

Teaching and Learning Using 1 to 1 Wireless Mobile Technology

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Abstract

Mobile computers and wireless networks allow students to have access to information anywhere, anytime. Because the world today is a knowledge-based economy, a wireless mobile environment is becoming necessary to give students access to information all the time. Advances in technology require faculty to be responsive to new methods of teaching and become skilled in various aspects of information technology using Tablet laptop computers. Because students have a computer in front of them all the time in the classroom (1 to 1), new methods of teaching are required to keep students engaged in the content and what is happening in the classroom. Using a mobile wireless computer along with a course management system changes the classroom to a paperless environment. Innovative practices in teaching using wireless mobile technology can impact student learning and allow teaching methods that match student learning styles.

Introduction

In 2004 Dakota State University, Madison, SD, implemented the WMCI (Wireless Mobile Computing Initiative) and developed the campus into a wireless mobile computing environment allowing students to travel back and forth between buildings with their Tablet laptop computers. With wireless mobile computing networks, the classrooms become computer labs. Gateway m275 Tablet PC's are used on campus by faculty and students as the mobile computer in the classroom. WebCT is used as the classroom management tool allowing faculty to communicate course materials to students. The use of new technologies in the classroom can be seen as an opportunity or as a risk by teachers and students. The new technologies can improve learning in the classroom or impede the learning process depending on how the technology is used.

Review of Literature

Key principles and guiding values determine how to use technology in the classroom. Students learn more in class when interacting with the course content using a computer. Students like using a computer to access instructional materials. Students seem to have a positive attitude toward using the computer to supplement classroom instruction (Nilson, 2003). The principles of learning that are part of the general field of educational philosophy and relate to using instructional technology are (1) students learn by doing; (2) without motivation, learning is diminished; and (3) for effective learning, responses are immediately reinforced. Learning improves when the learner is an active participant in the educational process. The method of learning that works best for an individual is the one where the learner becomes the involved in the process. Learners prefer learning experiences that are participatory. Learning is faster when new concepts are used

in the present and the future. Educators need to assess the learner's interest, current skills, and goals and structure the learning environment and methods of teaching that are most satisfying and effective for the learner (Honolulu Community College Faculty Development Committee, 2005).

Alley and Jansak (2001) indicate that the principles of cognitive learning are forces in the design of online learning. Key characteristics of effective learning apply to the development of online learning and traditional learning. The student is engaged in learning with attention focused on the activity. The chance of success is greatest when the student is informed of the expectations for learning. The content of the course should be organized in meaningful sequences, with guidelines to help the student. Learning is interactive, and learners need to be periodically informed of their progress with successes reinforced.

The active role of constructing knowledge and using activity is more meaningful for learning (Piaget, 1972). The study of the effects of prior knowledge, experience, and learning-style provide a framework on how students process information and knowledge gained over time and how knowledge is transformed and used. Learning styles help understand strengths and weaknesses of learners in the classroom (Merriam and Caffarella, 1999). Flannery (1993) indicates that cognitive learning theory for learning takes into account both global and analytical ways of processing information. Teachers who understand the way students learn work with the students' strongest learning style until the students achieve success and perceive themselves as able to learn. The students then are taught to learn in another learning style. In order to facilitate learning in both the global and analytical style, teachers develop learning settings in the classroom that promote global and analytical processing of information in various degrees. Teachers can find ways using technology to teach to the different skills of the learners in the classroom and to match their teachings, texts, and structure to the students' learning styles.

Dunn and Dunn (1993) state that for effective instruction teachers need to use a variety of instructional methods to meet the different learning styles of students. Merriam and Caffarella (1999) indicate that John Dewey's work has a major impact and influence on learning. Dewey's principles of learning indicate that (a) learning occurs through the process of engaging in problem solving, (b) learning is active and exploratory, (c) student learning is participatory, and (d) the teacher is a guide for students. Padgett and Conceicao-Runlee (2000) indicate that as students use more technology, students expect online access to reading materials, syllabi, and resources. Teachers need to be more responsive to students and understand the different ways students learn. Using technology, teachers can emphasize individual levels of motivation and design activities appealing to all students from the motivated learner to the inexperienced learner.

