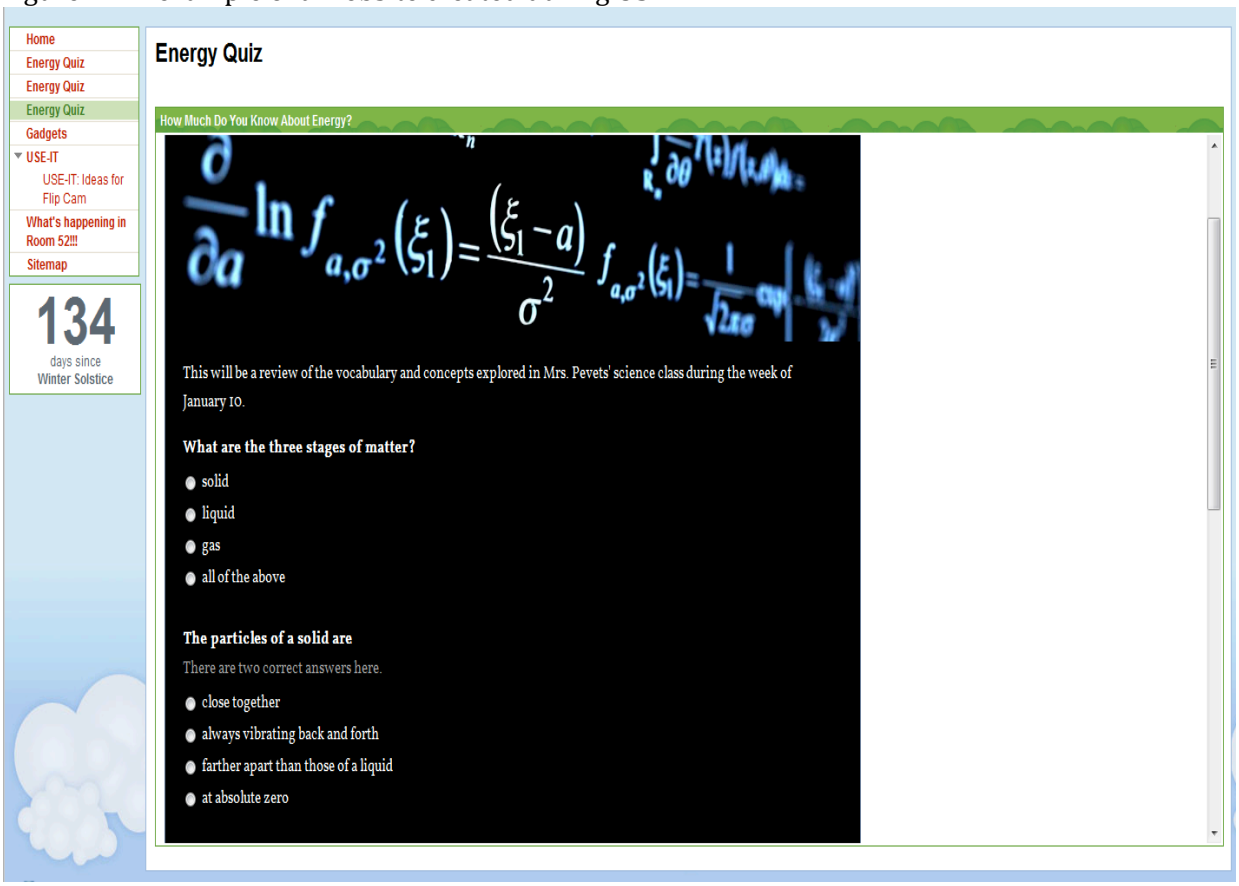
The teachers' Google sites were analyzed to determine how many and to what extent the technologies addressed during the project were incorporated into the websites. Throughout the project, the teachers were encouraged to add elements to the Google site they created in September. The facilitators encouraged them to include the technologies that were addressed each month (e.g., Google Docs, FlipCam video). Some of the teachers' websites can be seen at:

http://sites.google.com/site/mrsrobinsonscience/home

http://sites.google.com/site/jmastersr32/home

Figure 1 is a screenshot from one teacher's website that demonstrates the use of Google Docs in creating online assessments for his/her students.

