

OVERCOMING TECHNOLOGY BARRIERS IN ADULT ONLINE LEARNING ENVIRONMENTS WITH MODULAR INSTRUCTIONAL DESIGN

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ABSTRACT

This paper examines adult learning and ways in which the effective use of technology can foster the learning environment. The role of technology is discussed in addition to many of the barriers found in the implementation of technology in online and hybrid educational environments. Surprisingly, learning style has little to do with online student interactivity, rather, an instructional design customized for the specific learning outcomes is found to improve online experiences and course satisfaction. A modular course design is proposed to better integrate individualized learning outcomes that are consistent with current literature in learning theory and instructional design.

INTRODUCTION

Adult Learners

According to Knowles, there are five assumptions regarding adult learners (Conlan, Grabowski & Smith, 2003; Atherton, 2005).

The adult learner:

1. Has an independent self-concept and who can direct his or her own learning
2. Has accumulated a reservoir of life experiences that is a rich resource for learning
3. Has learning needs closely related to changing social roles
4. Is problem-centered and interested in immediate application of knowledge
5. Is motivated to learn by internal rather than external factors

Fostering an understanding of the above assumptions, many of the learning modalities that are currently utilized by colleges and universities have yet to capitalize on the greatest benefits for the learning styles of the adult learner. With the current trends in post-secondary education and the advent of lifelong learning, colleges and universities that are able to provide flexible curriculum and teaching modalities will no doubt gain a strategic advantage. From this perspective, the role of technology takes on greater responsibility and therefore becomes a critical component of the integrative process of education.

Learning Styles

Santo (2006) professed no standard learning style; she did, however, argue that when the various learning styles are considered, a student's ability to participate in an online course is greatly enhanced. While she did posit that the construct of learning styles was "vague" there are many other measures of a successful online experience for learners. According to Santos' research, the learner's computer skills and level of motivation may be more influential than understanding the various learning styles of the students. In contrast, Williamson and Watson (2007) found learning styles to be correlated with a student's success. In fact, according to Williamson and Watson, "...matching students' cognitive styles with instructors' teaching styles have direct impact on grades achieved" (p. 73). The later viewpoint is more intuitive and typically found in traditional learning and teaching belief systems.

How Adults Learn

Dobrovolny (2006) studied how adults learn in self-paced computer-based corporate training and found that while adult learning theory contends that many instances of learning are focused on Knowles'

assumptions, behavioristic types of feedback mechanisms are important for the learners' guidance through the material. Similarly, Imel (1995) found that adult learners expected their instructors to have the following characteristics:

1. to be knowledgeable
2. to show concern for student learning
3. to present material clearly
4. to motivate
5. to emphasize relevance of class material
6. to be enthusiastic

As can be seen, the adult learner comes to the class with expectations beyond that of expectation of learning content in a vacuum. Hase and Kenyon (n.d.) refer to the term heutagogy to describe the style of deterministic learning that adults prefer, while Gouthro (2006) argues that adult learners focus on reason and rationality in the types of educational environments.

THE ROLE OF TECHNOLOGY IN THE FUTURE OF EDUCATION

The role of technology in our educational system is still an evolving issue. The notion of adding multimedia opportunities in the daily classroom activities of students cannot be applauded enough. Sadly, however, many times the use of technology for the sake of using it gets in the way of emphasizing the learning outcomes rather than the "wiziwigs". Further education of our teachers through training and development is one of the more consistent ways in which this issue may be addressed.

With the evolution of online education, many of the assumptions of the adult learner can be met with proper preparation. Roy (2006) found that while learning styles had very little to do with the interactivity in an online environment, she did conclude that the ways in which we design our online environments through sound adherence to learning outcomes and design methodologies can contribute more to a good online experience than merely attending to a presentation focus. Returning once again to the assumptions of the adult learner, and the technology of online education; firstly, "an independent self-concept and who can direct his or her own learning" can be accomplished through sound instructional design and having opportunities for the learner to have access to immediate feedback for tasks relating to scaffolding where the adult learner prefers guidance for relevance.