Purpose

The purpose of this paper is to examine how engaging students in course content using wireless mobile Tablet computers affect student learning. Students in three programming classes use wireless mobile Tablets with WebCT where all course materials are available for students. The course materials include the syllabus along with chapter objectives notes, and key terms. Using email helps students send questions about problems with assignments. An assignment page in WebCT lists all the assignments students are to complete. Students go online to read about the assignments, download the files, and complete the work. Once the work is completed, students upload the assignment to the teacher in WebCT. All students' assignments are downloaded by

the teacher to correct and evaluate using the stylus capabilities of the Tablet and then sent back electronically to the student on WebCT. WebCT helps get the course materials to the students, and students use the Tablets to complete the assignments. WebCT is used for online five- to ten-point quizzes to keep students on task with reading the textbook. Quizzing takes a very short period of time, and cheating is not a concern since the quizzes are timed. Tests are given to students who use their own Tablets, and the tests are also timed so students do not have time to look up notes on their computers. Students also have chat and email available, but timing the test helps discourage communication with other students. Timed tests lasted 50 minutes while quizzes are five minutes. Even though students have notes, key terms, problems, and worksheets downloaded on their Tablets, timing tests and quizzes on WebCT discourage students' use during tests. Students are more concerned with answering all the questions in the time allowed rather than trying to look up answers and losing time during the test. All of the activities involving assignments, programs, quizzes, and tests engage the students in course content using 1 to 1 computing.

Research Questions

The study is to determine the effects of wireless mobile technology on student learning in the classroom. The numeric variables in the study includes ACT and course grade. The same teacher teaches all three classes with the classes taught one hour a day three times a week. All students take the programming class as part of the general education requirements and have a Tablet computer in the classroom to use during class. The sample size of the study is 77 students which is a small sample to determine statistically sound analysis. The study addresses the following questions:

1. Is there a difference in students for those who used the Tablet before coming to college and those who did not?
2. Is there a difference among students in how the Tablet is perceived as a tool in the classroom?
3. Is there a difference in how students perceive the Tablet as a distraction in the class?
4. Are those students who see the Tablet as an effective tool in the classroom visual and kinesthetic learners vs. auditory and read/write learners?

Hypotheses

These issues suggest several hypotheses that focus on outcomes for instructional technology using 1 to 1 wireless mobile computers. The hypotheses include:

Hypothesis 1: There is no difference in the two groups of students for those who used the Tablet before coming to DSU and those who did not.

Hypothesis 2: There is no difference among in how students see the Tablet as a tool in the classroom.

Hypothesis 3: There is no difference in the two groups of student on how students perceive the Tablet as a distraction in the class.

Hypothesis 4: There is no difference between those students who see the Tablet as an effective tool in the classroom in terms of learning style (visual and kinesthetic learners vs. auditory and read/write).

Design & Procedure

The subjects included 77 students in general education programming classes that use Tablet computer technology and programming software. The seven-question survey was administered to students who anonymously self-reported the information during class. Explanations were given to the students to determine the course grade as a percent and to complete the 20-question VARK Learning Styles Inventory to determine their current learning style. This learning-styles inventory can be found at the following website: <http://www.vark-learn.com/english/index.asp>. Students took the inventory and determined their predominant learning style. Once the results were reported, the results were then coded with visual and kinesthetic learners together and auditory and read/write together. Visual and kinesthetic learners were combined because the two learning styles focus on active engagement with hands-on activities. Auditory and read/write were combined as the focus is on students who listen to the teacher lecture or read to understand content.

Instrument

The instrument used was a seven-question survey that students were required to complete. The six-question survey consisted of the following questions:

1. What is your grade (as a percent) in the course?
2. What is your ACT score?
3. Did you use a Tablet PC before coming to DSU? (1 = No; 2 = Yes)
4. How do you see the Tablet PC as a tool in the classroom?
(1 = Not helpful or Neutral; 2 = Helpful or Very helpful)
5. Do you feel the Tablet PC is a distraction for you in the classroom? (1 = Yes; 2 = No)
6. What is your preferred learning style?
(1 = Auditory or Read; 2 = Visual or Kinesthetic)

Students took the learning style inventory located at <http://www.vark-learn.com> and reported their learning style as determined by the 20-question VARK inventory

Results

Descriptive statistics and independent t tests were used to analyze the results of the data. The mean for the class using grade (percent) in the course is 80.30% while ACT mean for the course is 21.52. A Spearman correlation coefficient was calculated for the relationships between the student's current grade as a percent in the course and the student's ACT score. A significant positive moderate correlation was found ($r(77) = .606$, significance at the 0.01 level).

1. Difference in the two groups of students for those who used the Tablet before coming to DSU and those who didn't using grade in the course.

