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ABSTRACT

Perhaps some of the most engaging, unique, Web-based activities are virtual quests that take student participants along on real expeditions, following a team in the field as they explore new territory or do research on authentic scientific problems. Virtual quests, such as the MayaQuest expedition produced by Classroom Connect, are excellent examples of classroom experiences that provide students with authentic opportunities to solve real life problems. This applied qualitative study looked at the value of virtual quests as classroom learning environments, at the instructional characteristics of teachers who chose to participate, reviewed related literature, and discussed, from the teacher's perspective, their application in a classroom setting. The study demonstrates the value of the anchored instructional approach to learning, as represented by MayaQuest. Student participants in this study were highly engaged, motivated, and appeared to benefit from increased skill development and work production. Students experienced models of problem solving, teamwork, thought processes and language in an authentic manner, not just as a scenario developed to simulate reality. The authenticity was made possible by access to the technology, bringing the field experience into the classroom while transporting the students to the field. The study concludes that adoption of virtual quests can motivate and rejuvenate teachers, but certain teachers are also more likely to adopt virtual quests. They are teachers who value a student-centered approach, view themselves as facilitators of learning, are flexible enough to modify the prescribed curriculum to fit the quest experience, and who are comfortable with technology. Virtual quests are a promising instructional approach; however, it is not recommended that a school or district adopt them globally. Rather, teachers should be given the opportunity to adopt virtual quests. It is also important that teachers be provided with both technical and instructional support as needed. For the appropriately oriented teacher, anchored instruction, in the form of virtual quests, is a very exciting addition to the learning environment. (Contains 12 references.) (Author/AEF)

VIRTUAL QUESTS AS LEARNING ENVIRONMENTS FOR K-12 STUDENTS

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Abstract

Virtual quests, such as the MayaQuest expedition produced by Classroom Connect, are excellent examples of classroom experiences that provide students with authentic opportunities to solve real life problems. This applied qualitative study looked at the value of virtual quests as classroom learning environments, at the instructional characteristics of teachers who chose to participate, reviewed related literature, and discussed, from the teacher's perspective, their application in a classroom setting.

Introduction

Use of the Internet in today's classrooms can offer opportunities that enrich and expand existing curriculum, support educational standards, and rejuvenate the teaching and learning process. Access to original documents, photos, video, sound, content experts, and live data, expands the resources available to the learner in a way that can make learning more engaging, interactive and authentic.

Perhaps some of the most engaging, comprehensive and unique, web-based activities are virtual quests that take student participants along on real expeditions, following a team in the field as they explore new territory or do research on authentic scientific problems. This study looked closely at these comprehensive virtual quests, defined their common characteristics, reviewed related literature on their efficacy in the K-12 setting, and discussed, from the teacher's perspective, their application in a classroom setting.

Virtual Quests

Although the term virtual field trip is often used in reference to these large quests, it can be misleading, as the term "virtual field trip" also refers to any number of non-interactive sites that can be found on-line. In contrast, virtual quests have the following unique characteristics:

- **Problem-based**: Focus is on an authentic mystery to be solved,
- **Curricular focus**: National standards support the content,
- **Multidisciplinary**: Resources and activities reach across the disciplines.
- **Real time interactivity**: A team in the field interacts with participants via e-mail, live chats, and video.
- **Participants as stake-holders**: Students are asked to make decisions about the quest that the field team acts on, i.e. should the team give money to beggars, travel through the jungle or into the cave?
- **Website as communication central**: The site contains activities and resources for teachers and students. It is highly visual and interactive, and is the center for daily updates and shared knowledge creation.
- **Scheduled**: The real-time component usually last six to eight weeks, although some last as long as a year.

Classroom Connect sponsors two expeditions a year that follow a team of explorers and scientists on a quest to solve a great mystery. The live experience of the Classroom Connect quests last for four weeks, although the website becomes live one week before the field team starts posting. The broad range of resources available on the site makes it possible for teachers to choose areas of focus most pertinent to their curricular needs.

Comprehensive virtual quests are designed to engage students in learning that includes authentic problem solving, real-time interaction with experts on the field, and an opportunity to share their research data, writing and artwork with an international team of peers. Over the past years I have offered teachers the opportunity to participate in virtual quests with their students, but had received a limited response. Even those who did commit did not take full advantage of the quest activities by following the quest consistently and engaging students.

The purpose of this study was to review associated literature that might support, or not, the validity of virtual quests in classroom, to identify the aspects of student outcome that would justify their use and to better understand the issues of quest implementation in the classroom, so that I might be able support teacher adoption in the future.