Secondly, the life experience that the adult learner comes to the class with needs to be tapped into for classroom sharing. This helps to set boundaries on the class environment and help the learners to determine their specific fit within the context of the course.

Third, "learning needs closely related to changing social roles" can be attended to through in an online learning environment though developing relevancy in the content. Showing the learners how what is being presented fits in to the larger scheme of things in real-world context. This notion also dovetails into the fourth assumption that learning "is problem-centered" and the adult learner is "interested in immediate application of knowledge." How learning is applied outside of the classroom environment is an important issue with the adult learning community.

Much of the research in the adult learning discipline substantiates the need for relevancy and applicability of the content. Situated learning as argued by Vigotsky (Roth & Lee, 2007) provides the contextual boundaries for the adult learners in the collaborative design of their learning activities. By participating in the development of the project and assessing methods, adults are better able to understand the context of the learning situations.

Lastly, the adult learner "is motivated to learn by internal rather than external factors." Internal motivation is the driving force in adult learners. This is one of the reasons that much success has been reported in the usage of technologies such as self-paced programmed instruction and online instructional methods. When there is a wide diversity among the learners, effective use of technology and design of the modules becomes critical (Yannacci, Roberts & Ganju, 2006).

The online learning environment has propelled new insights into adapting and aligning content closer to the tenants of adult learning theories. With the learner's ability to read through the content at

their own pace affords them the opportunity to delve as deeply into the material as they wish without the stigma of “keeping the rest of the class behind” or “feeling like the question they have is a stupid question.” In addition, an adult learning outcomes assessment study performed at the University of Phoenix found that the “...online students performed about as well as its classrooms students” (Maeroff, p. 167). They are better able to fit the learning into their busy schedules and are finding that much of their training and development in their daily jobs are coinciding with the extracurricular activities that they are attending to.

BARRIERS IMPLEMENTING TECHNOLOGY

Much of the previous literature provided the groundwork of matching the implementation of technology with the learning context, that is, without a culture of learning and change, the discussion of “barriers” would be kept in isolation. The rationale for this unorthodox approach was to develop an understanding, or systemic process for the underlying barriers when implementing technology rather than sorting through symptomatic obvious “topical fixes.”

According to Barth, Godeman, Rieckmann, and Stoltenberg (2007), the integrative nature of student sustainability of learned competencies begins with the pedagogical and contextual nature of the class environment. In other words, one of the foremost barriers to the implementation of technology is the experience levels of the teachers and professors. Those finding themselves adding technology because of the requirements are providing less than optimal learning contexts for their students as well as their own professional growth.

Understanding the adult learner is imperative for consistent and effective learning to take place. In the online environment, using the synchronous as well as asynchronous tools provides a maximization of the opportunities for the adult learners to take full advantage of the learning process. Within this process, there is a critical need for the instructional designers to not add content nor design interfaces that do not contribute towards the learning outcomes of the adult learner; the effectiveness is measured in terms of applicability. When referring to innovative and technological-oriented teachers, Burg (2008) argued that “...these pioneers had the courage and determination to work beyond the mainstream” (p. 6) indicating the ongoing necessity for the elimination of barriers to integrating technology begin with the teachers.

Sound course designs coupled with instructors that meet the learner’s expectations as mentioned previously, the adult learner can find themselves flourishing in today’s technology-enhanced learning environments.

TOWARDS A MODULAR COURSE DESIGN

Programmed Instruction

Early in education research, programmed instruction (PI) arose as a new alternative to the classroom (McDonald, Yanchor & Osguthorpe, 2005), and while PI was able to train a wide range of dispersed individuals simultaneously there were later findings that there were no consistent relationships to the outcomes of the individual training. This gave rise to two schools of thought subsequently termed ontological determinism and materialism (McDonald, Yanchor & Osguthorpe, 2005).

