The Omaha Science Media Project: Making a Case for Participatory Learning and New Technology in Educational Curriculum

Abstract

The Omaha Science Media Project, a collaborative project that aims to promote pedagogical and curriculum changes through the concept of "participatory learning", allows teachers and students to work with science and media professionals to create video and audio products that will provide a framework for ongoing research efforts to improve science learning. This paper will review participatory learning and present ways to enhance learning experiences through cutting edge technologies like virtual gaming and mobile applications.

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The Omaha Science Media Project was formed in collaboration with: Omaha Public Schools (OPS), The Nebraska Center for Virology (NCV), The University of Nebraska Medical Center (UNMC), The University of Nebraska State Museum (UNSM), NET, Soundprint Media Center, Inc. (SMCI), University of Nebraska College of Journalism and Mass Communications, and the Department of Psychology and the School of Education and Social Policy's Institute for Educational Research at Northwestern University.

A primary objective for this project is to improve pedagogy among science educators by using media production techniques to produce video and audio products that focus on various science research topics. By doing so, it is expected that this will increase students' level of performance and interest in the science field. From July 6th to July 17th, 2009, the Omaha Science Media Project conducted a summer workshop that gave Omaha Public School teachers and students the opportunity to experience virology research and media production first-hand.

The two-week workshop joined 16 teachers and 15, incoming-freshman, students from Omaha Public Schools with media professionals from NET and professional scientists from the University of Nebraska Medical Center and the Nebraska Center for Virology. Teachers and students were placed into separate groups that researched different viruses; viruses researched included: HIV/AIDS, Influenza, the Coxsackie virus, Herpes, and HPV. Teachers and students were immersed in the scientific community by interacting directly with scientists, science mentors, and even patients

living with these particular viruses. Also, they were immersed in the journalism profession by being taught media production techniques from NET professionals. From this immersive interaction and teaching, each group developed video and audio pieces that documented their learning experience in creative ways. The process of producing these video and audio pieces now provides a framework for ongoing research efforts to improve science learning among teachers and students through media usage.

The idea of immersing teachers and students into particular real-world arenas for an optimum learning experience is not a recent notion, John Dewey wrote about such student immersion in 1899 in his book *The School and Society*. Dewey stated that students learn more effectively when they take part in an occupation: "a mode of activity on the part of the child which reproduces, or runs parallel to, some form of work carries on in social life" (as cited in Cunningham, 2009, p. 46). This immersive style of learning in a particular occupation was what Dewey called "progressive education," which later became known as "participatory learning" by other authors and researchers such as Katrynne Mcgrath Speaker in her article *Interactive Exhibit Theory: Hints for Implementing Learner-Centered Activities in Elementary Classrooms* and Howard Rheingold in his book *Smart Mobs: The Next Social Revolution* (as cited in Cunningham, 2009, p. 46).

This paper will review participatory learning and present an argument for its importance. Also, this paper will present ways that participatory learning can be used in today's classrooms using new technologies. The review and analysis of participatory learning will make clear the need for research studies such as the Omaha Science Media

Project. The presentation of new technologies will help serve as a compass for future projects that wish to expand the research done by the Omaha Science Media Project.

Literature Review

Craig A. Cunningham thoroughly reviews John Dewey's research pertaining to participatory learning in his essay *Transforming Schooling through Technology: Twenty-First-Century Approaches to Participatory Learning.* Cunningham notes that Dewey would place his students in situations where they could experience trades and occupations first-hand, such as, "the building of a house, the spinning of thread, and the making of candles" (as cited in Cunningham, 2009, p. 47). For Dewey, such experience "engages the full spontaneous interest and attention of the children. It keeps them alert and active, instead of passive and receptive; it makes them more useful, more capable, and hence more inclined to he helpful at home; it prepares them to some extent for the practical duties of later life" (as cited in Cunningham, 2009, p. 47).

Dewey did not intend participatory learning to be used for job preparation, but as a way to build skills that will be used throughout life. He believed that the challenge for educators was to present participatory learning in such a way that the job skills and technical abilities become subordinate to the intellectual educational teaching that the experience provides. Cunningham writes: "In theory, this participation in what might be called 'historically situated' occupations could also be used as the basis for teaching related subject-matter in history, geography, and science, fostering mental quickness, 'sense training,' and 'discipline in thought,' achieving 'continuing purposes and well

planned social action,' and building lifelong habits of teamwork, persistence, and organization" (as cited in Cunningham, 2009, p. 47).