Figure 1. An example of a website created during USE-IT



The websites were analyzed using a simple rubric comprised of checkboxes for each technology and a comment box to document how the technologies are incorporated and if there is any evidence of the technology being implemented in classroom activities. The results of teacher website analysis indicated that most teachers were not using the websites to implement concepts from the project. Most of the teachers' websites included some basic features, such as a sidebar and some gadgets, as well as a survey developed with Google Docs. There was little evidence that the teachers were using the website to

communicate with their students or incorporating the website into their classroom instruction.

In reaction to this finding, the evaluator asked the teachers to respond to the following question:

> *After looking through your websites, it seems as though many of you are not actively using them for teaching and learning purposes. What are your thoughts about using the Google sites throughout the project? What are the challenges and drawbacks to using the Google sites?*

The major challenges that teachers identified to using the Google sites were time constraints, limited or no access at school, and the current use of other websites. Many teachers reported liking the sites and seeing their potential, but lacking the time to update the site and implement it into their classroom. Some teachers reported that their school does not allow access to Google sites. As a result of their school filters, these teachers were not able to use the sites for instructional purposes. A few teachers mentioned that their school already uses other websites such as wikispaces and Moodle. Those teachers, therefore, did not want to duplicate their efforts in order to maintain their existing site as well as the Google site. Based on these responses, it is recommended that before the start of future iterations of USE-IT, teachers' needs and current website usage be assessed in order to determine the feasibility and value of using Google sites during the project.

The extent to which teachers implemented the knowledge and resources from USE-IT was also determined by analyzing the teachers' responses to the following question on the April Inquiry Series evaluation survey:

> *Please tell us about how you used the knowledge and resources from the Inquiry Series in your classroom. What successes and challenges did you have during the year? In what ways, if any, do you think that using Inquiry Series knowledge/resources improved your students' learning?*

The teachers' responses indicated that the introduction of knowledge and resources from USE-IT resulted in classroom lessons that were more interactive and student-centered. Many of the teachers reported using the FlipCams and Google Earth in their

science and math classes. Furthermore, a couple of teachers mentioned that they were "more willing to take chances" with using the technology after participating in USE-IT. One of teachers gave the following response regarding his/her application of USE-IT in the classroom (the response is not representative of all teacher responses, but instead represents the most comprehensive use of USE-IT resources):

> *My students are researching famous people and they used the web to help with the research. They will use Google Earth to investigate the location the person is from. We will also have Skype buddies which are from those locations (for example, Taiwan). We are also going to use Google Docs to create a "shared book" with a language school in Japan. We will write a page and illustrate it and then the kids in Japan will write a page and illustrate it. We can continue to do this back and forth until the book is completed.*

What is the impact of the project activities on teachers and their teaching, including their beliefs and behaviors regarding science teaching and educational technology?

The impact of the project activities on teachers and their teaching was determined by analyzing data collected from the TBI, the Technology Attitudes and Usage survey, and the Inquiry Series Evaluation surveys.

The teachers' beliefs and behaviors regarding science teaching were evaluated using the TBI, which was administered once in September 2010 and again in April 2011. Reliability analyses were conducted for each scale at each administration time, and the alpha coefficients indicated that the scales were all sufficiently reliable (> .70).

Dependent t-tests were conducted using the pre- and post-scores to determine the direction, magnitude, and statistical significance of the change in teachers' beliefs and behaviors regarding science teaching. Fourteen matching responses were included in the t-tests. The mean scores, t score, effect size, and reliability coefficients for each TBI scale are displayed below in Table 4.