Ontological determinism argued that programmers give “...students little if any responsibility for learning” (McDonald, Yanchor & Osguthorpe, 2005, p. 87) whereas, materialism holds true to the behaviorist’s view that there is not knowledge or learning outside of what can be empirically observed. Another negative aspect of PI was that many programmers thought that the learning modules were the sum of the content and if all factors were presented within a specific order, the learners would succeed, however, sadly enough, those arguments lead to the old adage “even a bad program is a pretty good teacher” (p. 88).

Of all the opportunities found in PI, the most beneficial outcomes were discovered when teachers adapted to the proper usage of the instruction modules and as PI into a somewhat self-determination theory, “...human learning and intrinsic motivation are optimized when persons experience a sense of

autonomy, competence, and relatedness in their activity” (McDonald, Yanchor & Osguthorpe, 2005, p. 93). Another solution found in the early years of PI was the flexibility that is attributed to the learning situations. When designers and teachers incorporate multiple instructional strategies into various learning contexts we, as designers and instructors, are better able to incorporate the strengths from the LMS as well as the experiences from the instructors and learners.

Interactive Learning

Interactive learning as it is related to learner-centered instructional design got its roots through the evolutionary ideals of distance education. Since the 1960s, distance education (DE) has seen many instructional modalities ranging from correspondence to the real-time methods of video conferencing we use today (Baggaley, 2008). Many of the negative aspects of DE hovered around the instructor centeredness of curriculum and fell short of expectations. In contrast, distance-based asynchronous student-teacher interactions have been eclipsed by the ability of the online component to discard the need for direct teacher-student interaction and allow for more constructivist approaches to learning and create dynamic environments to increase complex learning skills (Botha, van der Westhuizen & De Swart, 2005; Baggaley, 2008).

Proposed Project Design

The proposed design methodologies utilize combination of the ADDIE model Lee & Owens (2004) and the ARCS model (Keller, 2006). The use of the ADDIE model provided the overarching umbrella from which the design process flowed while the used of Keller’s (2004) ARCS model provided the experiential learning environment which initially captured the learner’s Attention in each module by providing Relevance to the learner’s goals. The modular design of the course provides Confidence in the learner’s ability to master milestone achievements in a scaffolding fashion thereby leading to greater Satisfaction as the learner progresses through each of the components with a positive and successful experience.

Individual Learning Modules

Based on the experience in many online learning environments as a student as well as an instructor, I have participated in the waves of change throughout various initial course offerings as well as the revised versions based on agreed upon quality criterion. Nevertheless, much of the restructuring of the online learning components have undergone a notion of increased interactivity for the online student, yet research has found that student satisfaction depends more on the effectiveness of the instructor rather than on the advanced technology (Appana, 2008). The learning curve in the new era of technology does intimidate many instructors, yet as the technology advances; it seems they are growing further from their comfort zones.

My proposed notion of individual learning modules (ILM) creates basic online containers that are dynamically fed with updated materials. In this way, the instructional designers and content developers are better able to apply an object-oriented approach much like our current software developers. In essence, a multimedia container or object can make an outside “call” for the content for the specific module. With an object-oriented approach, owners of content do not have to be multimedia programmers or designers to provide a continuous feed of updated information for their courses. Figure 1 demonstrates this concept.