Cunningham continues to argue that Dewey's notion of participatory learning is even more applicable today than ever before because the complexities of today's industry can teach students much more than they could in Dewey's time. Cunningham states: "…schools have for the most part rejected Dewey's participatory approach to learning, preferring the decontextualized, nonexperiential, generalized knowledge found in textbooks." He gives three reasons for this: "One is that hands-on experiences take a lot more time than reading about such processes in a book. Another is that newer standards of safety and concerns about liability mandate against direct participation in some activities that might have been deemed acceptably safe in Dewey's time—such as melting wax or carding wool—but that could potentially expose children to hazardous conditions such as heat or allergens. A third, perhaps more important, argument is that contemporary educational objectives are quite different than what Dewey might have wanted for the early grades of his laboratory school" (as cited in Cunningham, 2009, p. 48).

Cunningham notes from Karen Schmelzkopf and Wesley Null, that today's educational focus on measurable outcomes does not allow participatory learning to become a key educational goal. Generic learning goals that are more transferrable, standardized, and measured are preferred over the learning goals and skills that can be acquired through participatory learning (as cited in Cunningham, 2009, p. 48). Because of this, Cunningham addresses Dewey's key arguments for the importance of

participatory learning. He states: "In participatory learning, students and their environments change together as they 'transact' in a cyclical process of action, reflection, and reaction. 'An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment.' Participatory learning activities generate transactions (or transformative interactions) by setting up problematic situations that students, working collaboratively, must resolve" (as cited in Cunningham, 2009, p. 49). He went on to say that students become actively engaged when certain problematic situations are molded to each students' needs and it is with participatory learning where "students gain deep understanding of the significance or meaning of their ideas" (as cited in Cunningham, 2009, p. 49).

Cunningham takes from Annmarie Sullivan Palincar, Laura Klenk, and John Dewey, stating: by nature, participatory learning is collaborative; thus, it is a very democratic process in which students learn from each other. Students form a "miniature social group in which study and growth are incidents of present shared experience" (as cited in Cunningham, 2009, p. 50). Cunningham takes from Russell Warhurst and John Dewey by quoting: "Like inductees into a new profession, students immerse themselves in a socially mediated context or situation in which meaning is constructed. Social participation then mediates the process of turning students into responsible citizens, with the priorities, values, and 'intellectual and emotional disposition' necessary for ongoing democratic participation" (as cited in Cunningham, 2009, p. 50). He concludes: "…participatory learning is the most effective means of fostering intrinsic motivation, intelligence, the disposition for social cooperation, and an appreciation of aesthetic experience, and for helping students develop the habits of mind necessary to continually

reconstruct their understanding and to direct the course of subsequent experience" (Cunningham, 2009, p. 50).

Today's technology has given students and young people in general, the opportunity to interact and "participate in a wide variety of socially mediated learning activities" (Cunningham, 2009, p. 50). These new technologies provide students the ability to interact using up-to-date knowledge and current, applicable situations. Cunningham categorizes these new technologies into: "practical computing, distant communications, personal computing, simulations, multimedia, and social networking" (Cunningham, 2009, p. 51). He notes that computing became mainstream in the 1960s; distant communication for educational use in the 1970s; simulations for educational use in the 1980s; multimedia in the 1990s; and social networking in the first decade of the twenty-first century. However, Cunningham states: "At the beginning of the second decade, virtual reality environments, which combine aspects of all the previous advances, are likely to become the most important educational technology" (Cunningham, 2009, p. 51).

The advance of computing technology throughout the twentieth century has now combined to provide "amazing opportunities for participatory learning in virtual participatory environments" (Cunningham, 2009, p. 52). An example of these new technologies is "in massively multiplayer online roleplaying games (MMPORGs) such as EverQuest and World of Warcraft" (Cunningham, 2009, p. 52). Cunningham takes from Marc Prensky by stating: because these games give the user the ability to interact with different situations and with other users through the internet to complete particular game

objectives, these games are being seen as more of an educational platform than pure entertainment (as cited in Cunningham, 2009, p. 52). However, the more sophisticated technology of Multi-User Virtual Environments (MUVEs) has evolved out of MMPORGs. MUVEs, or simply, virtual reality operates to "bring users together in a variety of 'worlds' affording a huge variety of interactive possibilities beyond gaming" (Cunningham, 2009, p. 52). Cunningham takes from Cathleen Galas, Diane Jass Ketelhut, Barab et al., Julie Sykes, Ana Oskoz, and Steven L. Thorne by quoting: "Some K-12 educators are using virtual environments—either relatively open 'worlds' such as Second Life or explicitly educational worlds such as River City and QuestAtlantis—to support student learning" (as cited in Cunningham, 2009, p. 53). Cunningham comments on the applicable use of MUVEs by writing: "Certainly, a virtual world can present a venue for engaging in historically situated occupations such as making candles or weaving fabric. But the real value of virtual worlds is to support activities that cannot easily be replicated in a typical school classroom because of issues of cost, safety, availability of particular environmental features, equipment or human resources, or because the activity would normally be too difficult for the students" (Cunningham, 2009, p. 53).