Literature Review

Research on the effectiveness of virtual quests is lacking. However, it is possible to examine research on the Internet in the classroom, writing, problem based learning, situated cognition, and anchored instruction.

Michael Ritter, a professor of geography, did a descriptive case study on virtual field trips with his students who visited key locations on-line by following a path of hyperlinked pages, gathered and analyzed data from photos and text, and kept field journals (1998). Ritter stated that the value of virtual field trips for learning geography is that it brings remote, dangerous or expensive locations into the classroom.

Lee and Songer looked at the effect of on-line collaboration on students' discourse about weather science, through the One Sky project (1999). They found that this collaborative on-line experience connected student personal experience with scientific

learning. It made science learning more authentic. Students became local experts and knowledge producers and developed a higher level of language applied to science.

Jean Lave, the key proponent of situated cognition, recognizes that learning occurs as a function of activity and that it is situated in the context of the learning environment (1988). The model of situated cognition involves a multidisciplinary, collaborative approach to complex problem solving with embedded data. Brown, Collins and Duguid point out that traditional learning is often disconnected from the context of content (1989). For example, students learn the vocabulary of science by using the dictionary, writing sentences or reading textbooks. This approach is devoid of any structure or clues that might help the student make connections to real meaning. In a situated learning environment, students might be asked to work like scientists, experimenting, observing, hypothesizing and recording. Situated cognition has learning occur within a community or culture of practitioners. Brown, Collins and Duguid note that activity, concept, and the culture of the learning community are interdependent (1989). Students who work and study like scientists are more likely to have a structure on which to build knew scientific knowledge.

Anchored instruction, a concept developed by the John Bransford at the *Cognition and Technology Group at Vanderbilt (CTGV)*, situates authentic problems into what are called macrocontexts, or story-like situations (1993). The problems are anchored around these realistic situations that may involve an adventure. The students can solve the challenge by using information embedded in the story. The story, or anchor, engages the student in realistic and relevant problem solving. Research done by the CTGV found that students:

- performed as well as or better on standardized tests than the control group.
- demonstrated superior performance on multi-step word problems.
- showed less anxiety about mathematics.
- were more likely to see mathematics as relevant to their lives (CTGV, 1993).

In summary, the theory of situated cognition proposes that students are more likely to develop skills that will transfer to new learning situations, if they are engaged in authentic activities that focus on development of problem solving skills. Anchored instruction has applied the theory of situated cognition to the classroom setting and promotes the development of activities that create situated environments.

Virtual quests such as those produced by Classroom Connect and The JASON Project, are anchored learning environments. Students are asked to help scientists in the field find solutions to real world problems. They place students into a community of learners where they can share their observations, responses, data and questions with an authentic audience. They can focus on solving complex problems with the support of the virtual community. Learning content such as math, biology, geography, or culture may even be, in many cases, unintentional or incidental.

The quests produced by Classroom Connect, are examples of comprehensive virtual quests. Its Adventure Learning Division produces the expeditions, and adventure is key to their quest experiences. Their team of explorers travels exotic places on bicycle, a mode of transportation to which students can easily relate. America Quest has taken students to the Four Corners region of the United States, Australia, Central America, Asia, Africa and Galapagos Islands.

Each of their quests must be organized around a real mystery, or what CTGV (1990) would refer to as an anchor or macrocontext. The mystery of the Spring 2000 America Quest expedition focused on the sudden disappearance of the Anasazi people from their homes over 700 years ago. Experts in the field don't have a clear understanding of what happened to the Anasazi. No one knows the answers at the outset, students, teachers or field experts, and it is unlikely that they'll know the answers when the expedition ends. The problem of the disappearance of the Anasazi is a very complex one. Clues are available but they conflict. Some experts say that the Anasazi were violent people; perhaps they were running from their enemies. Others say the opposite is true; they were peaceful and were affected by environmental changes. As participants in America Quest, students are exposed to the complexity of real world problems and the reality that solutions come from considering many perspectives.

Student participants are addressed to directly by the America Quest expedition team. Daily journal postings are written with them in mind, including descriptive language, interesting topics, and lots of multimedia. Students are considered to be members of the team, and are solicited for their input in a number of ways. Many of the postings from the expedition team include polls. Students can email the team, the on-line experts and each other. Responses are posted to the site bulletin board where students are also invited to post. The audience of archaeologists, anthropologists, environmentalists and biologists value their responses acting as mentors to the students' developing knowledge. Immersed in the culture of exploration, students are witnessing the language and behavior of experts in the field. They are called upon by the team to share their input and are being acknowledged for their thought processes.

