Interdisciplinary Teaching & Learning in Middle School Classrooms: A Technology-Rich, Constructivist-Based Approach

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Abstract — The use of a constructivist approach has been shown to enhance teaching and learning. During summer 2001, an interdisciplinary team of faculty members and graduate students from American University hosted a workshop for 15 middle school teachers and 5 gifted middle school students within the District of Columbia. This interactive workshop provided an opportunity for teams of teachers and students to experience constructivist teaching and learning strategies using an interdisciplinary approach. Throughout the workshop the teams worked to prepare an integrated, technology-based lesson using materials from science, mathematics, as well as the language arts. This paper will expand upon previously reported efforts to expose area teachers to a constructivist-based approach in the classroom[1]. Particular emphasis will be placed on how modeling this approach can be effectively implemented in a workshop setting. Highlights of the curriculum developed for the workshop will be presented. Results of a questionnaire given to teachers will also be shared.

I. Introduction

Through a Dwight D. Eisenhower Faculty Development Program award, a team of faculty members and graduate students from American University hosted a pre-institute workshop from June 26 - 28, 2001 and a formal summer institute June 29, July 2 & 3, and July 5 & 6, 2001 on the American University campus. The summer institute was held for a group of 15 middle school teachers and 5 gifted middle school students from the District of Columbia. The framework for the pre-institute and formal institute was developed to build upon the success of our work during previous summers. Moreover, the institute was modified and enhanced in 2001 to respond to feedback received from participating teachers during a similar institute held in summer 2000 and to respond to the request for applications from the District of Columbia, Department of Human Services. The pre-institute workshop was a direct result of feedback received from teachers who had asked for more intensive instruction with computers. Resources for the workshop can be found at http://www.american.edu/IRVINE/ike. A follow-up to the institute was held on October 20, 2001. One goal of the follow-up was to provide participating teachers with an opportunity to frame a strategy for implementation of what they learned at the institute into their own classes. A second goal was to assist teachers in the preparation of a framework for dissemination of information within their individual schools.

In addition to the institute's leaders, project resource faculty were available throughout the course of the project as well as during the institute. The resource faculty consisted of professors from the Departments of Computer Science, Mathematics and Statistics, Chemistry, Physics, and Biology with many years of experience teaching and working with undergraduate and graduate students, including pre-service and in-service teachers. The resource faculty provided support

for the project by offering content-area specific expertise and materials which helped meet the institute's objects. Several of these faculty members also gave presentations and shared resources during the institute.

The pre-institute workshop provided participating teachers the opportunity to become familiar with various technological tools, including web-based technologies. The intent of the pre-institute was to provide teachers an opportunity to work with and learn about the technologies they would be using during the institute. Thus, participants were able to acquire relevant skills pertaining to computer usage in a hands-on interactive format without the students present. Particular emphasis was placed on assisting teachers to enhance their skills by focusing on techniques that they could bring back into their own instruction. A more detailed synopsis of the pre-institute activities will be provided in a subsequent section of this article.

The week long, interactive institute provided an opportunity for participating teachers to experience constructivist-based teaching and learning strategies first-hand. During the week, the teams of teachers and students worked to prepare an integrated, technology-based lesson using materials from science, mathematics, and the language arts. The project objectives are highlighted in the following section.

II. Institute Objectives

Specific objectives of the institute were to:

1) Integrate the use of technology from a constructivist perspective into math, science, and the language arts;
2) Provide teachers with the opportunity to examine commonalities among the curriculum standards from NCTM, NCTE, and NSTA;
3) Provide opportunities for facilitators and school-based teams to investigate "in-depth" themes such as Statistics and Probability, Patterns and Functions (algebraic thinking), scientific modeling and the like as they relate to curriculum standards;
4) Improve the use of technology through integration into content areas;
5) Integrate writing across the content areas as a means of expression and assessment; and to
6) Provide teachers with the opportunity to explore constructivist curriculum design with their students.

The sections that follow provide a summary of how these objectives were met. Following a discussion of the theoretical framework for the project, highlights of the pre-institute, formal institute, and follow-up activities are outlined, and a brief summary of feedback from participating teachers and students acquired through a detailed questionnaire is presented.