Table 4. Summary of the Teacher Beliefs Instrument analyses

Scale	Pretest Mean (S.D.)	Posttest Mean (S.D.)	t	Effect Size	Pretest α	Posttest α
Self-efficacy	3.94 (0.48)	4.00 (0.63)	0.59	0.14	.87	.92
Outcome expectancy	3.61 (0.46)	3.69 (0.40)	0.92	0.19	.81	.67
Frequency	3.26 (0.37)	3.37 (0.42)	0.97	0.28	.93	.95
Importance	3.27 (0.39)	3.51 (0.37)	3.23**	0.63	.94	.93
Preparedness	2.74 (0.56)	3.07 (0.61)	2.76*	0.56	.97	.97

*Note: * p < .05, ** p < .01, effect sizes > .20 are considered small and > .50 are considered medium*

The results demonstrate that after USE-IT, teachers believed reform-based science instructional strategies to be more important, and felt more prepared to use the strategies than before the project. Teachers did not improve their self-efficacy or outcome expectancy beliefs regarding science teaching, nor did they more frequently use reform-based strategies after the project than before. These data suggest that USE-IT may have helped teachers to see the importance of reform-based science teaching and to feel more prepared to use reform-based strategies. The lack of a control group makes it difficult to attribute the observed change in beliefs solely to USE-IT – especially since the effect sizes weren't that large – but it's likely that the project did, to some extent, positively influence teachers' beliefs about science teaching.

The teachers' beliefs and behaviors regarding educational technology were evaluated using the Technology Attitudes and Usage Survey, which was administered once in September 2010 and again in April 2011. Reliability analyses were conducted for each scale at each administration time, and the alpha coefficients indicated that the scales were all sufficiently reliable (> .70).

Dependent t-tests were conducted using the pre- and post-scores to determine the direction, magnitude, and statistical significance of the change in teachers' beliefs and behaviors regarding educational technology. Fourteen matching responses were included in the t-tests. The mean scores, t score, effect size, and reliability coefficients for each Technology Attitudes and Usage survey scale are displayed below in Table 5.

Table 5. Summary of the Technology Attitudes and Usage Survey analyses

Scale	# of Items	Pretest Mean (S.D.)	Posttest Mean (S.D.)	t	Effect Size	Pretest α	Posttest α
Self-efficacy	10	3.51 (0.67)	4.12 (0.54)	3.50**	1.00	.91	.84
Familiarity	7	1.77 (0.40)	2.96 (0.62)	9.49***	2.28	.63	.86
Frequency	7	1.58 (0.35)	2.57 (0.76)	6.53***	1.67	.62	.86
Preparedness	7	1.58 (0.49)	2.76 (0.57)	7.21***	2.22	.75	.86
Integration Frequency	7	2.47 (0.68)	3.01 (0.71)	2.79*	.76	.86	.91
Integration Preparedness	7	2.37 (0.69)	3.05 (0.61)	3.02*	1.04	.88	.91

*Note: * p < .05, ** p < .01, *** p < .001; effect sizes > .20 are considered small, > .50 are considered medium, and > .80 are considered large*

The results demonstrate that after participating in USE-IT, teachers 1) felt more self-efficacious about integrating technology in their classroom, 2) were more familiar with the technology addressed during the project, 3) used the technology addressed during the project with greater frequency, 4) felt more prepared to use the technology addressed during the project, 5) used technology integration and 21st century learning strategies with greater frequency, and 6) felt more prepared to use technology integration and 21st century learning strategies.

Teachers' responses to the Inquiry Series Evaluation survey support the results of the Technology Attitude and Usage Survey regarding teachers' familiarity, preparedness and use of technology in the classroom. Teachers were asked to respond to the following question after the last professional development session in April:

> *What changes, if any, do you see in yourself (e.g., knowledge, attitudes) as a result of attending the Inquiry Series this year?*

The teachers' responses indicated positive changes being specifically attributed to participation in USE-IT. Teachers reported increases in technology use and confidence to use technology in their classroom. Some of the teachers wrote:

> *I have more confidence in using the technology in the classroom.*
>
> *Better prepared to use technology in the classroom, and in knowledge of what's out there to use ...*

Wow, I have learned so much this year with USE-IT. I learned many differed things to do with technology and was able to try it in class.