In order to make informed statements and decisions, students need to do some study and research. America Quest also provided a large amount of archived topical information on its site. Students are encouraged to use whatever online or offline resources are available to them, in the same manner that their teammates in the field do. Immersed in the culture of archaeology and anthropology, students were building knowledge about Anasazi culture, environment and their modern day successors. They are acquiring knowledge as a tool rather than a collection of facts.

Although most classroom participants are not prepared to tackle an investigation of this scale, the contributions they do make are clearly part of the process. There are also several smaller problems that students are called upon to solve. On the America Quest expedition, Dan Buettner presented the students with a weekly ethical dilemma called Dan's Dilemma, for example whether or not to photograph the remain in Hopi gravesites. At the end of the week a summary of students' responses was posted, along with a sample of supporting explanations of their choices. A weekly dilemma calls on them to think outside of themselves, while calling on their own personal experience to make informed decisions.

As with any trip, time, distance, cost, location, and supplies are important things to be aware of.

Figure 1. Example of AmericaQuest Daily Data

GPS position:	35° 36 minutes N 106° 20 minutes W
Sunrise:	5:54 AM
Sunset:	6:25 PM
Dental floss used:	133 ft.
Toilet Paper Used:	407 ft.
Pictures Taken:	4608
Miles Biked:	260
Miles Hiked:	52
Flat Tires Fixed:	3
Ailments:	Fatigue, sliver in Dan's finger

The America Quest expedition team has placed a variety of data within the context of the expedition. Figure 1 shows an example of the team's daily postings (Buettner, 2000b). This authentic data, both serious and whimsical, is provided as a resource for study of geography, weather, health, measurement, and mathematical computation. The numbers have meaning within the context of the quest, whereas traditional approaches often stretch to create context for manipulation of data.

Personal, archaeological, biological and anthropological information are presented within the expedition team's posted journal entries. A weekly entry by the team biologist, called "Gross and Disgusting," described items that attract the attention of students but also address issues of a biological nature (2000). For example, the team biologist's entry on March 9, 2000 discussed the discovery of road kill.

" The other day I was ... searching for mule deer. I came around a corner and there ... was my first animal!

As I got closer I saw it was a cat but it was so bloated and putrid that I didn't want to get too close. (Allen, 2000)

She goes on to discuss what kinds of animals are more likely to become victims of road kill and why, and that bacteria is largely responsible for road kill clean up. It's easy to see that both the topic and language can pull the reader in, drawing attention to what's "gross" and away from the challenges of reading.

In the case of road kill, the team biologist asked students to think about the issue of road kill in Arizona and apply what they'd learned to the entire United States. She polled them on how the United States should reduce the road kill problem. The expedition experience gave the students a structure upon which informed opinions could be made. Situated cognition may also help with the transfer of problem solving skills to new situations (CTGV, 1993).

Multimedia is a major supporting factor in the America Quest experience. Each weekly Kid Profile, for example, included a video of the host student and a recording of them speaking or singing. In some cases they were speaking in the Navaho language. As virtual members of the expedition team, they can experience more closely what the team in the field is experiencing. Another aspect of the audio-visual nature of the quest site is that it supports the varied learning styles of the participants and provides cues for students who may have learning difficulties.

Brown, Collins and Duguid stress the value of the enculturation of the learner into the domain, or content (1989). By observing the members of the new culture, in the case of the America Quest expedition team, archeologists, anthropologists and biologists, students can learn the behavior and language of the field experts. The environment encourages student interaction with the adult experts as well as with other student team members. Students can communicate through email, message boards and occasional scheduled chat rooms.

Collaboration and cooperation are key characteristics of an anchored learning environment (CTGV, 1993). Real world problems are solved in environments where many people contribute to the search for solutions. Complex problems often necessitate the input of many. Students with weaker skills can contribute to the process while they benefit by learning from their peers. The process of problem solving within a group, requires articulation of thought. Students must be clear about their thinking. When posting to the site, the America Quest team chose models of articulate thought, what they referred to as the most interesting questions and responses, to post on the bulletin board. They are able to view good models of communication.