III. Theoretical Framework

The need for the successful implementation of technology into any educational program, especially the innovations within middle school classrooms, must be built upon a genuine educational pedagogy in order for authentic learning to occur [1]. The constructivist model has emerged from the works of developmental theorists such as Bruner, Piaget, and Vygotsky [2].

The cognitive constructivist theory adopts the works and conclusions of Bruner and Piaget as the foundations of its principles. Within this theory, students construct their knowledge of the world through assimilation and accommodation. Within the field of educational computing, the best-known cognitive constructivist theoretician is Papert, who characterizes behavioral approaches as "clean" teaching, and constructivist approaches as "dirty" teaching. The contrast emphasizes the difference between perspectives that isolate and break down knowledge to be learned (clean) versus approaches that are holistic and integrative (dirty) [3]. Intertwined together, at some level both "clean" and "dirty" approaches serve as the authentic foundations of the constructivist theory. By considering these approaches together, we can get a clearer understanding of how Internet technology, when integrated into any classroom, can be used to create successful distance learning in educational environments.

Another example of constructivism in educational technology is outlined by Dede and Sprague [4], who pose the question "If I teach this way am I doing my job?" Their article is based upon the constructivist theory at work in a traditional classroom. Educational technologists have often stated that an effective way to integrate technology into the teaching and learning processes is to follow a constructivist foundation. Furthermore, educators may have technical skills, but they may not understand how constructivism translates into effective, "hands-on" classroom practice. Constructivist theory can be one of the most useful and yet simultaneously difficult to adapt theories in terms of daily classroom activities. However, constructivist theory is well matched to using technology as a medium of presentation and demonstration of knowledge, rather than simply using technology for its own sake.

There are many examples in which the constructivist theory has successfully been implemented with or around technology. Within the model constructed by Egbert, Thomas, and Fischler [5], the Tigerlake Public School simulation is assessed through substantial research. The model mimics the following concept: if the constructivist theory is successfully implemented with and around technology, students learn authentically. In this situation, student-educators who are the participants in this simulation learn by doing. This simulation offers a way to integrate field experience and alternative technology-based instruction, which combined can help to improve almost any type of student to achieve high levels of competence in technology. The Tigerlake simulation allows the 29 student-educators to interact in a learning environment where "rich" experiences could be achieved. The richer the experience, the richer and more indelible learning takes place. By presenting related practices in learning environments that are simulated, the participants are provided with a set of "experiences" to compare to some current problem or relevant issue. Participants are also able to simplify concepts in order to make them understandable, in order to build upon existing understandings of theory and apply it to practice. Again, even among student-educators, the constructivist theory, intertwined with technology and applied to the content areas, may successfully allow participants to gain a better grasp of how to turn theory into practice.

For an authentic constructivist theory to breed successfully in any classroom, students are expected to be more actively involved than in traditional classrooms [6] -[8]. They are required to share ideas, ask questions, discuss concepts, and revise ideas and misconceptions. To successfully ensure that the constructivist theory is in practice while using technology, the educator must, in most cases, change his or her more traditional beliefs. In the constructivist

classroom described by Dede and Sprague there is no evidence of neatly lined desks or a type of "dense" order within the classroom walls. Instead, students are working in teams, asking questions and moving about the classroom. In addition, the educator, instead of simply repeating a redundant lecture, is engaging in interactive activities with his or her students. The mission of the constructivist method is centered upon the needs and interests of the student. Any constructivist classroom demonstrates that learning can often times go beyond the content area. Thus, the constructivist emphasis of the workshop provided a natural vehicle for the intertwining of technology with the science, mathematics and language arts content areas. The main foundation of the constructivist scenario is built upon states that authentic learning must be student-centered and meaningful and must encourage students to engage in real-world experiences, thus allowing them to go further in their learning and education.

In addition to understanding the constructivist approach to teaching and learning, it is also important to address issues of diversity and differences in individual learning styles [9] - [11]. A learning style approach acknowledges the fact that each individual has a unique style of learning and that each individual *can learn*. Furthermore, in a differentiated classroom, instructors begin by assessing where the learners are at and then form the curriculum accordingly. The following section describes the overall design of the pre-institute and formal institute workshops and highlights how a constructivist approach can be employed.