An example of how MUVEs have been integrated into classroom curriculum is found in the study: *Children's Participation in a Virtual Epidemic in the Science Classroom; Making Connections to Natural Infectious Diseases*, conducted by Nina Neulight, Yasmin B. Kafai, Linda Kao, Brian Foley, and Cathleen Galas. Their study focuses on the MUVE, Whyville and its use in teaching students about infectious diseases. They studied 46 sixth grade students during a four-week period that

experienced an outbreak of Whypox through avatars they created in Whyville on their computer. When an avatar was infected with the disease, its appearance changed and the students' ability to interact with other avatars was also affected. Their study had two initiatives: One, "…to understand in which ways students perceived Whypox as a natural disease;" two, "…to know how students draw on their participation within a virtual disease simulation in order to expand on their knowledge of natural infectious diseases" (Neulight, Kafai, Kao, Foley, & Galas, 2007).

The entire curriculum that was adapted for this study covered a 10-week period, which was led by teacher instruction. Classroom activities such as watching videos, conducting experiments, and completing worksheets, ran in conjunction with the students' Whyville experience; all activities were videotaped. Participants' avatars traveled through Whyville via drop down menus that took their avatar to different destinations where they could experience different activities such as: "science related activities about infectious diseases; recreational games like checkers; the Center for Disease Control, where members could read about past outbreaks of Whypox authored by children and science educators; and the Whyville Times, the website's online newspaper that included participant-authored articles about the site. Members could communicate with other participants synchronously by having a cartoon chat box appear above their avatar face or members could communicate asynchronously through ymail, an internal mail system, and a bulletin board system" (Neulight et al., 2007).

When the curriculum dictated Whyville be infected with Whypox, the teacher conducted classroom discussions to gauge students' thoughts about the infection.

Further, the teacher used graphs that showed how many avatars were infected on a specific date; they used this data "to discuss how Whypox was affecting participation in Whyville" (Neulight et al., 2007). Also, students were given two surveys. An infectious disease survey that gauged students understanding of natural infectious diseases and a Whypox survey that gauged the student's connection between the virtual and the natural disease. Both surveys were given to students at the beginning and the end of the study.

The results indicated that because the study lasted 10-weeks, the students were able to indentify with the fact that Whypox was not going to go away quickly. Further, because the experiment was so immersive, the students started to refer to themselves as actually having the Whypox disease. This component allowed the students to identify and connect Whypox with actual diseases such as the chicken pox (Neulight et al., 2007). Also, by using avatars, students "experienced a disease without physical harm to their actual self, a form of immersiveness absent from traditional science curricula of instruction from textbooks, videos, and laboratory experiments" (Neulight et al., 2007). One finding in particular noted that although the student's level of understanding about the cause of Whypox did not "go beyond observable explanations such as touching someone or sneezing," students did not think Whypox was caused by a "computational mechanism." Also, the study concluded: "…having an integrated curriculum around the participatory simulation stimulated teacher-student discussions about the causes and spread of virtual and natural diseases" (Neulight et al., 2007).

This study is a prime example of how MUVEs are being adapted for use in the classroom, specifically the science classroom; as Craig A. Cunningham wrote concerning

the works of John Dewey: "We never educate directly, but indirectly by means of the environment. This applies to virtual environments as well as real ones. Almost any situation can be designed in a virtual world, including what I've been calling participatory learning, involving an endless variety of problematic aspects tweaked for any given audience or learning outcome" (as cited in Cunningham, 2009, p. 53).

Another technology that can connect teachers and students is mobile applications. The advent of the Internet has permitted educators to find new ways to communicate with learners. In fact, many higher-education institutions have taken the step to implement virtual learning environments into their traditional classroom teachings (Evans, 2008, p. 492). With the development of mobile technology and applications, traditional ways of teaching and learning through classroom settings are expected to achieve higher levels of engagement and interactions between teachers and students.