The America Quest experience also builds a sense of community. At each location the team selects a student for the Kid Profile to be interviewed and introduced on the website. Students often have misconceptions about people from different parts of the world or from different cultures. The Kid Profile helps children develop some global awareness and cultural sensitivity. Profiles include information about the student's family, daily routine, school day, personal interests and goals. Students can relate to another child's experiences, and can see the world from a different perspective. This experience can change a student's, and even a teacher's, global awareness.

The Challenges of Quests in the Classroom

Adoption of a new instructional approach is a challenge for any classroom teacher. Accountability for standardized test scores makes it difficult to shift attention from mandated curriculum schedules. For many, a cultural shift also needs to take place in the classroom. Teachers and students must move from the more traditional didactic to a more process oriented learning approach (SCOPE, 2001).

Research has shown that successful adoption of innovations is dependent on six factors: relative advantage, compatibility, complexity, trialability, observability and reinvention (Rogers, p.15-16). Adopters must perceive that the new technology has a relative advantage over the usual way of doing things. Teachers must believe that the quest experience offers enough value to justify modification of mandated curriculum. They need time to explore the quest and talk to other teachers who believe in the quests' value.

Teachers considering participation in a virtual quest, want to know if this new learning environment is compatible with their own their personal values about education. Teachers who favor problem-based, student-centered and process oriented approaches may be best suited for virtual quests. The complexity of an innovation has an impact on its adoption. Innovations perceived as too complex or difficult to understand are less likely to be successfully adopted. A teacher approaching a quest for the first time must be comfortable with the technology and its management in the classroom. They must decide which quest experiences to use, what instructional focus to choose, and how much time to. Trialability is another factor impacting successful adoption. It gives the uncertain adopter an opportunity to experiment, and become comfortable with the new technology. Teachers have the opportunity to visit archived virtual quests on the Quest Channel at Classroom Connect's website prior to the expedition (www.classroom.com), or to visit the quest website before the quest starts. Important, particularly to adoption of any innovation in the educational setting, is the degree to which the impact of an innovation is observable to others, i.e. teachers, parents and administrators. Improved student motivation makes the adoption of innovation more likely. Once an innovation is adopted, if the adopter is able to modify or reinvent the innovation to customize it to their needs, then it is more likely to continue to be used. Quests, such as America Quest, are designed so that the breadth of the experience and resources leaves room for teachers with varying student or curriculum needs to make decisions about what they will focus on and how it will be used. The more often a teacher participates in quests, the more familiar they become with its components and the more easily they can customize the experience for their students.

The introduction of the virtual quest into the classroom environment brings with it the issue of teacher readiness to use technology as an instructional resource. Roger's model for adoption of innovation touches on this issue when considering the adopter's perception of innovation's complexity, i.e., whether or not the teacher is technically ready to integrate technology into the instructional process. According to Sandholtz, Ringstaff and Dwyer, adoption of technology integration happens in five stages: entry, adoption, adaptation, appropriation and invention (1997).

Teachers at the entry stage are struggling with learning how to operate computers and are more likely to rely on teacher directed activities away from the computer. At the adoption stage, teachers have developed some personal skills with computers and begin to show some interest in integrating technology into their lessons. Teachers at these stages may find a virtual quest overwhelming, and are least likely to participate.

It's in the last three phases that change in instructional practices begins to take place. In the adaptation phase, teachers begin to realize that computers can save time, that students are highly motivated and, therefore, more productive. As teachers develop confidence in and mastery of their own technical skills, they begin to realize the natural association of technology and work. At this stage, appropriation, students are working at the computer more, interacting more collaboratively and are more involved in project-based learning. At the height of the integration continuum is the invention stage. It is at this point teachers have moved to a more constructive approach to learning in the classroom, have begun to question more traditional teaching approaches and are frequently collaborating with other teachers. It seems that teachers at these last three stages would be most ready to consider participation in virtual quests, particularly those in the invention stage. Their collaborative and project-based classrooms are well suited for anchored instruction.

In 1993, the Cognitive and Technology Group at Vanderbilt (CTGV) revisited their 1990 classroom implementation of the Jasper Woodbury series and looked at the challenges of teaching an anchored curriculum. They noted that one of the greatest challenges for the teacher was the shift in their role as provider of information to coach.

Teachers in CTGV's research group questioned the value of the Jasper series activities and wondered where it fit into their curriculum. They also worried that taking their students out of the mandated curriculum for a month would impact their achievement test scores. CTGV found that achievement test results of participating students were equal or better than those students that did not participate (CTGV, p. 58). The Classroom Connect quest experiences are designed with national curriculum standards in mind and should make their acceptance as supporting local curriculum easier.