IV. Design

The basic structure of the institute involved sharing information and materials with the teachers during the morning sessions. This structure builds on known ideas about infusing technology into the instructional techniques of teachers, as many educators are experiencing a transformation in the ideology of "best-practices" as they once knew it [12]. Appendix I highlights the schedule developed for the pre-institute and institute workshop activities.

A. Overview of Pre-Institute Activities

One goal of the three-day pre-institute was to introduce teachers to the university and to the institute leaders and facilitators. However, a more significant goal of the pre-institute was to help teachers become familiar with the Macintosh Operating System and the basics of web-design. The pre-institute took place in the university's Design Lab, with 20 G3 Macintosh computers, internet access, and a flatbed scanner. Although technology has influenced methods and practices in almost all-educational institutions, traditional pedagogy should still be used as the foundation for all educational practices [13]. The sessions followed a teaching/training methodology for instruction in using the computer applications in the lab. First teachers discussed general principles of educational web design, and then participated in a whole-group training session on how to use the tools.

The first day of the pre-institute began with an activity in which each teacher created his or her own Microsoft PowerPoint presentation on their "Ideal Vacation" using research and images from the internet. Each presentation was required to teach something about the history and culture of the "ideal vacation" spot, and to integrate mathematical and scientific information about the region. Each presentation had to be accurate and adhere to basic design principles for

multi-media presentations. The participating teachers were also presented with information on copyright issues related to using the internet for research. Each teacher then shared his or her PowerPoint presentation with the group.

On the following two days of the pre-institute, participating teachers used the skills they acquired through the PowerPoint lesson and web-research activities to design web-sites using Netscape Composer. The institute leaders and facilitators chose Netscape because of the ease of use of the program as well as affordability (free). Each teacher used the material they had gathered on the "ideal vacation" project to design a web-site with at least three different sections. Adobe PhotoShop (for photo and image creation and manipulation) and SoundEdit 16 (to add sound files to web-pages) were used to create multi-media web productions. Each teacher used the lab projection equipment to present his or her web site to the group. Finally, teachers discussed how they would teach basic web-design principles to their middle school students, outlining how a project using this approach would take place, from storyboarding to assessment.

B. Overview of Formal Institute Activities

The basic structure of the institute involved sharing information and materials with the teachers and students during the morning sessions. A portion of the morning sessions were designed for teachers and students to come together in one large group. Another portion of these sessions were designed to split up the teachers and students for small periods of time to allow for activities and discussions to be conducted that were pertinent to just the teachers or just the students. The teams of teachers and students spent each afternoon working together in a computer lab to learn how to use the internet and world wide web to create constructivist-based integrated lessons. In addition, the afternoon sessions provided teachers an opportunity to apply the computer skills they had developed during the pre-institute. Thus, the teachers and students were given a considerable amount of time to work together within their teams to plan and develop their lessons.

Each morning, the institute began with a group discussion of the previous day's "reflection questions." Each day participants were given several questions to ponder after the conclusion of the day's events and activities. Participants were asked to go home and keep track of their reflections in a journal. The reflection questions were typically associated with information presented during that day's sessions. The intent of the reflection questions was to give teachers time to digest information they had received during the day, and to reflect on how that information might have relevance to them in their daily teaching activities.

Following a welcome by from the Dean of the School of Education, the first day of the institute began with introductions of the participants and workshop leaders. In addition, participants were given notebooks in which they could collect and organize the materials that would be distributed throughout the week. Participants found that by the end of the week their notebooks were full of materials! In addition, participants were given copies of the National Standards in Science, Mathematics, and Language Arts as well as a book describing differentiated instruction, which was one of the underlying themes of the institute.

Following the introductions and distribution of materials, information on constructivism as a teaching and learning tool was shared with the participants. The focus of this presentation was on how to use technology along with a constructivist approach in Science, Mathematics, and Language Arts content areas.

A second presentation focused on learning styles and how to use a learning style approach in the classroom. Prior to the workshop, copies of a learning style assessment were mailed to workshop participants (teachers and students). The participants completed the assessment and returned it to prior to the start of the institute. The assessments were then processed prior to the institute and provided workshop participants with immediate feedback on their own individual learning styles during her presentation.

