Online Learning: Is it as Effective as Traditional Classroom Delivered Instruction?

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It is undeniable that online learning, also called distance learning, is here to stay. Online learning consists of classes that are fully delivered via the internet, or a combination of internet delivered classes and periodic meetings in a traditional classroom. Clark and Mayer (2003) state that almost 90% of all universities with more than 10,000 students offer some form of distance learning, nearly all of which use the Internet (12). One of the major advantages of online learning is the flexibility it provides the student. Tucker (2003) states that distance learning classes reach a broader student audience, better address student needs, save money (for both the school and student) and more importantly use the principles of modern learning pedagogy. Adults that cannot attend traditional college classes due to work or family requirements can take college classes through web-based technology that better fits their schedule. Colleges are not the only institutions that employ online learning. Grade schools and businesses around the world utilize online training. In 2001 approximately 11% of all business related training was delivered via computer (Clark and Mayer 2003). An ongoing and important debate in the education community questions whether online learning is as effective as traditional classroom learning. With the amount of time, money and other resources dedicated to online learning, the level of learning students reach is an important factor in judging online learning effectiveness. The purpose of this paper is to analyze the following thesis: Online learning is more effective, as judged by the students’ level of understanding, than
traditional classroom delivered instruction. The level of understanding is judged by grades students receive through the online learning.

In her meta-analysis of online learning, Swan (2003) states learning effectiveness must be the first measure by which online education is judged. The bottom line is if students cannot learn as well or better through online learning as compared to traditional classroom instruction, than online learning cannot be judged effective. Through her analysis of over 20 primary source documents, Swan found that 85% of the faculty teaching online classrooms felt student learning outcomes were comparable to or better than those found in traditional classrooms. However, Swan did not elaborate on what the faculty based this on; empirical evidence, test grades, or “gut feelings”. However, research involving students also indicates the effectiveness of online learning. For example, of 1,400 students enrolled in online classes 47% believed they learned more than they would have in a traditional classroom. An additional 41% believed they learned just as much. Again, no information is given on what the student’s base their beliefs. However, 19 empirical studies comparing the learning effectiveness of online learning with that of traditional instruction using “objective measures” provided overwhelming evidence that online instruction tends to be just as effective as or more effective than traditional delivery. Frustratingly, again what “objective measures” the researchers used is not identified.

Swan also includes in her meta-analysis studies that dispute the effectiveness of online learning. For example, one comparison of traditional classroom, online and correspondence instruction found that achievement scores
were highest for correspondence students and lowest for students taking courses on line. Interestingly, this study identified the basis of judgment – achievement scores. While citing studies reporting significantly worse performance on examinations for online students, Swan states that these types of findings are very much in the minority.

Swan (2003) states researchers concerned with computer based education have identified three kinds of interactivity affecting learning: interaction with content, interaction with instructors, and interaction among peers. Interaction with content refers to learners' interaction with the course material and the concepts and ideas they present – in other words do the student learn. Interaction with instructors includes the many ways teachers instruct, guide, correct and support their students. Interaction among peers takes many forms – debate, collaboration, discussion, peer review and informal contact. Of course these interactions do not occur in isolation. However, Swan provides ample evidence that supports the importance of the interactions in the learning process. Using empirical studies the remainder of this paper will address the effectiveness of online learning as compared to traditional classroom delivered instruction using this model of interaction.

In analyzing interaction with content I looked for studies that showed how students performed based on online learning. If possible, I wanted studies that compared the results of online and traditional classroom learning, taught by the same instructor. I found four such studies.
Aivazidid, Lazaridou and Hellden (2006) compared online and traditional classroom delivered versions of an environmental education program. The purpose of their study was to compare knowledge and attitudes of junior high school students before and after their participation in an environmental education program delivered in the two different ways. Their study involved intact high school classes utilizing a quasi-experimental design. The classes were divided into two subgroups with group one receiving the class through traditional classroom methods and with group two receiving the class using online methods. The lesson content was identical, except in the method of delivery. The sample was comprised of 297 students aged 13 to 14 years old from four junior high schools throughout Greece. The first group was taught the program in a traditional lecture-based way. The meetings were held weekly, in normal 45 minute classes over a term of 10 weeks. The second group received exactly the same amount and structure of training over the same period of time, but the sessions were held in the school’s computer laboratory instead of the classroom. Both groups were tested simultaneously to exclude potential influences independent of the study.