I have always been interested in using technology in the classroom on an as-needed basis. Thanks to these USE-IT classes I feel even more comfortable with other forms of technology. I also feel more comfortable with having my students use technology. Before, I was the person making movies, Powerpoints, searching the web, etc. Now I am having my students do it.

Based on the project findings, we can conclude that the project was more successful at improving teachers' beliefs and behaviors regarding technology than their beliefs and behaviors regarding science teaching. In fact, teachers demonstrated statistically significant improvements on six out of six technology scales, while demonstrating improvements on two out of five science teaching scales. This conclusion is not altogether surprising, given that more time and effort was devoted during the project to helping teachers learn about technology and 21st century skills. As has been previously stated, science did not appear to be addressed in depth, and teachers for the most part received only a superficial understanding of how the technology in the project could be used to teach science.

RECOMMENDATIONS

During its implementation, USE-IT successfully met most of the objectives outlined by the project staff. Throughout the project, teachers expressed their excitement and gratitude about the opportunities to learn about and use the instructional technologies that were explored during USE-IT. However, based on the project's findings, there are several considerations that should be made if the project is to be replicated in the future. The following recommendations are made based on the teachers' comments and suggestions and this author's analyses.

Make curricular and instructional decisions regarding the content of the project based on teachers' previous experience and current needs.

The findings of the project indicated that while some teachers were struggling to keep up during the project, other teachers were bored. Some teachers had very little experience with technology, while other teachers had a lot of experience with technology. As a result, some teachers suggested that the pace of instruction be slowed down, while other teachers suggested that the pace be sped up. In order to enact this recommendation, facilitators might consider formatively assessing the teachers in the project regarding their knowledge and experience with certain types of technology. These data could then be used to guide the development of the professional development sessions. If previous experience varies widely, like it did in this project, perhaps the facilitators could differentiate the instruction to accommodate the needs of all the teachers in the project. For example, while some teachers might need more help grasping the basic concepts of a technology, other teachers might already know the basic concepts, and should be given opportunities to learn about more advanced concepts.

This recommendation also applies to the curricular decisions made for the project. For example, the decision to use of Google sites during the project should be made only after assessing the teachers' current needs. Many teachers in this project could not use Google sites at their school for one reason or another, and therefore did not benefit from these sites as much as the teachers who could use them. Making decisions in this way implies that a lot of assessment needs to be done at the beginning of the project. Perhaps a short assessment could be sent to the teachers shortly after they enroll in the project, or an assessment could be given to the teachers during the first professional development session. This report is not offering any specific suggestion for how this should be done. However, basing curricular and instructional decisions on teachers' needs would certainly ensure that the project would be meaningful and relevant to the teachers in the project.

Provide more structured examples regarding the use of technology for science teaching.

The project would likely be more beneficial to science teachers if the technology addressed during the project was situated within a science context. Science examples were mentioned

during the project, but the frequency and depth of the examples should be increased for future projects. For example, facilitators might do an actual science lesson with the teachers as the students, using technology throughout the lesson. This way, teachers could explicitly see how the technology might be used in their science classroom.

Allow teachers more time to explore the technologies that are being addressed, specifically in how they could be used in the classroom.

Many teachers suggested that they be given more time to explore the technologies being addressed during the project. According to the professional development observations, teachers were given a fairly large amount of time to play around with the technology in each session, but this time seemed to be aimed at understanding the technical aspects of the technology (e.g., the features of the technology, how to find one's way around the technology). However, perhaps teachers could be given time to explore how the technology might be used in the classroom. This type of exploration is a little different from what was given during this project, but teachers would likely find it to be beneficial. While explicit science examples could be illustrated during the project (see the first recommendation), teachers could also be allowed to create their own examples. Teachers could be encouraged to try out their idea in their classroom before the next professional development session, and then share with the rest of the class how their idea worked.

Continue to allow teachers to "share out" at each of the monthly sessions.

Throughout the project, teachers were given several opportunities to share with the other teacher participants how they were implementing technology in their classroom. This seemed to be valuable aspect of the project, and would be worthwhile to ensure that teachers were given the opportunity to have these discussions at each professional development session. Teachers' comments on the session evaluations illustrated that sharing their progress and listening to other teachers' progress was an important and beneficial part of the monthly sessions. The comments for the last monthly session in April were particularly supportive of this recommendation.