While the constructivism and learning style discussions were taking place, the five gifted students worked on a polyhedron folding exercise. This exercise was constructivist-based and allowed students to think critically while combining mathematical reasoning with geometric modeling.

Each day following lunch, participants went to a computer lab facility to work on their team projects. A number of workshop leaders and staff were available during these sessions to assist the teams. Thus, participants had ample opportunity to ask questions and receive personal assistance from the institute team.

The second day of the institute began with a session on reading visual images using a critical literacy perspective. During this session the important role that language plays in the development of web-based learning tools was highlighted.

An additional session was held on the use of writing as a teaching and learning tool. The focus of this presentation was to share with participants various ways of incorporating writing into their classrooms to assess student learning. During this session, the student participants were taken to the physics laboratory where they were given an opportunity to build their own motors. This activity was designed in a constructivist-based, interactive engagement format. At the conclusion of this session, the students were allowed to keep their motors and take them home and share with their parents and other family members. The students really enjoyed this activity.

On the third day of the institute, a session on using the web and unexpected internet adventures was presented. Internet resources were highlighted and shared and the many uses of the web as a teaching and learning tool. Several important caveats regarding use of the web in education were presented.

Also on the third day, teachers and students had the opportunity to be involved with a hands-on, interactive, constructivist-based biology laboratory. The focus of this activity was to provide participants an opportunity to experience a hands-on approach to teaching and learning within a specific content area. A set of small lab activities involving DNA were prepared. Concrete examples of web-based resources in biology were also shared.

Thee fourth day of the institute began with an exercise that dealt with graphical interpretation. During this activity the teams of teachers and students worked on several constructivist-based activities designed to enhance one's ability to understand key mathematics concepts graphically. This session was followed by an informative session on evaluating software. This presentation also included a viewing of software (such as "Fire!") that was developed based on an integrated-curriculum format.

On the morning of the final day of the institute, teachers were exposed to the use of rubrics as an assessment tool. During this session, the students were taken aside and given the results of their learning styles assessments. Workshop leaders and staff talked with the students about their individual learning styles as well as the results of their learning style assessments.

The efforts of the teacher-student teams culminated on the last afternoon of the institute when they gave presentations on the web-based projects they had completed. The students were a prominent part of the presentations and each had an opportunity to share the ways in which they had contributed to the overall design of the project. Links to each school's final project are highlighted in Section 5 of the project evaluation notebook. A detailed view of the projects can be seen on the institute's web site.

The focus of the projects that the teachers created were centered around an integrated lesson that allowed the teachers to build on national standards in his or her own curricular area. The point of this focus was to have the teachers build a series of activities that would not only give their students the opportunity to construct their own knowledge, but also provide an interesting way to meet curricular standards. This integration of curriculum standards helped teachers acknowledge the commonalities that exist between the content areas. In addition, this acknowledgment precipitated the observation that alternative methods of assessment could be used to measure student learning, while still meeting the school district's objectives. Therefore, teachers could still feel they were "doing their jobs."

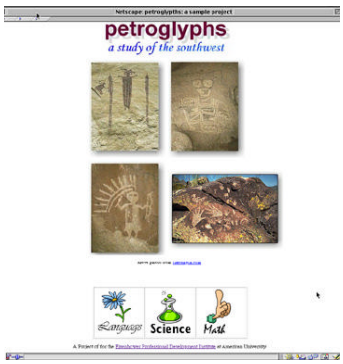

Figure 1. A sample constructivist learning project
on the study of petroglyphs

An example model project prepared in advance of the workshop highlighted an integrated lesson on the study of petroglyphs is presented in Figure 1. The model illustrates how students can learn about something of interest, while still achieving learning standards in mathematics, science, and the language arts. This model examined this interesting field of study through

mathematical activities, scientific methods, and the use of language and communication skills to demonstrate their understanding.

The following section highlights the feedback received from the institute participants. The section is divided into two subsections representing feedback received from teachers as well as students.

V. Feedback from Institute Participants

On the final day of the workshop, feedback was elicited from the workshop participants (teachers and students) in the form of a written questionnaire prepared by the project's evaluator. The questionnaire was used as a substantive portion of the summative assessment of the workshop. A brief summary of the feedback received from institute participants will now be presented.

