

Zone of Proximal Development and Scaffolding Online

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INTRODUCTION

While developing our courses, we realized the importance of the zone of proximal development (Vygotsky, 1978) in supporting our students. Learners' experiences and backgrounds influence the learning process by bringing together the current learning situation with their individual social and historical backgrounds. Vygotsky (1978) defined the zone of proximal development (ZPD) as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Learners move from needing constant assistance to becoming knowledgeable participants who at times may need to review previous learning. Each student has the potential to provide needed scaffolding for others in the group by becoming the knowledgeable other in appropriate situations. This shared power based on "levels of understanding" (Driscoll, 1994) allows the learners to achieve a state of intersubjectivity.

Since students needed to learn course content and many needed to learn the technological skills to use the course software, we recognized that they would require support in both areas. Vygotsky's (1978) construct of the ZPD is adaptable to the electronic environment. The notion that "learning leads development" (Vygotsky, 1978; Wertsch, 1985) is a useful concept with adults as well as younger students. During the learning process, students need support. Adults may require more technological support than younger students, even as they both need academic assistance in the content area. Therefore, an electronic dyad may need to be established between the professor and the students,

to be accessed by the students as they develop their technological abilities. An academic dyad may also be necessary for the under-prepared students in the course. They may need to have background material available in order to succeed.

BACKGROUND

Learning is taking on a whole new dimension with distance and Web-based learning environments. Chickering and Gamson (1987) identified seven principles of good practice in undergraduate education. Others have furthered the work on these principles of good practice in adult learning (Chickering & Ehrmann, 1996; Poe & Stassen, 2002; Provost's Task Force on Student-Centered Learning, 1997; Richard, 2003). Incorporating these principles into distance or Web-based learning is a significant challenge. In addition, adult learners are often required to master more than the coursework. They may need to become proficient in computer technology as well as the academic content of their courses. The use of Web-based technologies such as Blackboard or WebCT have made the creation of electronic courses and supplements much easier for the instructors to develop and more uniform for the students to use.

Constructivism has also informed the creation of electronic support (Gifford, 2003). It is with caution that we use the term "constructivism" because, as Phillips (2000) points out, the terrain of constructivism lies between the poles of social constructivism and psychological constructivism, and the "between" is a varied field of definitions. For our purposes, the term applies to knowledge that is constructed socio-

culturally through interactions between individuals and the world in which they live. According to Bruner (1966), constructivism involves the creation of new knowledge based on prior understanding, so there is a natural link between cultural historical and constructivist approaches to be used when creating and teaching electronic learning environments.

Chickering and Gamson (1987), through their seven principles of good practice, argued that students should actively participate in the acquisition of knowledge. "Student-centered learning activities are designed to provide students with opportunities to take a more active role in their learning by shifting responsibilities of organizing, analyzing, synthesizing, and evaluating content from the teacher to the student" (Means, 1994, in Brush & Saye, 2001). By providing various layers of explanation and recognizing the different needs of individual students, the creation of scaffolding opportunities on Blackboard or other electronic learning environments shifts some of the learning acquisition to the students themselves, thus making them more active participants.

Contact between students and faculty is another measure of good practice (Chickering & Gamson, 1987). Contact can and should occur both in and out of the classroom. With the level of today's technology, contact can also occur electronically through e-mail, discussion boards (Chickering & Ehrmann, 1996) and instructional dyads. Scaffolding can be done electronically as well as in face-to-face situations, thus maintaining a focus on student learning by giving them access to assistance outside the classroom.

MAIN THRUST OF THE ARTICLE

Vygotsky (1978) identified the zone of proximal development (ZPD) as the distance between what individuals can learn by themselves and what they can learn with the help of a knowledgeable other. Asynchronous instructional dyads can be established that enable learners to access instructional material when they require it, at their own convenience. Most institutions provide academic tutoring, but the statistics indicate that certain groups of students do not take advantage of this opportunity. In one of our institutions, the students in low-level mathematics courses visit the Academic Resource Center once every ten weeks for assistance (Bilics, Lerch, & Colley, 2004).

The establishment of asynchronous instructional dyads provides another means for the students to access help. These are detailed instruction sheets that supplement explanations given during regular class sessions. Most courses present areas students traditionally find difficult to understand, and the asynchronous instructional dyads open a line of communication on these specific topics. Those students who need help with specific processes can access a more in-depth explanation than the time allows during class. The explanation sheets provided on Blackboard present alternative processes for the individual student to implement if he or she so chooses, since "learners seldom come to a learning setting with the same background knowledge" (Bull et al., 1999). These sheets enable the creation of an individual dyad between the student and the professor. A zone of proximal development is established where, when, and at what level the student needs the assistance.

Another area that leads to difficulty for many students is the ability to take accurate and complete notes during class. Students should be engaged with the material during class by reading and note taking, but their notes are generally not complete. By making presentation slides (using PowerPoint or other software) available for the students at the end of the day, the instructor can provide them with access to all slides used throughout the course. Students can review various processes when they come up again in the coursework, thus implementing Chickering and Gamson's (1987) principle of respecting diverse talents and ways of learning. For example, Jake, a student in a low-level math class, discussed how these slides helped him learn a difficult mathematical procedure. He printed out the lecture slides and the appropriate instructional unit and used them in conjunction with his notes and the textbook. Jake was very pleased with his ability to learn a complicated mathematical process and was confident in his ability to use the procedure when taking the test on this material. An asynchronous learning dyad was formed on a specific topic, Jake was able to progress in his development with assistance, and a sense of accomplishment was engendered in him.

The data from a survey administered at the end of the Fall 2003 semester shows a very positive response by the students regarding the course Blackboard site and information contained therein. Eighty-eight percent of the students enrolled in a mathematics course used the material on the site at least once per week, a much

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