The assessment instrument was 40 knowledge questions from the course of study. The questions were multiple-choice with five possible choices, with only one correct answer. The assessment instruments were submitted to a panel of experts, who established their content validity. Each group was given a pretest and a postest. The pretest was administered one week before the class started and the postest was administered one week after the class ended. The results
indicated that group two, receiving the online learning, raised their score higher than group one, who received their learning through the traditional classroom method. Group one scored an average of 69.07 on their pretest with a standard deviation of 5.59 and scored an average of 70.78 on their posttest with a standard deviation of 6.7. Group two scored an average of 69.35 on their pretest with a standard deviation of 5.14 and on their posttest scored a 74.21 with a standard deviation of 7.03. Aivazidid, Lazaridou and Hellden conclude that the online class was more effective than the traditional classroom instruction.

Tucker (2001) conducted a more in-depth study that examined pretests and posttest scores, homework grades, research paper grades, final exam scores, final course grades, learning styles, and ages of distance education and traditional students enrolled in a business communication class. The study was designed to determine if distance education is better, worse, or as good as traditional education. Research participants were 47 undergraduate students enrolled in the business communications class. The students were divided into two groups with each group receiving the same content, completed the same assignments and were allotted the same timeframe for completion of assignments. Each group received the same content. The same instructor taught both classes. Twenty three students were enrolled in the traditional face-to-face class and 24 were enrolled in the distance education class. A quasi experimental research design was used.

The online class scored significantly higher in posttest scores and final exam scores. Tucker found no significant difference between pretest scores,
homework grades, research paper grades and final course grades. Tucker concludes that a lack of significant difference in the final course grade may indicate that one delivery method is not superior to the other. Tucker also states online education is an acceptable alternative, because it is just as good as traditional education.

Thirunarayanan and Prado (2001) conducted a study for the purpose of comparing achievement between online and traditional classroom study in which the students did not know in which way the content would be delivered. The students were enrolled in a program to teach English to speakers of other languages. The classroom delivered content was composed of 31 students, while the online class was composed of 29 students. The students were assigned to the online and classroom-based course after the course had begun. However, when students enrolled in the course they had no way of knowing whether they were registering for an online or traditional classroom course. A pretest was administered to both groups and the same test was administered as a posttest at the end of the course. The same instructor taught the same content to both classes. The same material was covered in both sections of the course with the off-line class receiving the content through lectures, activities, and cooperative exercises in the classroom. The online class received the same content through online modules, discussion forums, interactive chat sessions with the instructor and classmates, links to video clips and links to relevant web pages. Both groups had the same hours of access for individual time with the instructor through office hours. The results showed that online students improved their
scores from the pretest to the posttest by an average of 15.21 points, while the average scores of students in the traditional class improved their scores by only 13.19 points. This indicates the students in the online group achieved numerically, but not significantly, higher than students in the classroom-based section of the course. Thirunarayanan and Prado concluded that students in the online class achieved more than their classroom-based counterparts, however the results do not support this conclusion.

Finally, O'Dwyer, Carey and Kleiman researched the effectiveness of online learning involving students participating in the Louisiana Algebra 1 Online project during the 2004-2005 school year. The Algebra 1 Online course was available to students in grades eight and nine in which no certified mathematics teacher was available in their schools. In total 463 online and traditional group students were taught within 33 classrooms. The classes met on a standard schedule, with the online students meeting together in a technology equipped classroom. The online class was composed of 231 students and the traditional class was composed of 232 students. The comparison groups met in traditional classroom settings with certified mathematics teachers. The certified mathematics teachers also served as online teachers. There were no pre-requisites for the algebra 1 course, and all students were taking algebra 1 for the first time.