A. Feedback from Teachers

Numerical ratings given by the participants ranged from 4.21 to 4.93 (with 5.0 being the highest possible rating). The overall average numerical rating was 4.44. From these ratings it might be concluded that overall, the workshop participants were very satisfied with the workshop.

Feedback from the teachers regarding the pre-institute revealed that they felt it extremely valuable. As in a typical classroom, each of the teachers experienced a different learning curve that was directly related to their prior use and knowledge of computers. The teachers commented on the fact that regardless of their prior knowledge, the institute leaders and resource persons were extremely helpful and patient. In addition, several teachers expressed that the pre-institute helped to build their own self-confidence about using computers. As a result, the teachers were much more comfortable working with the technology during the formal institute.

In terms of the formal institute, the feedback from the teachers was very positive. Overall, the teachers indicated that the structure of the institute was very well planned and organized. When asked how the information shared will help them differentiate their instruction, some teachers expressed that this would be possible because they felt more comfortable with the use of technology themselves. Many teachers also note the importance of taking time to respond to the learning needs of students with different learning styles.

When asked how they intend to integrate what they've learned in the institute into their own classrooms, participants indicated a definite eagerness to return to school and begin implementation of the new strategies. Several participants shared ideas about how they will have their students use the web to conduct research, etc. This type of statement suggests that after the institute, the teachers felt confident enough in their own technical abilities with the computer and the web, that they would be able to now use these skills to work with students in their own classrooms.

Some teachers suggested that they would have liked to have had a little more time working on their projects in the computer lab. Interestingly, this was the same comment received from teachers who participated in the 2000 summer institute. During the 2000 summer institute it became quite clear that providing some basic instruction on the use of the computer and web-based resources was very necessary for most teachers. Thus, a portion of the time teachers were allotted to work on their projects became time in which computer basics had to be taught. As a result of this feedback, the three-day pre-institute was added to the 2001 summer institute. The intent of the pre-institute was to deal with the basics of computer usage and web-design before the formal institute began, thus allowing teachers more quality time to work on their projects. Even with the addition of the pre-institute, some of the teachers suggested that they would have liked more time!

Overall participants indicated that they felt the workshop was a valuable experience, worthy of being repeated in future summers. Some participants indicated that if the workshop were to be repeated, it could even be extended even longer because of the amount of material presented and the value of that material to them.

B. Feedback from Students

One student (along with three teachers) from each school participated in the formal institute. Feedback from the student participants revealed that they really liked having an opportunity to work with their teachers in a collegial fashion. The students all felt that they made significant contributions to their team's project. In addition, the students felt they learned a great deal during the institute and that they were able to expand their individual knowledge of computers and the web. When asked if they would participate in a similar institute at some point in the future, all students indicated that they definitely would. In fact, one student remarked that they would participate in another similar institute contingent upon the fact that it be held at American University!

On the final day of the workshop, feedback was elicited from the workshop participants in the form of a written questionnaire. The questionnaire was used as a substantive portion of the summative assessment of the workshop. A brief summary of the feedback received from workshop participants will now be shared.

Numerical ratings given by the participants ranged from 3.86 to 4.93 (with 5.0 being the highest possible rating). The overall average numerical rating was 4.60. From these ratings it might be concluded that overall, the workshop participants were very satisfied with the workshop. Participants were asked whether they felt the goals of the workshop were achieved. Responses to this question clearly showed that most participants felt that the goals and objectives were met, and in many cases, exceeded. In regard to the overall structure of the workshop, one participant commented "This was the 'best' professional development experience I have had in several years."

When asked how they intended to integrate what they'd learned in the workshop into their own classrooms, participants indicated a definite eagerness to return to school and begin the implementation of the new strategies. Several participants suggested that they planned to make

better use of the web in their classrooms. In addition, participants indicated that they would be making use of the constructivist approach as they worked with and helped other faculty interested in adapting the approach.

Comments from some participants indicated that they did not necessarily feel there was enough time for interactions to occur, especially between teachers from schools other than their own. The teams were structured in such a way that most teachers worked with teachers from their own schools. This was done to allow teachers to return to their individual schools and continue working together to further enhance what was learned during the workshop and to provide each other with needed support once back at their school sites. In addition, these teams were encouraged by the workshop leaders to return to their own schools and share what they learned with other teachers. Overall, participants indicated that they felt the workshop was a valuable experience, worthy of being repeated in future summers. Some participants indicated that if the workshop were to be repeated, its length could be extended further because of the amount of valuable material to be shared.