Appendix A: Teacher Beliefs Instrument

Teacher Belief Instrument (Pre-survey 2010)

Part A: Self-Efficacy Beliefs About Teaching

(Enochs & Riggs, 1990; modified Haney, 2005)

Directions: Please indicate the degree to which you agree or disagree with each statement below by checking the appropriate category for each statement.

As you can see below, science and mathematics are both included in the statements. We understand that your beliefs may differ (sometimes greatly) between science and mathematics teaching, so we ask that you answer the statements based on your beliefs about science *OR* math, not both.

If you teach only science or only mathematics, please answer the statements based on your beliefs about that subject. If you teach both science and math, please choose one or the other.

Please indicate how you will answer the statements.

- ◯ Based on my beliefs about SCIENCE teaching
- ◯ Based on my beliefs about MATHEMATICS teaching

1. I am continually finding better ways to teach SCIENCE/MATHEMATICS topics.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	◯	◯	◯	◯	◯

2. Even when I try very hard, I do not teach SCIENCE/MATHEMATICS topics as well as I do most subjects.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	◯	◯	◯	◯	◯

3. When the grades of students improve, it is often due to their teacher having found a more effective SCIENCE/MATHEMATICS teaching approach.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	◯	◯	◯	◯	◯

4. I know the steps necessary to teach SCIENCE/MATHEMATICS concepts effectively.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	◯	◯	◯	◯	◯

5. I am not very effective in monitoring SCIENCE/MATHEMATICS experiences.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	◯	◯	◯	◯	◯

Teacher Belief Instrument (Pre-survey 2010)

6. If students are underachieving in SCIENCE/MATHEMATICS, it is most likely due to ineffective teaching.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

7. I generally teach SCIENCE/MATHEMATICS topics ineffectively.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

8. The inadequacy of a student's SCIENCE/MATHEMATICS background can be overcome by good teaching.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

9. When a low-achieving child progresses when studying SCIENCE/MATHEMATICS, it is usually due to extra attention given by the teacher.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

10. I understand SCIENCE/MATHEMATICS concepts well enough to be an effective SCIENCE/MATHEMATICS teacher.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

11. Increased effort in SCIENCE/MATHEMATICS teaching produces change in students' SCIENCE/MATHEMATICS achievement.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

12. The teacher is generally responsible for the achievement of students in SCIENCE/MATHEMATICS topics.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

13. Students' achievement in SCIENCE/MATHEMATICS is directly related to their teacher's effectiveness in teaching SCIENCE/MATHEMATICS.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

14. If parents comment that their child is showing more interest in SCIENCE/MATHEMATICS at school, it is probably due to the performance of the child's teacher.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

15. I find it difficult to explain to students why SCIENCE/MATHEMATICS investigations turn out as they do.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

16. I am typically able to answer students' SCIENCE/MATHEMATICS questions.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

17. I wonder if I have the necessary skills to teach SCIENCE/MATHEMATICS.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

18. Effectiveness in SCIENCE/MATHEMATICS teaching can impact the achievement of students with low motivation.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

19. Given a choice, I would not invite the principal (or other) to evaluate my SCIENCE/MATHEMATICS teaching.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

20. When a student has difficulty understanding a SCIENCE/MATHEMATICS concept, I am usually at a loss as to how to help the student understand the concept better.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

21. When teaching SCIENCE/MATHEMATICS topics, I usually welcome student questions.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

22. I do not know what to do to turn students on to SCIENCE/MATHEMATICS topics.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

23. Even teachers with good SCIENCE/MATHEMATICS teaching abilities cannot help certain kids learn.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE TODAY:	○	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

Part B: Instructional Practices Inventory

(modified from Haney, 2006)

Directions: For each of the instructional strategies below, please rate how ...