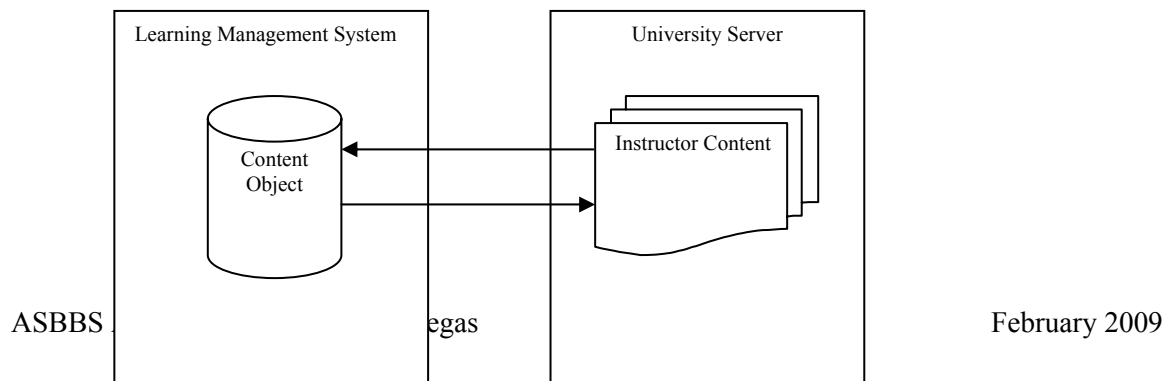


Figure 1. Dynamic Content Update

Currently, the practice is that the content resides within the Learning Management System (LMS) and therefore is accessible either by the “content manager” of the specific course in addition to limited access by the individual instructors. In many cases, the content frequently becomes outdated and the courses require much more maintenance time than the content managers have available. In the proposed dynamic systems design, the files can be coded for revision dates whereby when a book edition changes, a trigger is initiated that would identify course component affected.

Figure 2 illustrates this example using an Adobe Flash Shockwave file with its associated content file developed in extensible markup language (XML).

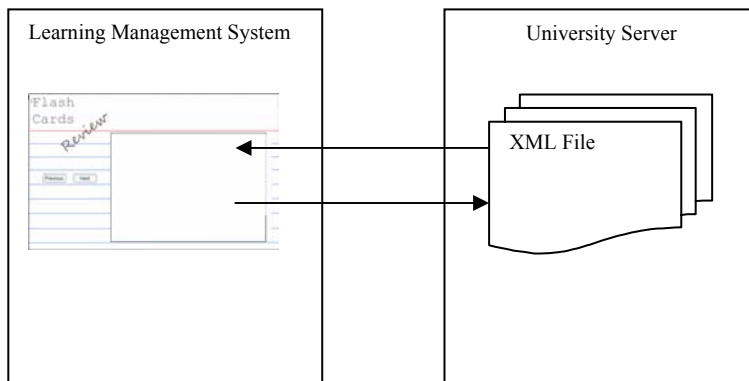


Figure 2. Dynamic Content Update – Flash Cards Revised Through XML File

Referring to Figure 2, one is able to discern the notion of object-oriented behavior. As the XML file on the Universities server is revised, the Flash object within the LMS remains unchanged. In the way, instructors and course content managers need not become involved in the intricacies of instructional design or multimedia programming; rather they are better able to manage the content from within a text file that is accessed by the Flash object.

The Future of Individual Learning Modules

The prospects of ILMs are limitless. For example, imagine a course which may have various instructors yet a baseline, or minimal course content which is preexisting. Instructors may pick modules from a list to incorporate individualized dynamics within the course and each module will have been designed for effective learner outcomes. For example, according to Chang and Smith (2008), there are fourteen learner-centered psychological principles which should be included in curriculum design. They are:

1. nature of the learning process
2. goals of the learning process
3. construction of knowledge
4. strategic thinking
5. thinking about thinking
6. context of learning
7. motivational and emotional influences on learning
8. intrinsic motivation to learn
9. effects of motivation on effort
10. developmental influences on learning
11. social influences on learning
12. individual differences on learning
13. learning and diversity, and
14. standards and assessment.

If we are to be effective as instructors or course designers we need to fully understand the dynamic nature of our learners and to the extent multimedia helps us to achieve our ultimate goal – that of providing learners with a relevant and appropriate learning environment. Xing and Spencer (2008) argue that multimedia integrates our educational processes by taking the student from a linear mode of learning to a “...relational or creative mode of inquiry” (p. 170). Our ability to provide this environment for our students mandates us as educators to continually prepare for the changes in the instructional design process that espouses content within context. With a dynamic and interactive environment, the modular use of constructivist methodology could find new research avenues in learning as well as instructional development theory.

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