Anchored instruction, problem-based learning and virtual quests lend themselves to portfolio and performance based assessment (SCOPE, 2001 & CTGV, 1993). Virtual quests, such as America Quest, have assessment opportunities built in; the Weekly Quiz is an online review of the event of the week; performance-based rubrics are available in the Teacher's Lounge; and suggestions for developing student portfolios can be found in the teacher's guide.

Students, too, who are used to a more didactic approach to learning, may not know how to participate in a learning environment that is more process oriented and where the path to solving problems is less clear. Used to working as individuals, the shift to cooperative learning may take some training and practice.

In conclusion, virtual quests are excellent examples of learning environments that engage students in real-world problem solving in authentic settings. Research has shown that students engaged in situated, anchored learning environments performed as well as or better on standardized tests than the control group (CTGV, 1993).

Issues of virtual quest adoption in the classroom, however, include consideration of a teacher's readiness to try an innovative approach to instruction, their perception of its compatibility with their teaching style, the ability to which he or she can try it out, see how well it works and modify it to fit their curriculum and instructional style. Because virtual quests are by nature technologically supported, adoption readiness is also contingent on the teachers' level of technology adoption. Teachers who are

comfortable with technology themselves and as a classroom resource are more likely to find that virtual quests fit in their classrooms.

Methodology and Results

The 2001 MayaQuest expedition was conducted with six elementary school teachers from the author's school. The teachers registered their classes at the Classroom Connect web site and were committed to incorporate MayaQuest as part of their instructional day. These six teachers were then interviewed about their instructional characteristics, issues surrounding the use of quests in the classroom, and their level of comfort with technology. Although conducted as objective research, the author's enthusiasm for the topic introduced some subjectivity. One fifth grade teacher chose to pair up with a third grade teacher and held a peripheral role in the daily planning. All six teachers agreed to the interviews, which lasted 25-45 minutes and were conducted during their planning time. The MayaQuest project was in its second and third week when the interviews were started.

The interviews were audio taped, transcribed and coded in reference to the three focus areas for this study: 1) teacher instructional characteristics including their comfort with and use of technology as an instructional tool, 2) student outcome as a result of the MayaQuest experience and 3) issues surrounding successful implementation of the quest in the elementary classroom.

Each classroom at Sawnee Elementary School has 5 networked, Internet accessible multimedia computers. Each teacher has her own multimedia notebook computer with a video card that allows for projection to the classroom TV, and that is also network able. In addition, there are three mobile mini-labs that contain ten notebook computers per cart. These notebooks have a wireless connection to the network. Students shared the notebooks or worked individually in an activity center arrangement.

Teacher Instructional Characteristics

All teachers taught regular classrooms that included four fourth grades, one third grade, and one-fifth grade classroom. Three of the teachers had tried previous Classroom Connect virtual quests with limited success.

When asked about their comfort level with technology as an instructional tool, on a scale from 0 (no comfort) to 5 (total comfort), 5 teachers in the group placed themselves well above average (4-5) and one teacher rated herself as average (3). (See the chart below.)

Table 1.Characteristics of Teachers Participating in the Study

Teacher	Grade Level Taught	Years Teaching Experience	Prior Online Project Experience	Technology Comfort Self Rating Out of 5	Self-stated Role in Student Learning	Student Desk Grouping
Anne	3	7	No	4	Facilitator	Groups
Betty	4	11	Yes	4	Guide	Groups
Carol	4	11	Yes	4.5	Facilitator	Groups
Diane	4	4	Yes	4	Facilitator/ Direct Instruction	Rows
Edith	4	5	No	5	Facilitator/ Direct Instruction	Rows/ Grouped
Faye	5	25	Yes	3	Manager	Rows

As a result of classroom observation and experience working with these teachers, this author would rate their apparent comfort with technology about the same as or slightly higher than they rated themselves.

The teachers were asked about their approach to instruction, i.e., what they saw as their role in student learning. Ann and Carol defined their role as facilitators. Betty referred to herself as a guide. Faye, on the other hand, referred to herself as a manager. All of the teachers stated that they used cooperative group work as part of their normal daily instruction. Diane and Faye said that they used cooperative group work either weekly or bi-weekly. Edith noted that she used computers more often after the beginning of Maya Quest.

Cooperative group work in a classroom is best facilitated by a desk arrangement that allows for ready communication. Within a week of starting the expedition, Edith had rearranged her classroom to four desk groupings.