VI. Institute Follow-up

On October 20, 2001 a follow-up to the summer institute was held at American University. Four of the five teacher teams participated with teachers Deal Junior High unable to participate. The agenda for the 4-hour session involved a sharing and question and answer time. A discussion of the national standards was held. A focal point of the discussion was a comparison of the similarities and differences between the standards across disciplines. A central objective for this follow-up meeting was to provide teachers an opportunity to design professional development plans to be implemented within their own schools.

VII. Observations of Workshop Leaders

Workshop leaders observed that each of the workshop participants brought with them different amounts of knowledge and experience related to the use of technology in the classroom. Thus, the pre-institute workshop allowed workshop leaders to begin "where the learners were at" and adjust the workshop content accordingly.

Presentations and activities coordinated by the workshop leaders carefully modeled the constructivist approach to teaching and learning. Participants were given numerous opportunities to "construct" knowledge via making valuable connections to their own lives and world views. Through feedback given by participants and observations made by workshop leaders, the overall impression of the workshop was that it was very effective in terms of sharing and applying constructivist theories to actual classroom activities.

VIII. Summary

Although many educators think that implementing the most high tech tools is the way to maintain successful educational practices, others bow to traditional theories. What is obvious is that constructivist theory can be successfully implemented when intertwined with current Internet technologies and various content areas. What seems to be needed currently is an

understanding that the constructivist approach to learning can be implemented with the Internet. Furthermore, if this implementation is handled properly, it can be highly successful, taking educators and students to levels that they have not been able to achieve in the past. For example, when teachers and students are actively engaged in the application of Internet technology and implement projects in such a domain (by building their own environments), they are simultaneously actively engaged in the acquisition of new and relevant knowledge within that domain.

Students building artifacts on the web are creating a creditable and sharable externalization of their knowledge, which provides both motivation and opportunity to exercise meta-cognitive skills. As a result, students gain the ability to learn simply by applying the constructivist theory to their success factors when using the Internet. A passive view of integrating the Internet into education may only support instructions and techno-centrism. Educational Internet resources will change this approach by allowing students some degree of autonomy in choosing their path of learning via computers. The Internet alone cannot produce "good" learning, however "good" learning can occur through successful implementation of the Internet [14].

The need for professional development opportunities related to the emergence of new technologies is well documented [15] - [22]. Furthermore, it is imperative that technology be grounded using a "scholarly" approach to teaching. Within this "scholarly" approach is the need to understand the different ways people learn as well as differences in their learning styles [23] - [28]. The over-riding goal of the "Constructing Knowledge Networks: Integrating Science, Math, Language, and Technology in the Middle School Classroom" workshop was to provide teachers with hands-on learning experiences and materials related to developing technology-based learning tools for use in Science, Mathematics, and Language Arts classrooms. Based on feedback from participants, the goals and objectives of the workshop were met and exceeded. In addition, participants encouraged workshop leaders to offer similar workshops in the future, focusing on a project-based approach to professional development.

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Andrea I. Prejean is an Assistant Professor of Mathematics Education at American University. She earned her doctorate from the University of Central Florida in Curriculum and Instruction in 1996. Dr. Prejean taught in the public schools for 10 years and was a mathematics specialist for the Florida Department of Education, providing professional development for K-12 mathematics teachers. Her research interests include teacher belief systems and how they affect students' interest and achievement in mathematics and the use of action research in changing teachers' practices in the classroom. Dr. Prejean is chair of the membership committee for the Association of Mathematics Teacher Educators (AMTE) and a member of the Instructional Issues Advisory Committee (IIAC) for the National Council of Teachers of Mathematics (NCTM). She co-edits a column in NCTM's journal Teaching Children Mathematics and her most recent publication, Reflections on China: Implications for Gifted Education was published in Gifted Education Press Quarterly. Dr. Prejean can be reached at: American University, School of Education, 4400 Massachusetts Ave. NW, Washington, DC 20016-8030. [aprejea@american.edu]