Three instruments were used to gather data; a pretest designed to assess general mathematics ability, a posttest based on Louisiana’s Algebra 1 student requirements and a survey to gather data about students’ online experiences.
Results of the pretest showed no significant difference between the two groups. With a maximum score of 25 points, the traditional students scored 14.99 points and the online group scored 14.91 points. Pre- to posttest scores were not examined directly. Instead, a multi-level regression model in which students pretest scores were included as a covariate to examine the effect of the online experience on students’ scores was examined. In this 25 item model, the online class scored higher in 18 items with significant difference in four of the items. Of the seven items in which the traditional classroom scored higher than the online class only three were statistically significantly.

Both sets of students were also surveyed to analyze their online or classroom learning experience. 71% of the students who received online learning reported that they liked using the online technology as compared to classroom delivered instruction. However, a higher percentage of students in the traditional classroom felt more confident about their algebra skills. 67.6% of the students who received classroom delivered instruction felt very confident in their algebra skills, while only 49.8% of those students who received online instruction felt confident of their algebra skills. The researchers conclude that while this finding is interesting given that students in the online classrooms had a higher posttest score than those in the traditional classrooms, it is consistent with the findings of other studies suggesting that students in online learning courses may have poorer perceptions of their learning. Most importantly, however the study suggests that the Louisiana Algebra 1 online model is a viable approach in teaching students when a certified teacher is not available.
In analyzing the results of these four studies it appears that online learning is more effective than traditional classroom delivered instruction. However, the Louisiana Algebra 1 Project raises an important issue. If students perceive their learning is of lower quality than classroom delivered learning then the actual achievement results may not be the proper way to judge the effectiveness of online learning. Searches for studies analyzing student perception of online learning revealed very few primary source empirical studies. The issue of student confidence in their online learning warrants additional study.

Before moving on to the other two forms of interaction a discussion of the issues raised by the Louisiana Project is warranted. Atan, Rahman and Idruss (2004) conducted a study involving students’ perception of their learning needs. The purpose of the study was to identify what students perceived as the most important aspects of online learning. Questionnaires were distributed to first, second and third year undergraduate students enrolled in the School of Distance Education in Malaysia. The questionnaire contained questions related to the various aspects of online learning, learning materials, and learning resources. Each statement was accompanied by the Likert Scale ranging from one to five with one being the least important and five being the most important. The analysis of the data involved extracting the means of each statement with the means of 3.0 representing the equilibrium point. The means greater than 3.0 reflected the students’ agreement with the statements put forward while means with values less than 3.0 reflected the students’ disagreement with the statements put forward. While student attitudes reflected some very interesting
perceptions of online learning, the most important deal with the role of online learning. The results showed that students agreed with the superior advantage of an online learning curriculum however, students believe the role of online learning is that of a supportive nature to enhance and assist their understanding of the content. In other words, the instructor takes on more of a role as a facilitator and the students take ownership of their education. Despite the advantages of online learning students perceive printed modules should remain the main medium of course delivery in distance education. The authors conclude that online learning benefits motivated and more mature students. The students desire printed material because it provides more flexibility and can be studied whenever the situation arises even when away from the computer.

The final two interactions, interaction with instructors and interaction with peers will be analyzed together since they are closely related. Literature review of these two interactions revealed the importance of both the instructor and peers in an online learning environment. The following two studies are typical.

Vonderwell, Liang, and Alderman (2007) researched asynchronous discussion and assessment in online learning. Specifically, they were concerned with the role of the instructor and peers in the online learning environment. Assessment in learning is defined as a process to enable students, through effective feedback, to fully understand their own learning and the goals they are aiming for. The purpose of the study was to answer two questions. First, how are asynchronous discussions used in the assessment process of online learning? Second, what meaning do students derive from their experience with
respect to assessment and online asynchronous discussions? The participants were from five master level online courses that were observed over the course of three semesters. The majority of the students were in-service teachers pursuing a master's degree and all the courses used WebCT as a course management tool. All the classes included weekly or biweekly asynchronous discussions as part of the total grade. Three data sources were used; online observations of the asynchronous discussion, an open ended online survey conducted with students, and transcripts of asynchronous discussions. The survey questions were checked and approved for validity.