FREQUENTLY you use each of the strategies

IMPORTANT you feel each strategy is to effective teaching

PREPARED you feel in using each strategy

24. Have students investigate real-world problems.

24a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

24b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

24c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

25. Have students make connections between science/mathematics and other disciplines.

25a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

25b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

25c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

26. Require students to supply evidence to support their claims or explain their reasoning when giving an answer.

26a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

26b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

26c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

27. Ask students to discuss alternative conclusions or consider alternative methods for solutions.

27a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

27b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

27c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

28. Have students write to learn science/mathematics.

Teacher Belief Instrument (Pre-survey 2010)

28a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

28b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

28c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

29. Engage the whole class in discussions based on science/mathematics concepts.

29a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

29b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

29c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

30. Ask students to explain concepts to one another.

30a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

30b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

30c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

31. Use reflections written by students to guide instruction.

31a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

31b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

31c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

32. Differentiate classroom instruction to meet students' learning needs.

32a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

32b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

32c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

33. Allow students to work at their own pace.

33a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

33b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

33c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

34. Ask students to use multiple representations (e.g. numeric, graphic, symbolic).

34a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

34b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

34c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

35. Work collaboratively with other teachers to plan or teach a unit.

35a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

35b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

35c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

36. Provide opportunities for students to pursue issues/ideas/topics of personal interest.

36a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

36b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

36c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

37. Assess student learning via performances and projects (performance-based assessments).

37a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

37b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

37c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

38. Assess student learning via writing.

38a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

38b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

38c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

Part B: Instructional Practices Inventory (continued)

(modified from Haney, 2006)

Directions: For each of the instructional strategies below, please choose the response that best represents how ...

FREQUENTLY you use each of the strategies

IMPORTANT you feel each strategy is to effective teaching

PREPARED you feel in using each strategy

39. Use the community setting, or local environment, as a context for learning.

39a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

39b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

39c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

40. Allow students to construct their own understandings.

40a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

40b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

40c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

41. Provide students with concrete experience before abstract concepts.

41a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

41b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

41c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

42. Develop students' conceptual understanding vs. memorization of facts.

42a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

42b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

42c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

43. Take students' prior knowledge into account when planning lessons.

43a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

43b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

43c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

44. Have students work in cooperate/collaborative learning groups.

44a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

44b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

44c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

45. Have students develop, implement and revise a design process.

45a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

45b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

45c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

46. Engage students in inquiry and/or problem-solving activities.

46a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

46b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

46c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

47. Have students prepare project/lab/research reports.

47a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

47b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

47c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

48. Have students use appropriate educational technology (e.g., calculators, computers, electronic probes, Internet-based scientific data sets).

48a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

48b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

48c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

49. Have students use science/mathematics instructional manipulatives, supplies and/or equipment.

49a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

49b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

49c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

50. Ask students to apply science/mathematics in a variety of contexts.

Teacher Belief Instrument (Pre-survey 2010)

50a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

50b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

50c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

51. Use informal questioning to assess student understanding.

51a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

51b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

51c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

52. Have students use feedback to revise their work.

52a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

52b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

52c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

53. Have students keep a notebook to organize their learning (summarize main ideas, record/analyze data, etc.).

53a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

53b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

53c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

54. Plan classroom instruction and/or assessment using the state or national standards for science/mathematics.

54a. Frequency

	Never	Rarely	Sometimes	Frequently
MY RESPONSE TODAY:	○	○	○	○

54b. Importance

	Not Important	Somewhat Important	Important	Very Important
MY RESPONSE TODAY:	○	○	○	○

Teacher Belief Instrument (Pre-survey 2010)

54c. Preparedness

	Not Prepared	Somewhat Prepared	Prepared	Very Prepared
MY RESPONSE TODAY:	○	○	○	○

Appendix B: Technology Attitudes and Usage Survey

USE-IT Technology Attitudes and Usage Survey

Your Unique Code

Hello USE-IT teachers!
Thank you for taking the time to complete this survey. Your cooperation is very much appreciated, and your honest input is absolutely invaluable for the continuation of NWO projects like USE-IT.

Please use the drop-down menus to enter your unique code, which will used to keep track of your responses during the evaluation of this project.