Betty, Carol and Diane mentioned that they had attempted previous Classroom Connect quests with limited success, and Betty described her past experience (AmericaQuest 2000) as "overwhelming."

All teachers indicated that prior to MayaQuest their students used computers for word processing, i.e. journaling, letter writing, cooperative story writing and research reports; all took advantage of *Encarta Multimedia Encyclopedia* '97 and the Internet; and several used notebooks/TV connections for whole group demonstration.

Throughout the year Betty, Carol, Diane, Edith and Faye used Power Point presentations for morning announcements that were projected on the classroom TV. These included reminders of what the students should do when they arrived in the

classroom, journal prompts, and learning center management. Several also created hyperlinked learning centers, for example, creating a single slide to explore electricity and magnetism by linking to several related websites (students rotated through the computers stations with this teacher created focus sheets).

Looking at these teachers' level of adoption of technology in reference to the ACOT model none, it is possible to place them loosely along the continuum of growth. Faye's instructional emphasis placed her in the adoption stage, whereas Anne, Carol, Diane and Edith style of instruction placed them at the Appropriation stage.

Student Outcome

Each of the teachers was asked to comment on student outcome, as a result of MayaQuest participation. Several noticed an increase in the students' independent use of technology. Students developed independent problem solving skills through use of the Mystery Photo. For example, the "Mystery Photo" is a picture of an object taken at close range so that its size and context are questionable Students were asked to guess, or infer, what it was with the least number of clues. Betty explained:

> "Of course, the kids love the Mystery Photo... We looked at it, we got our clues...and we still didn't have a clue what it was. But they knew it was some kind of plant. It said it wasn't a bush, so they guessed it was some kind of tree. And then it said something about ants. So, then I showed them how they could go into the Quest library and start looking for websites about plants and helped them to come up with what do we need to look for...We had to look in several places, and they found the tree. They couldn't WAIT to get over to the computer to write their answer...they'll call me over, I found it! I figured it out! Instead of them just guessing and seeing what the answer is, which is what mine did in the past because I didn't do it that way and show them how to find the answer. They're getting so much better at research skills, on the Internet sites, on the Encarta sites. They're skimming for information."

Increased student motivation was noticed by all of the teachers. Betty noted that her class would be so involved in what they were doing that they would forget to go to lunch. Anne, a third grade teacher, noted a student who had come into third grade barely reading at all who was able to read MayaQuest entries and "state five facts he'd read." She also stated that reading this type of text, i.e., expository text helps to "...train the reader's eye, to read for understanding."

Edith used words from the quest for the weekly vocabulary. Faye had observed her students reading the journal entries on the quest website and that "...they read through the text with vocabulary I know they don't know but continued to read anyway to get the gist of what they were saying."

Several teachers noted that learning curricular content in the context of the quest helped students to make connections to their learning. Betty and Carol used ecosystems as their focus. Betty said,

> "They're talking about producers. They're talking about consumers and ...they're using it in conversation now. They read something about an animal...I guess it was about the termite eating rotten wood and I heard them say, 'Oh, so that's a decomposer.' They're making the connection."

All of the teachers commented on the importance of the realism and opportunities for decisions making that are part of the quest experience. Their participation in the quest

> "...was not just a scenario in a book. It's real. Someone's really talking to us and thinking we're important. They think that what we have to say matters. And these fourth graders, they feel so important. That they want to hear what their vote is and that they make a difference." [Betty]

The Kid Profile had a particular impact on their students. The students were most intrigued by Alfredo, a 9year-old shoeshine boy in Guatemala who has lived on his own for 3 years (Buettner, 2001). These teachers did a compare and contrast activity comparing basic characteristics of their lives and Alfredo's. The difference was "stark," as Carol put it.

Table 2. Teacher Selected Curricular Focus for MayaQuest

TEACHER	Science	Social Studies	Math	Language Arts
Anne	Animal classification	Reading maps and charts, communities, compare/contrast	Gathering data, graphing	Expository writing, reading for facts
Betty	Ecosystems, food webs	Reading maps, charts, latitude & longitude, compare/contrast	Gathering data, graphing	Journaling, writing research reports
Carol	Ecosystems, food webs	Reading maps, charts, latitude & longitude, compare/contrast	Gathering data, graphing	Journaling, writing research reports
Diane	Animal classification, weather			Writing research reports
Edith	Animal classification, weather	Reading maps, charts, compare/contrast	Gathering data, graphing	Writing research reports
Faye		(Mentoring)		Reading expository text

Issues Surrounding MayaQuest Implementation

During the year of this study, teachers had access to 5 classroom computers, a teacher laptop and three mobile notebook computer carts available on sign out from the media center. When asked what would keep them from participating in future quests, Betty and Carol stated that access to the technology would be a major factor.