Results indicated instructor interaction is the most important aspect of online discussions. Students reported that feedback from instructors was a vital part in the quality of the online discussions. Discussions in which the instructors were proactive by responding to student comments resulted in a more in-depth discussion of the topic. Students wanted the instructors to act as facilitators and gatekeepers. The instructor’s most important role, according to the students was to provide structure for the discussion. The students reported that a discussion topic that was not structured properly impacted student responses and restricts learning. Threaded discussions versus non-threaded discussions initiated more in-depth and diverse responses. The researchers also concluded that discussions involving instructor feedback are far superior in terms of quality, depth of discussion and breadth of discussion to those that had little to no instructor feedback.
Interaction among students was also seen as a key component in a successful learning environment. 78% of the students considered online discussions as a valuable tool in their learning process. Through comments, students reported that most learning takes place through asynchronous discussions. The interaction with peers was judged just as important as interaction with the instructor. However, students also noted the importance of the instructor’s presence in the asynchronous discussion. When instructors were involved in discussions, content was of higher quality and of greater frequency. The researchers fully agreed with the students in that instructor involvement is key. The conclusion in this study is that interaction with instructor and peers is vital to successful online learning. Further, one of the most important aspects of online learning is the online discussion.

If online discussions are of significant importance in the effectiveness of online learning it warrants additional research. Baglione and Nastanski (2007) compared online discussion to that of traditional classroom discussion. The purpose of their study was to examine and compare online and classroom discussion. Their research explored three hypotheses. First, the online classroom according to faculty facilitates more substantive discussion than a traditional classroom. Second, half of the professors will prefer the online method or both forms of teaching. Third, faculty preference will moderate respondents’ evaluation of online discussion. Their study involved 122 faculty members teaching both online and traditional classroom courses. Each faculty member was e-mailed a survey to compare two items; the quality of online
discussion versus classroom-based discussion and online teaching enjoyment. Quality of discussion was based on a four item scale while enjoyment was based on a three item scale. A seven point Likert-type scale was used with one being the lowest and seven being the highest. The faculty’s responses were uploaded into SPSS 14.0 for analysis. According to the results, online discussion is more substantive than traditional classroom discussion. This is attributed to the fact that there is a more equitable distribution of participation in an online environment compared to traditional classroom and students in an asynchronous environment have more time to think about and research their answers. The research showed teachers rate online discussion much higher in terms of quality. The research also indicated that a slightly higher number of faculty preferred teaching online as opposed to in the classroom. Half of the respondents prefer teaching in both environments, 29% prefer the online environment and 21% prefer the traditional classroom. Of note, only the faculty who preferred traditional classroom instruction rated classroom discussion higher than online discussion. All three hypotheses were shown correct. Faculty comments also agreed with Vonderwell, Liang, and Alderman’s research findings: instructor interaction is a vital aspect of the quality of online, as well as traditional classroom discussion.

The purpose of this paper was to explore the following hypothesis: online learning is more effective, as judged by the students’ level of understanding, than traditional classroom delivered instruction. This highly controversial topic has been researched and analyzed using a wide variety of participants, samples, and
teaching subjects. It is clear that no answer will be accepted by both advocates and opponents of online learning. The literature review revealed at best, online learning scored only slightly better than traditional classroom-based education when achievement scores are compared. Based on achievement scores alone, the hypothesis was supported. However, two additional factors were revealed. First, online asynchronous discussion between students is far superior to classroom discussion based on quality, breadth and depth of discussion. Students highlight that discussion between peers is one of the most important factors in a successful learning environment. Second, students who receive online learning are not as confident in their skills as those students who receive traditional classroom-based learning. This is true even for those students that scored higher on achievement assessments than their classroom-based counterparts. For those concerned with the development and implementation of online learning this issue clearly warrants additional research.


References
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