The data shows a significance difference in the means of the two groups with significance at .013 with $p < .05$. The mean for students (number of students = 38) who used the Tablet before coming to DSU was 77.08, and the mean for students (39) who did not use the Tablet before coming to DSU was 83.44. Looking at the data itself, the mean is higher for those students not using the Tablet while those using the Tablet had a lower mean. This indicated that other variables may have caused the difference in the means.

2. Difference in the groups of students on how students see the Tablet as a tool in the classroom using grade in the course.

The data shows no significance in the difference in the means of the two groups with a significance at .128 where $p > .05$. Those who see the Tablet as an effective tool in the classroom (67) have a mean of 81.06 while those who did not see the Tablet as an effective tool or felt neutral about the Tablet (10) have a mean 75.20. With such a small sample size of 10, the conclusion cannot be determined to be statistically significant.

3. Difference in the two groups of student on how students perceive the Tablet as a distraction in the class using grade in the course.

The data shows that there is a significant difference in the two groups of students and how the students perceive the Tablet as a distraction in the classroom with a significance at .000 where $p < .05$. Those who see the Tablet as distraction in the classroom (32) have a mean of 74.78 while those who did not see the Tablet as a distraction (45) have a mean of 84.22. The data indicates that those who see the Tablet as a distraction and have a lower mean may be those students who are not on task in the classroom and use the Tablet for email, chat, games, etc. in class. Those who do not see it as a distraction and have a higher mean may be those students who are on task in the classroom and use the Tablet as an instructional tool while in the classroom.

4. Difference between those students who see the Tablet as an effective tool in the classroom in terms of learning style for visual and kinesthetic learners as opposed to auditory and read/write.

The data shows that there is no significant difference in the two groups of students based on learning style with a significance at .887 where $p > .05$. Those students who are visual, kinesthetic learners (60) have a mean of 80.20 while those who are auditory, read/write learners (17) have a mean of 80.65. The sample size of 17 is small which makes the results statistically insignificant.

Findings

1. There is a correlation between course percent and ACT score in a classroom. According to the data, there appears to be a correlation between the student's current percent in the course and the student's ACT score.

2. There is a difference in the two groups of students for those who used the Tablet before coming to DSU and those who didn't using the grade in the course. A significant difference was found between the means of the two groups ($t(77) = 2.549, p < .05$). Analyzing the data, the mean is higher for those students not using the Tablet while those using the Tablet had a lower mean. The two groups being compared had other variables that may have caused the difference in means such as ACT score and previous programming courses; therefore, the data indicates that Hypothesis 1 is rejected.
3. There is no difference in how the students see the Tablet as a tool in the classroom using their grade. The analysis of data indicates no significance in the difference in the means of the two groups ($t(77) = -1.539, p > .05$); therefore, according to the data, Hypothesis 2 is not rejected.
4. There is a difference in the two groups of student on how students perceive the Tablet as a distraction in the class using the grade in the course. Distractions include chat, email, games, and surfing the Internet. A significant difference was found in the two groups of students and how students perceive the Tablet as a distraction in the classroom ($t(77) = -3.932, p < .05$); therefore according to the data, Hypothesis 3 is rejected.
5. There is no difference between those students who see the Tablet as an effective tool in the classroom in terms of learning style (visual and kinesthetic learners as opposed to auditory and read/write). No significant difference was found in the two groups of students based on learning style ($t(77) = .143, p > .05$); therefore, analyzing the data, Hypothesis 4 is not rejected.

Conclusion

The teaching style in the classroom uses hands-on activities with students readily working on the computer to complete the activities. The activities include online quizzes and tests taken in class, programming assignments that are downloaded and completed, and assignments that are completed and submitted in class. Using WebCT to post course materials, assignments, and online quizzes provides access to assignments and resources and allows availability all the time. When students engage with course content through active learning activities using Tablet computers, students are on task and motivated to use computers to access resources and complete assignments. Students come to class to complete the assignments using the Tablet, but the Tablet is a distraction in the class if the teacher does not keep the students actively engaged with activities during the class.

After the Tablet has been used in the class and students develop organizational skills for handling a wireless mobile computer, the survey should be given again to analyze if distractions in the class decreased or were eliminated. For future study, the Tablet as a distraction in the classroom should continue to be studied as students increase their skills at managing time in class, and faculty increase skills at engaging students during class. The purpose of the survey and paper was to determine if mobile wireless Tablet technology made a difference in student learning. The data indicates that the Tablet may make a difference in learning because the Tablet is a distraction away from the teacher and what is happening in the classroom. Teachers have to engage students in learning activities to keep their attention on course content. Teachers have to develop

new teaching strategies using technology to engage students and to focus students' attention in class so students use computers for learning tasks.

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