Integrating Technology into the Developmental Mathematics Classroom: A WebQuest

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Although the WebQuest has been around for several years, it appears that not many educators are aware of it, or know how to use it. Thus, it is important to not only expose developmental educators to the use of this strategy, but also to help them realize how they can easily implement it into their curriculum. The use of a Webquest integrates technology into the classroom, while utilizing a learner-centered activity and a constructivist approach to learning. When using this strategy, the students benefit from cooperative learning, discovery learning, and a high level of engagement while practicing Internet skills. The purpose of this article is to explore the use of a WebQuest in the developmental mathematics classroom, and give an example.

The integration of technology into all classrooms is essential, and the developmental mathematics classroom should be no different. However, this educational setting provides a challenge to the educator who wants to incorporate any additional material into the curriculum. Because of the sequential nature of mathematics, it is important to cover all of the required topics, so the timeframe is usually constrained.

How then, can we as educators go beyond the limits imposed by the timeframe and content of our courses, in order to expose our students to computerized learning? According to Zimmerman, students need to become "active participants in their own learning process" (1989, p. 1). In addition, Brown and Crawford state that incorporating the Internet into the learning environment of mathematics "offers significant strengths" (2002, p.3). Among these is the development of higher-order thinking skills, which is of "primary concern within mathematics" (2002, p. 2). These and many other results can be accomplished by incorporating the WebQuest into the curriculum. This learner-centered activity utilizes a

constructivist approach to learning, achieving the benefits mentioned above. The purpose of this article is to explore the use of a WebQuest in the developmental mathematics classroom, and to propose an example.

What is a WebQuest?

A WebQuest is an inquiry-based activity or lesson, in which most or all of the information used by the learner comes from resources on the Internet (Dodge, 1997). This activity allows students to go beyond the ordinary world of classroom learning. The instructor researches the material ahead of time and presents the learners with a list of resources containing pertinent web sites that will help them learn about the topic. In their quest for information the learners answer a set of questions that are also provided by the instructor (Simon, 2005). The students are actively engaged in the learning process, higher-order thinking skills are involved, and independent learning takes place (Brown & Crawford, 2002). Most learners today are extremely comfortable using the Internet (North Central, 1999, 2005) and effective teachers are aware that the attitudes and performance of any learners are improved when the learning process involves student interests (Brown & Crawford, 2002).

It is important to note that the use of a WebQuest incorporates not only technology, but also Internet skills, cooperative learning, discovery learning, constructivism, and a high level of student engagement.

Designing the WebQuest

A WebQuest can take on a variety of formats. A well-designed WebQuest requires the learners to analyze and note only relevant information, as well as apply this information to the task at hand (LoParrino, 2005). Thus, the WebQuest is best used when students possess some basic skills relevant to the topic, whereby they can use those skills to further learn. This allows them to establish some cohesion and integrate the newly found information with previously learned skills. Rather than lecture about the subject matter, with students passively taking notes, the instructor's role will be to plan, guide, and facilitate learning of the material, while actively engaging students in the learning process (Simon, 2005).

Such a quest for information can involve from one to several class periods and can also be designed to culminate in a presentation or submission of a summary project. The proposed lesson in this article is

a WebQuest in a rather abbreviated form, involving a standard lesson for developmental Algebra. The recommended timeframe for this short-term WebQuest (1 day) is approximately the same for a traditional lesson on this topic.

The WebQuest

The proposed WebQuest involves how to graph an equation using the slope and *y*-intercept, with an exercise in application. This particular WebQuest is designed to replace the traditional presentation of the topic, rather than add to the curriculum. Thus, a summary project or presentation is not involved, although this WebQuest can be modified to suit any of these needs. Students will require the use of a computer lab for this class, so they can utilize the Internet. The learners should be broken into small groups of about four students, and conduct their search for information under the guidance of the instructor. The groups work collaboratively to answer the questions posed in the WebQuest. A continuation of the search for information can be extended to outside the classroom, should additional time be required. It is hoped that exercises from the textbook involving analysis and/or synthesis of the material may be assigned for homework, adding to the higher-order thinking skills involved.

An instruction/assignment page containing the questions should be made available to the learners electronically. The same instruction/assignment page should be given in hard copy form to be used as a worksheet in class. This page should contain instructions on how to complete the WebQuest, as well as suggested web sites that the learners may search. While students work in groups to complete the WebQuest, the instructor can circulate the classroom, offering help as needed.

The instruction/assignment page (See Appendix) outlines the procedures, and explains the learning quest they will take. Graph paper should also be provided. This WebQuest is intended to be completed in one class period, including instructions, etc.; therefore, the exercises are brief. What is notable is that higher-order thinking skills are involved, while independent learning takes place. Again, the level of difficulty can be adjusted according to the students' abilities and/or the instructor's needs. Please note: problem 10 in the Appendix is a variation of an exercise from Aufmann, Barker, and Lockwood (2004, p. 285).

Conclusion

In her study on WebQuests, Wagman (2005) found that experiential activities enhanced motivation, as well as critical thinking and problem-solving approaches. Cochrane, Eller, and Jones (1991) also found that using computers in combination with traditional teaching methods improves student learning of developmental math.

Because this proposed WebQuest conforms to curriculum and time constraints, this strategy can be employed often in the developmental classroom, thereby enhancing the learners' experience. It is hoped that not one, but several lessons of this type will be integrated into the curriculum. Thus by incorporating computer technology into the classroom through the use of WebQuests, our developmental students will be motivated and engaged, thereby improving their chance for successful learning.

References

Aufmann, R., Barker, V., & Lockwood, J. (2004). *Beginning Algebra with Applications* (6th Ed.). Boston: Houghton Mifflin.

Brown, E., & Crawford, C. (2002). *Focusing upon higher order thinking skills: WebQuests and the learner-centered mathematical learning environment.* Retrieved July 15, 2006, from http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/27/f0/45.pdf

Cochrane, D., Eller, B. F., & Jones, B. H. (1991). An Analysis of the use of technology in teaching developmental mathematics. *Journal of Educational Technology Systems*, *20*(3), 273-279.

Dodge, B. (1997). *Some thoughts about WebQuests*. Retrieved July 15, 2005, from http://webquest.sdsu.edu/about_webquests.html

LoParrino, C. A. (2005). *A transformational process: Facilitating WebQuests*. Retrieved September 29, 2006, from http://www.eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/31/b9/f7.pdf

North Central Regional Educational Laboratory. (1999, 2005). *Critical issue: Using technology to improve student achievement.* Retrieved September 30, 2006, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te800.htm#goal

Simon, A. E. (2005, April). The new modus operandi: techno tasking: recognizing students' ability to use multiple technologies simultaneously presents a new paradigm (Cover Story). *The School Administrator*, *62*(4), 10.

Wagman, J. C. (2005). *The effects of an inquiry-internet research project on motivation, self-efficacy, and academic autonomy in heterogeneously grouped high school Latin I students.* Retrieved on September 22, 2006 from http://www.eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/31/90/35.pdf

Zimmerman, B. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329-339.