	First letter of your mother's maiden name	Second letter of your mother's maiden name	Your birth month	Your birth day
My Unique Code				

USE-IT Technology Attitudes and Usage Survey

Self-Efficacy Beliefs About Technology Integration

Directions: Please indicate the degree to which you agree or disagree with each statement below by checking the appropriate category for each statement.

1. I am continually finding better ways to use technology in my classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

2. I know the steps that are necessary to effectively integrate technology into my classroom lessons.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

3. I am not very effective at monitoring my students' use of technology in the classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

4. I understand instructional technology well enough to be able to effectively use technology in my classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

5. I find it difficult to help students who have trouble using technology in my classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

6. I do not know what to do to get students excited about using technology.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

7. I know how to use technology to enhance my classroom lessons.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

8. I wonder if I have the necessary skills to integrate technology into my classroom lessons.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

9. I am typically able to answer my students' questions about using technology in the classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

10. I know how to use technology to get my students more excited to learn.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MY RESPONSE:	◯	◯	◯	◯	◯

USE-IT Technology Attitudes and Usage Survey

Instructional Technology Integration Scale

Directions: For each type of instructional technology listed below, please rate how ...

FAMILIAR you are with the technology (what it is, how it is used, etc.)

FREQUENTLY you use the technology in your classroom

PREPARED you feel to use the technology in your classroom

11. Google sites

11A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

11B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

11C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

12. Google Docs

12A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

12B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

12C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

13. Flip VideoCams

USE-IT Technology Attitudes and Usage Survey

13A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

13B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

13C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

14. Personal Learning Networks

14A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

14B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

14C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

15. RSS Feeds

15A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

15B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

USE-IT Technology Attitudes and Usage Survey

15C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

16. Google Earth

16A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

16B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

16C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

17. Skype

17A) FAMILIARITY

	Not Familiar	Very Slightly Familiar	Moderately Familiar	Very Familiar
Please choose a category	◯	◯	◯	◯

17B) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

17C) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

USE-IT Technology Attitudes and Usage Survey

Technology Integration Strategies

Directions: For each of the strategies below, please rate how ...

FREQUENTLY you implement the strategy

PREPARED you feel to implement the strategy

18. Use technology to collaborate with teachers in your school for the purpose of developing student learning activities.

18A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	○	○	○	○

18B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	○	○	○	○

19. Facilitate learning tasks that require students to think critically about academic subject matter.

19A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	○	○	○	○

19B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	○	○	○	○

20. Have students use technology to complete collaborative learning tasks.

20A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	○	○	○	○

20B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	○	○	○	○

USE-IT Technology Attitudes and Usage Survey

21. Have students use technology (e.g., wiki, blog, Google Docs) to communicate with other students about academic subject matter.

21A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

21B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

22. Use technology (beyond e-mail) to communicate with teachers and parents about the learning activities in your classroom.

22A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

22B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

23. Facilitate learning activities that foster 21st century skills.

23A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

23B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	◯	◯	◯	◯

24. Facilitate learning activities that provide real-world applications of academic subject matter.

24A) FREQUENCY

	Never	Rarely	Sometimes	Frequently
Please choose a category	◯	◯	◯	◯

USE-IT Technology Attitudes and Usage Survey

24B) PREPAREDNESS

	Not Prepared	Very Slightly Prepared	Moderately Prepared	Very Prepared
Please choose a category	○	○	○	○

Appendix C: Inquiry Series Evaluation Survey

April 2011 Inquiry Series Evaluation

In order to better plan for future NWO activities, we would be grateful to receive your comments on the NWO Inquiry Series session you recently attended. Kindly complete this short questionnaire to share your views with us. At the end of the survey, you can provide your name and email address to enter the drawing for a DOOR PRIZE! You can also request a contact hour (CEU) certificate. Your information is required if you want to enter the drawing and/or receive a certificate.

Please use the drop-down menus below to enter your unique code, which will help us organize and keep track of survey responses.