SARAH IRVINE BELSON

Sarah Irvine Belson is an associate professor of Education, specializing in technology integration. She received her Ph.D. in Curriculum and Instruction from Arizona State University. Her research activities focus on infusing effective components of instructional design with emerging technology in special education. In addition to extensive use of computer-mediated instruction in her teacher preparation courses, Dr. Irvine Belson directs several school-based projects examining implementation of high-end technology, telecommunications and international networking in the classroom. Dr. Irvine has trained preservice and inservice teachers in the area of electronic communication and technology integration. She serves as consultant to schools and business on design, implementation, and analysis of technology-based solutions to instruction and application development. Through field-based research, she has successfully worked to integrate Internet-based activities into educational programs for rural and at-risk K-12 students. Her background in special education provides a knowledge-base for development of the types of support that assist educators to adaptively respond to a variety of individual differences in learning strategies among students. Dr. Irvine Belson can be reached at: American University, School of Education, 4400 Massachusetts Ave. NW, Washington, DC 20016-8030. [sirvine@american.edu]

VIVIAN VASQUEZ

Vivian Vasquez is an Assistant Professor in the School of Education at American University in Washington DC. She completed her doctorate in Language Education at Indiana University, Bloomington. Dr. Vasquez has had articles published in various journals including, UKRA Reading, Language Arts, Reading Teacher and Primary Voices. Recently she has published chapters in scholarly publications as well as a Research Bulletin with Phi Delta Kappa. She also has a book forthcoming with Lawrence Erlbaum Publishers on Critical Literacy. Dr. Vasquez has presented at various national and international conferences including AERA, NCTE, IRA and the World Congress in New Zealand. Her research interests are in Critical Literacy, Critical Media Literacy and Inquiry Learning. She was recently voted to the Executive Committee of the National Council of Teachers of English and serves as the Chair of the Elementary Section of NCTE. She also serves on the joint Critical Literacy Task Force of NCTE and IRA. More recently she was invited to participate in the White House Summit on Early Childhood Cognitive Development and was appointed as a member of the District of Columbia Commission on Primary Education Reform. Dr. Vasquez can be reached at: American University, School of Education, 4400 Massachusetts Ave. NW, Washington, DC 20016-8030. [vvasque@american.edu]

Appendix I

Pre-Institute Workshop

June 26-28, 2001

Tuesday	Wednesday	Thursday
Introduction to computing ♦ Operating Systems (Windows and Macintosh) ♦ File Management and Storage. ♦ Techniques for organizing computer time ♦ Managing the Physical computer	Introduction to the internet as an instructional tool ♦ Using Web Site as tools ♦ On-line educational resources Basics of Web Design	Managing computer software and equipment in the classroom Taking full advantage of your computer as a instructional aide. Helping students use the computer

Summer Institute Schedule

9 am - 5 pm

June 29 July 2-3 and 5-6, 2001

Friday	Monday	Tuesday	Thursday	Friday
Welcome - (Lynn Fox)	Reflection Question Discussion	Reflection Question Discussion	Reflection Question Discussion	I Evaluate. They Analyze. We Assess: How Rubrics Change the Way We Communicate (Lynn) **Students with Teresa--Learning Styles** Complete Projects
Introduction - Team Building/Goals (Andrea) Constructivism--Didn't We Do That Last Year? (Andrea) **Students are with Lynn Stallings** Folding Poyhedron A Learning Styles Approach in Constructivist-based Classrooms (Teresa)	Reading Visual Images: A Critical Literacy Perspective (Vivian) The "Write" Approach in Middle School Classrooms (Teresa) **Students in Physics Lab--Building Motors**	DNA labs as content and examples of web resource issues (Nancy) Web Wonders: Unexpected Internet Adventures (Sarah)	Interpreting Graphs (Franny) Evaluating Software (Conrad)	

Lunch 12 pm - 1 pm

Lunch	Lunch	Lunch	Lunch	Lunch
Define the projects due on Friday (Sarah) LAB	Designing Instructional Websites (Sarah) LAB	The Great American Rocket Car Race: Differentiated Instruction (Andrea) LAB	Advanced Web Design: Bringing it all together. (Sarah) LAB	Final Presentation and Awards Ceremony