Even though the concept of mobile learning is still evolving along with the ever-changing world of technology, one obvious definition and conceptualization of mobile learning can be described as "learning delivered or supported solely or mainly by handheld and mobile technologies such as personal digital assistants (PDAs), smartphones or wireless laptop PCs" (Traxler, 2007, p. 4). It not only incorporates desktop-based virtual learning environment into mobile and wireless channel but also allows learning to take place anytime, both inside and outside of the classroom (Siau & Nah, 2006 p. 1).

As learning has now being viewed as a situated and collaborative activity (as cited in Sharples, Taylor, & Vavoula, 2005, para. 11), where people individually or

collectively have issues to resolve or knowledge to share, mobile-networked technology allows people to learn and interact regardless of where they are. Being engaged in collaborative learning activities provides an opportunity for students to "take hand in shaping the informational, communicational and learning process, rather than remaining a passive and individual recipients" (Zurita, Antunes, Baloian, & Baytelman, 2007, p. 1435).

Unlike e-learning that usually requires access to a desktop computer and wired Internet access, mobile learning distinguishes uniquely given its ability to "facilitate 'just-in-time' learning where learners can often take advantage of unexpected free time since they have their devices with them" (Evans, 2008, p. 492). Therefore within the classroom, portable mobile devices provide teachers and students with more flexibility as well as new opportunities for interaction. If appropriately facilitated, mobile learning can contribute to classroom learning by enabling instructional materials and interaction between teachers and students even while they are on the move (Corbeil & Valdes-Corbeil, 2007, p. 54).

Naismith et al. hypothesized that mobile technologies will have a huge impact on learning (as cited in Corbeil & Valdes-Cornbeil, 2007, p 55). These predictions, if accurate, can have significant implications that are both an outcome of, and an opportunity for, mobile communication in an educational setting (Corbeil & Valdes-Corbeil, 2007, p. 55):

a) Learning will focus more on the individual learner's environment rather than the classroom.
b) Learning will involve learners making useful connections to resources and other people.

c) Learning will be quick and efficient given the ability to instantly publish learners' observations and reflections, which in turn empowers learners to become investigators of their own environments.

d) The ability to easily capture and record life events will help learners in recall and collaborative reflection.

e) Distributed collaboration and mobile team opportunities will be greatly increased.

Realizing the potential benefits and pedagogical implications of mobile learning, mobile developers have been trying to create mobile applications that can be used specifically in a classroom setting. Suitable devices, like digital media players (e.g. iPods, MP3 players), personal digital assistants or PDAs (e.g. Palm, Pocket PC), and smartphones (e.g. iPhone, Blackberry), allow learners to either vary their study location or have access to the same resources or classroom materials on their very own devices. The following section lists several commonly used portable communication devices and the potential instructional uses of relevant mobile applications both inside and outside of the classroom.

Personal Digital Assistant (PDA)

Personal digital assistants (PDAs) have been used frequently in the classroom over the years. They combine "computing capability, Internet access, and networking features in one system with a calendar, notepad, address book, and productivity tools" (Corbeil & Valdes- Corbeil, 2007, p. 53). New educational mobile applications, such as quizzing and trivia programs, along with assignment-tracking tools, show great benefits for both teachers and students (Corbeil & Valdes-Corbeil, 2007, p. 52).

One particular example is Vision@Hand, a cutting edge application that allows teachers to control classroom computers from a PDA, smartphone, or other wireless mobile device. Launched in the United Kingdom in 2008, teachers can now find new way to share an individual student's work with the entire class without having to leave the student's side. Further, teachers can also hold the entire class's attention during important discussion and control students' Internet access during class time by using a mobile to lock student computer screens, keyboards or their mouse (Six Degrees, 2008, para. 4).

Smartphone

Very much like PDA, a smartphone "combines telephone capability with a PDA, camera, video, mass storage, MP3 player, Internet access, and networking features in one compact system" (Corbeil & Valdes-Corbeil, 2007, p. 53). Students are able to download and play audio and video lectures or podcasts, access email and Web content, send and receive text messages, and use it for mass storage.

Seeing the increase popularity and potential in mobile learning, telecommunication companies like AT&T introduced a mobile system called UpperClass that distributes a wide range of campus-related information to students, faculty members, parents and administrators. The application not only gives college community with real-time access to academic-based information, it can also be used for ticket purchases, fundraisers, weather alerts or other important notifications (Harrison, 2009, para. 1).