	First letter of your mother's maiden name	Second letter of your mother's maiden name	Your Birth Month	Your Birth Day
My Unique Code				

Which session did you attend?

- ◯ Experiencing Engineering is Elementary
- ◯ Growing Up WILD and Project Learning Tree
- ◯ Take Math Outdoors!
- ◯ The Blade and Toledo Museum of Art E-Resources for Classrooms!
- ◯ Uncovering Student Science Misconceptions for Middle and High School Life Science Teachers
- ◯ USE-IT (Uniting Science Education, Inquiry, and Technology)

Did you complete an evaluation survey (like this one) for any of the other Inquiry Series sessions during this school year?

- ◯ Yes
- ◯ No

April 2011 Inquiry Series Evaluation

Please answer the following questions.

Which of the following best describes your current status?

- ◯ Pre-service teacher (undergraduate or graduate student)
- ◯ PreK-12 teacher
- ◯ University/College faculty
- ◯ School administrator
- ◯ Other (please specify)

If you are a student, please tell us your major and concentration.

What is your major?

What is your concentration?

What STEM subjects do you teach? Choose all that apply.

- ☐ Science
- ☐ Math
- ☐ Technology
- ☐ None of these

Do you teach special education?

- ◯ Yes
- ◯ No

How many years (including this year) have you been teaching?
If you are a student, you can enter "0".

Please enter numbers only.

April 2011 Inquiry Series Evaluation

Please choose the category that best represents the grade level(s) you teach.

For example, if you teach 2nd grade, you would choose the "Pre-Kindergarten to 4th grade" category.
If you teach grades 6 to 8, you would choose the "5th grade to 8th grade" category.

If you absolutely cannot fit yourself into one of the categories, please choose "other" and tell us the grade levels you teach.

- ◯ Pre-Kindergarten to 4th grade
- ◯ 5th grade to 8th grade
- ◯ 9th grade to 12th grade
- ◯ Other (please specify)

April 2011 Inquiry Series Evaluation

Please choose the category that best describes your level of agreement/disagreement with the statements below regarding the session you attended.

The session was engaging.

- ◯ Disagree
- ◯ Somewhat Disagree
- ◯ Somewhat Agree
- ◯ Agree

The content/information presented during the session was valuable to me.

- ◯ Disagree
- ◯ Somewhat Disagree
- ◯ Somewhat Agree
- ◯ Agree

I learned something new from the session.

- ◯ Disagree
- ◯ Somewhat Disagree
- ◯ Somewhat Agree
- ◯ Agree

I will incorporate the content/information from the session into my classroom lessons. Please choose N/A if you do not teach.

- ◯ Disagree
- ◯ Somewhat Disagree
- ◯ Somewhat Agree
- ◯ Agree
- ◯ N/A

Attending the session made me feel more excited about teaching science, technology, engineering, and/or math. Please choose N/A if you do not teach.

- ◯ Disagree
- ◯ Somewhat Disagree
- ◯ Somewhat Agree
- ◯ Agree
- ◯ N/A

Please tell us about your perceptions of the session in your own words. You can include comments (good or bad) about the session, as well as your perceptions about the value and applicability of the information presented during the session.

If you have any suggestions for how the session could have been better, please include them below.

April 2011 Inquiry Series Evaluation

How many Inquiry Series sessions did you attend this school year (starting with the first session in September, and including the most recent April session)?

- ◯ One (April was my first)
- ◯ Two to three
- ◯ Four to five
- ◯ Six to seven

April 2011 Inquiry Series Evaluation

Please reflect back on your overall experiences with the 2010-2011 NWO Inquiry Series. We'd love to read about how (if) you changed as an educator, how you used the knowledge and resources gained during the Inquiry Series in your classroom, and how (if) the Inquiry Series impacted your students.

What changes, if any, do you see in yourself (e.g., knowledge, attitudes) as a result of attending the Inquiry Series this year?

Please tell us about how you used the knowledge and resources from the Inquiry Series in your classroom. What successes and challenges did you have during the year? In what ways, if any, do you think that using Inquiry Series knowledge/resources improved your students' learning?