Table 2. Teacher Selected Curricular Focus for MayaQuest

All teachers mentioned the need to find a curricular focus for the quest (See Table 2). Several teachers felt pressure to meet the established curriculum and prepare for the standardized tests.

In response to this perceived pressure, however, some teachers noted that their students learned helpful content and skills in preparation for standardized testing. Betty noted that,"If I hit these objectives [the QCC's] through the quest, they're going to like it better...if I can find the right [curricular] focus I can do any quest."

Assessment of student outcome was an issue raised by several of the teachers, even though no question addressed it directly. "Can I assess all of their growth in understanding of the world, their communication? No!" [Anne] Portfolios, rubrics and use of the quest's on-line quizzes, however, were ways that most of the teachers measured student growth.

Discussion

Teacher and student response to the MayaQuest experience was uniformly positive. Teachers spoke excitedly about their students' response to the experience and about their own enjoyment with teaching with MayaQuest. Comments throughout the five weeks included how engaged the students were and how ordinarily reluctant learners were participating fully. They remarked that their students made connections between their newly introduced content skills and the quest experience. At the end of MayaQuest, all participating teachers agreed that it was a valuable experience that they plan to repeat the following school year.

The teachers in this study were all relatively experienced; even the least experienced had taught for four years (see Table 1). As a result, they had a good understanding of school culture, curriculum management, the Georgia QCC's, and basic classroom management. Their self-proclaimed comfort level with technology was relatively high. These teachers were well along the continuum of technology adoption as defined by Sandholtz, Ringstaff and Dwyer's model (1997).

All of the teachers said that given adequate resources, they would sign up for another quest. For these teachers, learning best takes place in an environment that is interdisciplinary, involves authentic problem solving, is collaborative and supports skill development. Some teachers have found previous quests to be overwhelming. However, once they determined a curricular focus, they looked at the quest's complexity more as a rich resource than a roadblock. Betty, Carol and Diane had tried previous quests. This certainly helped them with understanding what was involved. They all reviewed the teacher's guide thoroughly before starting and Anne said that this was key in her finding the focus for her instruction. Key to their final adoption of MayaQuest, and possibly future quests, was their 1) ability to reinvent or modify the experience to fit their instructional style and curricular needs and 2) the impact that it had on their students' academic growth.

Perhaps the most significant common instructional characteristic of these teachers was how they defined their role in student learning. They proclaimed themselves as facilitators focused on creating a learning environment for their students rather than simply imparting information or delivering curriculum. They actually verbalized a preference for an interdisciplinary approach to instruction, i.e. teaching in this manner helped students make connections across the curriculum.

Their classroom-learning environment regularly included student to student and student to teacher collaboration and cooperation. They recognized the classroom as a community of learners and organized student activities with that in mind daily.

All of the teachers used the classroom desktops, and Anne, Betty, Carol and Edith also used the student notebooks to support MayaQuest. Classroom student assistants, called TechnoBuddies, were responsible for pick up, setup, troubleshooting, break down and return of the notebook carts to the media center. They developed independence from daily technology use, which made it possible for the teacher to focus on facilitating the various classroom activities. In the classroom, students worked in pairs, or sometimes individually at the computer to interact with the MayaQuest web page, do research or publish their Power Point presentations, reports and journal entries. Because these teachers supported collaboration, their students' skills with both the technology and the content grew. The students frequently learned technical and content information from each other.

Key to the success of MayaQuest for these teachers was access to the technology. All but Diane and Faye noted that if they had not had access to the notebooks on a daily basis, that the impact of the MayaQuest experience would not have been as great. There was new information on the site daily, and because there was so much that was interesting, both the students and teachers felt a need to keep up with team's adventures. Daily access also allowed for students to respond daily to journal postings, continue research, draft, revise and produce quality responses to their learning. Missing a day was not a choice they wanted to make. When asked if they would do MayaQuest with just the five desktops in their room, the teachers said that they would, but felt that fewer students would be able to interact with the site daily or produce the same quantity or quality of work. As Betty said, "They have to touch it everyday or you lose them."