Another mobile application known as "Super-Clickers" is designed specifically for iPhones by programmers at Abilene Christian University to let professors set up instant polls in various formats and receive instantaneous feedback from the students (Young, 2008, para. 3). "Clickers" are originally small wireless gadgets that look like television remote controls and are used especially in large lecture courses so that a professor can view responses or share them with the class by projecting them on the screen. One of the biggest drawbacks of the clicker systems, however, is that every student in the course must own a clicker and they have to remember to bring the gadgets to class, which does not happen at all times (Young, 2008, para. 4). Therefore, using smartphones like iPhone instead of dedicated clicker gadgets solves the issue since most students own a regular cell phone, if not a smartphone, and they usually keep the devices on hand.

Podcasting

Podcasting is a form of mobile learning in which "a device is used to listen to or watch an audio or video broadcast" (Evans, 2008, p. 492). In addition to the fact that producing podcasts is relatively easy for educators, when combined with wikis and blogs, podcasts can also enhance the learning experiences of students as well as their engagement and reflection throughout the learning process (Baird & Fisher, 2006).

In a study conducted to investigate the effectiveness of mobile learning in the form of podcasting, a separate group of college students were given a series of podcasts upon completing a course in Information and Communications Technology. They were then required to complete an online questionnaire regarding their experience (Evans, 2008, p. 491). Results from the study suggest that "students *believe* podcasts are more

effective revision tools than their textbooks and are more efficient than their own notes in helping them to learn" (Evans, 2008, p. 491). They also indicate that they are most receptive to learn class material via podcast than traditional lecture or textbook.

This study shows the significant potential of podcasting in enhancing the interest students have for their course materials because they believe it is "efficient, effective, engaging, and easily received learning tools for revision" (Evans, 2008, p. 497). Therefore, it is feasible to conclude that such belief toward the effects of cutting edge technologies like podcasting can further enhance students' willingness in using these tools to help them learn in a classroom setting.

While mobile technology can complement with classroom education by enabling easy sharing or receiving of class material as well as increasing interactivity between teachers and students, there is also concern that mobile devices might "disrupt the carefully managed environment of the classroom by bringing into their own multimedia phones and wireless games machines, to hold private conversations within and outside the school" (as cited in Sharples, Taylor, & Vavoula, 2005, para. 19). Another challenge in mobile learning is the possibility that tech-savvy students might have an advantage over non-technical students, or students who do not own a mobile device, thereby creating a sense of isolation or further widening the gap between the tech- and non-technical students. In addition, mobile learning raises ethical issues of privacy as applications like Vision@Hand and "super clickers" allow teachers and parents to keep track of every intimate detail of learning or even blocking students' access to the Internet during class time. This can be seen as a "disturbing vision of childhood without privacy,

(especially when) companies bring to market electronic tagging devices for parents to track the location of their children" (Sharples, Taylor, & Vavoula, 2005, para. 20).

Although the subsequent implications of mobile learning on student achievement remain unclear, mobile learning capabilities in a classroom setting will continue to grow along with the evolutionary shift in the world of technology as more mobile applications designated to be used in classrooms will continue to be introduced and refined over the years. Teachers and students who already use mobile devices will find ways to integrate them into their daily teaching and learning routines (Corbeil, Valdes-Corbeil, 2007, p. 57). Telecommunication companies, on the other hand, will seek ways to develop applications that help users gather or present content in formats that are easily accessible through various mobile platforms. As these devices become more powerful, teachers and students can take advantage of their benefits by using and incorporating them into traditional classrooms to achieve better teaching and learning experiences.

Discussion

The references to the works and thoughts of John Dewey that Craig A. Cunningham mentions in his essay *Transforming Schooling through Technology: Twenty-First-Century Approaches to Participatory Learning* are congruent with the aim of the Omaha Science Media Project. John Dewey noted that students learn better when they participate in an occupation, which he defined as: "a mode of activity on the part of the child which reproduces, or runs parallel to, some form of work carried on in social life" (as cited in Cunningham, 2009, p. 46). The Omaha Science Media Project provided 15 incoming freshman students the opportunity to experience both the occupations of science research and professional journalism during the summer workshop of 2009. The

students had the opportunity to immerse themselves in the science and journalism fields, an immersive style of learning now called "participatory learning," which was earlier coined by John Dewey as: "progressive education" (as cited in Cunningham, 2009, p. 46). On the other hand, 16 teachers had the opportunity to experience how the students reacted to participatory learning, thus, providing them the opportunity to implement this style of learning into their classrooms.