The teachers' view of students as part of a community of learners and their willingness to participate in MayaQuest demonstrated a broad view of education. They all had the established curriculum to teach and goals to meet but were flexible enough in their view of education to be able to blend these goals into the quest experience. Curricular focus was very important to their adoption of the quest, and as Betty stated, "If I can find the curricular focus I can do any quest."

The MayaQuest 2001 experience was an excellent example of anchored instruction. Students were placed in a learning environment, or macrocontext, that was truly authentic. They worked with a team of field experts over a period of time to find clues about the mystery of the fall of Mayan civilization, a complex problem with few clear answers. Students worked as

practitioners. They shared their research and theories, collaborating not only with their classroom peers, but also with students around the world and with field experts. Considered part of the research team, their input was valued, which added to the authenticity of their participation.

The most significant outcome of the MayaQuest experience for these teachers was the impact that it had on student learning. According to the teachers, student response to MayaQuest was unanimously positive. Even students considered to be at risk, were excited enough by the content that they seemed to forget that they were reading, writing and doing mathematics. Teachers noticed increased scores on vocabulary tests, increased reading comprehension and writing production. Anne's third grader, a non-reader at the beginning of the year, was reading web site postings and able to state facts about what he'd read during the quest. All teachers noted that student critical thinking showed growth, as evidenced by improved problem solving and journal reflections.

The range of topics and the authenticity of the issues blurred the boundaries between mathematics, science, reading and so on. Aided by their teachers, and often independently, students made connections to curricular goals and applied new learning to a real context. Students meeting children through the Kid Profile were often moved by their counterparts' lifestyle and easily made connections to their own lives certainly developing a broader global view.

Implications

Those teachers who view themselves as classroom facilitators of student learning, take a flexible approach to instruction, have a clear direction in terms of curricular goals, and prefer to help students make connections to learning and real life through an interdisciplinary approach to learning, are more likely to adopt virtual quests. Teachers with well-developed and frequently used technology skills are also more likely to tie quests into curriculum goals. The results point toward these teachers as the best candidates for successful quest experiences.

Teachers, who participate in a virtual quest for the first time, might be encouraged to speak with other teachers who have participated in previous quests. Communication could happen through the Classroom Connect Quest Channel where previous and current quest bulletin boards are available for teachers.

The high level of student motivation, increase in student work production, and good work, cannot be ignored. It is the most exciting outcome of virtual quest participation. By their nature the quests' adventure, authenticity and interaction with the quest team in the field, are so engaging that students seem to learn without realizing it. The teachers in this study noted that the amount and type of reading that their students were doing, i.e. daily high level expository reading, writing, and the development of their students' critical thinking skills through quest activities, did more to prepare their students for standardized testing than did drill and practice. The students developed skills that were transferable to new academic settings.

Access to technology as part of virtual quest success was an issue brought up by teachers in this study. Although they had five networked multimedia desktops in their classrooms, four of them felt that the high level of student achievement was related to the daily use of the additional ten wireless notebook workstations. The implications are that teachers with less technology access will find quest implementation more challenging.

Further Research

The results of this study lead to some new questions for further research. First, would a larger sample of interviewees show the same teacher characteristics for quest participants? Second, would a sample of teachers who do not know the author provide different results?

The next step for this study would be to measure student outcome more quantitatively. How, and how much, does student achievement increase as a result of participation in a virtual quest? Student data on language arts, mathematics, science, social studies and critical thinking skills prior to and following quest participation would give data for comparative study. Standardized test scores of students participating in the quests might be compared to those who use drill and practice preparation.

Final Comments

This study demonstrates the value of the anchored instructional approach to learning, as represented by MayaQuest. Student participants in this study were highly engaged, motivated, and appeared to benefit from increased skill development and work production. Students experienced models of problem solving, teamwork, thought processes and language in an authentic manner, not just as a scenario developed to simulate reality. That authenticity was made possible by access to the technology, bringing the field experience into the classroom while transporting students to the field.

Adoption of virtual quests can motivate and rejuvenate teachers, but certain teachers are also more likely to adopt virtual quests. They are teachers who value a student-centered approach, view themselves as facilitators of learning, are flexible enough to modify the prescribed curriculum to fit the quest experience, and who are comfortable with technology.

Virtual quests are a promising instructional approach. It is not recommended that a school or district adopt them globally. Rather, teachers should be given the opportunity to adopt or not adopt virtual quests. It is also important that they be provided both technical and instructional support as needed. For the appropriately oriented teacher, anchored instruction, in the form of virtual quests, is a very exciting addition to the learning environment.

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