Amy Spiegel noted in her report: *Omaha Science Media 2009 Workshop Follow-up: Participating Teachers' Plans and Activities Using New Science Media Skills*, that all 16 teachers that participated would incorporate student-generated activities into their classrooms and a third had already done so, as of September 2009. Spiegel notes: "…student media projects are taking a variety of forms, some as learning tools for the students creating them, some as teaching tools for other students to use, and still others are being used as a means of assessing student learning or as a significant part of a portfolio of student work" (Spiegel, 2009, p. 3).

Looking forward, teachers have the ability to mold learning activities that engage students more effectively with the technology of Multi-User Virtual Environments (MUVEs). One MUVE in particular, Whyville, was adopted into a science classroom to teach students about infectious diseases in the study: *Children's Participation in a virtual Epidemic in the Science Classroom; Making Connections to Natural Infectious Diseases*. The study immersed students into a virtual town called Whyville where students would eventually contract and spread the disease Whypox. Throughout the experience the teacher conducted classroom discussions, and tracked the rate of disease

infection on visual graphs. Because the study was 10 weeks long and because it was so immersive, the students learned to identify that their Whypox disease would not simply disappear rapidly and the students referred to themselves personally as having the Whypox virus. Also, the study noted that students could identify Whypox with other viruses such as the chickenpox.

Besides virtual gaming, mobile technology plays a pivotal role in learning science both inside and outside of the classroom. It supports a wide range of activities for learners of all ages and provides each student the opportunity to interact with the technology on a personal basis. Portable mobile devices like PDAs, smartphones, and other wireless mobile products "enable mobility, facilitate mobile learning…and allow teaching and learning to extend beyond the traditional classroom" (Corbeil & Valdes-Corbeil, 2007, p. 54). Within the classroom, these devices give teachers and students increased flexibility and alter the way they interact with one another. In other words, teachers can no longer view themselves as distributors or transmitters of knowledge but "facilitators of learning in order to create new learning pathways that are more situated, personal, collaborative, and long-term (Corbeil & Valdes-Corbeil, 2007, p. 55). With a mobile device on hand, students are able to access the Omaha Science Media Project's website or any other science-related webpage to download audio and video files or search for relevant resources for their class projects at anytime regardless of their location.

One of the aims of the Omaha Science Media Project is to develop an interactive virus learning game to engage and motivate students to learn science-related knowledge from it. In fact, the learning outcome of mobile technology in a classroom setting has

already been studied by researches in the past. A study in 2006 explored the "distinctive contribution of PDAs, under the hypothesis that their value rely on integrating them to a methodology that enhances mobility, technology integration into curriculum, problem-solving, and interactive games" (Sanchez, J., Salinas, A., & Saenz, M., 2006, p. 18). Results showed that "learners took decisions and got along in the use of technology because they felt comfortable with digital technologies. Even if they did not know a specific device, they could transfer knowledge and experience obtained in the use of other technologies. (Sanchez, Salinas, & Saenz, 2006, p. 28)"

As the potential of mobile technology and its applications continues to be tested and evaluated, issues pertaining to how mobile learning will impact teaching and learning are worth addressing in future research: Will it be sufficient to develop mobile gaming applications for course content other than science? Will the quality of instructional content be enhanced or reduced by transferring to a mobile-compatible format? What are some of the ethical issues that will arise when it becomes easier for students to acquire and share information inside and outside of classroom?

The question of whether mobile learning will be adopted by teachers and students will "depend to a great extent on how efficient and necessary they consider the services and features" (Corbeil & Valdes-Corbeil, 2007, p. 57). Past studies have shown that students are willing to take advantage of mobile technology because they believe applications that are being offered can enhance their learning experience even beyond the classroom.

Although the concept of mobile learning is constantly evolving along with the development of technology, teachers and students can respond to this situation by "exploring how mobile devices may be used for teaching and learning… and work toward the realization of a long-term vision for the development of institutions and training departments to take account of new staff and student development needs" (Kukulska-Hulme & Traxler, 2005, p. 3).

As noted above, the Omaha Science Media Project's main goal is to promote pedagogical and curriculum changes through the use of media production techniques. During the 2009 summer workshop, teachers and students worked with media and science professionals to produce video and audio products. Participating teachers are, as of September 2009, incorporating collaborative techniques learned during the workshop into their curriculum. Technology such as Multi-User Virtual Environments and mobile applications are now available that allow participatory learning to take place in classrooms in new innovative ways.

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