

2010

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Recommended Citation

Morra, T., & Reynolds, J. (2010). Universal Design for Learning: Application for Technology-Enhanced Learning. *Inquiry: The Journal of the Virginia Community Colleges*, 15 (1). Retrieved from <http://commons.vccs.edu/inquiry/vol15/iss1/5>

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Universal Design for Learning: Application for Technology- Enhanced Learning

By Thom Morra and Jim Reynolds

The construct of Universal Design (UD) has been used in a number of fields such as engineering and architecture to design and produce products and services that are usable by people with a wide variety of characteristics. The Center for Universal Design (CUD, 1997) at North Carolina State University defines UD as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (p. 1). A good example of UD in action is the sidewalk curb cuts now found in cities and towns throughout America. These curb cuts were designed to help people in wheelchairs, but the design is also useful for bicycle riders, skateboarders, runners, and others. The benefit of UD is that products and environments are made more usable to a wider range of people.

The field of UD supports a framework that can also be used to enhance the field of education. A number of constructs have been established that have as their goal the improvement of learning environments to benefit people with a wide range of characteristics. One model is called Universal Design for Instruction (UDI) (Burgstahler, 2008; Higbee & Goff, 2008) and another one is Universal Design for Learning (UDL) (CAST, 2008). Both of these models have as their core mission to produce flexible learning environments that reduce learning barriers and support the needs

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of all learners. Because we embrace a learning-centered philosophy, we have applied the UDL construct to see how it might influence the design of technology-enhanced courses.

Technology-Enhanced Learning

As we all know, courses in higher education are being

offered that no longer fit into the traditional mode of the three-hour, face-to-face lecture/laboratory instruction each week. These courses now include learning opportunities that occur fully online or in some combination of face-to-face classroom learning and online learning. Such a combination may be known as hybrid, blended, or mixed-mode courses, but under any name these technology-enhanced courses are now a major component of how higher education is meeting learning challenges in the 21st Century.

As technology-enhanced learning becomes more widely used, the effectiveness of such learning remains in question. Walker's (2007) review of four major studies suggested that technology-enhanced courses may be improving, but much variability still exists between technology-enhanced courses and comparable face-to-face courses. We agree that just the use of technology does not – in and of itself – improve the learning process, but our focus is to use technology to enhance the learning process as defined by UDL principles. As we shall see, using guidelines from the UDL can improve the design of technology-enhanced courses.

Universal Design for Learning

The Center for Applied Special Technology (CAST, 2008) has articulated learning principles that were inspired by the field of UD. CAST's (2008) guidelines are built around the following three learning principles:

- provide multiple means of representation;
- provide multiple means of action and expression, and
- provide multiple means of engagement.

Each of the learning principles has guidelines that delineate the strategies, options, and examples to give flexibility to the UDL construct (CAST, 2008). The UDL construct's goal is to create flexible learning environments that can reduce learning barriers and support the needs of a wide range of learners.

Applying the Principles of UDL

How are UDL learning principles and options used in technology-enhanced courses such as hybrid or online courses? We reviewed several technology-enhanced (hybrid and online courses) created by the lead author to identify course strategies and materials that support UDL principles. Strategies and course material were also reviewed for possible course updates or changes that would support UDL principles.

Principle One. When given multiple means of representation, CAST (2009) argues that learners are given “various ways of acquiring information and knowledge” (p.1). CAST (2008) explains:

To reduce barriers to learning . . . it is important to ensure that key information is equally perceptible to all students by: 1) providing the same information through different sensory modalities...; 2) providing information in a format that will allow for adjustability by the user....
(p. 11)

Through the use of available computer software and other mediated technologies, the stage has been set to transform how information is presented to learners. A good example of this can be seen through the examination of one of the required course assignments known as the small group assignment that is part of an online section of “Interpersonal Communication” (CST 126) and of “Intercultural Communication” (CST 229), both of which were developed by the lead author. As part of the speech curriculum, it is required that students learn about small-group communication. To address this requirement, it is typical for students enrolled in speech classes to work together in groups toward a collective assignment objective. The idea is for the students to put their communication skills into practice as they work with their classmates toward the completion of this assignment.

When developing this assignment for the online version of the courses mentioned above, specific care was used to take advantage of the online platform in which these assignments are delivered. The assignment description was developed to be highly interactive and full of links to resources students can use to help them understand and complete the assignment. In the assignment description, students are guided through various Web links that help them fully comprehend the concept of group functioning. As they work to apply what they have learned in class to their group experience, students are given many examples and other Web-based material to explain fully the concepts and ideas present in the assignment. Specific Web links are embedded that highlight Web-based resources defining key concepts, highlighting important resources, and directing students to various examples they can use to assist them in completing their work. This not only gives students multiple ways of acquiring information but also gives various ways to interact with that information. Also included in these descriptions are PowerPoint lectures, text references, and concept-specific Web sites that assist students in managing the typical questions and challenges they may experience along the way. As O’Banion (1997) expressed in one of the key principles of a Learning College, “the learning college creates and offers as many options for learning as possible” (p. 47).

The goal is to give students multiple ways of interacting with similar information but using different modalities. As the assignment description above continued to develop, additional enhancements could include online PowerPoint presentations enhanced by adding audio so that students could hear the information as well as see it. Another enhancement could be adding a video and/or an audio clip that would highlight the major points in the assignment description, including interactive Web assessments to guide students into making assignment specific choices. The UDL principle of using multiple means of representation can go a long way in creating more flexible learning environments for all learners.

Principle Two: According to CAST (2009), when learners are given multiple means of expression, they are provided with “alternatives for demonstrating what they know” (p. 1). Probably one of the most important impacts that technology-enhanced learning has had on the learning process is its ability (through the use of technology) to offer learners choices over how they demonstrate what they have learned. When it is time to assess how much students have learned in a traditional course, one might give them an exam or have them write a paper that is designed to demonstrate their comprehension. The idea is that if a learner does well on the exam or writes a strong paper, one could feel as though the student has gained something from the educational experience. One of the challenges with the traditional format is that not all learners do well on exams or write papers effectively. In the end, instructors may not be assessing a learner’s ability to comprehend course material; instead, they may be measuring a learner’s ability to take tests or write papers. In order to accommodate the learning diversity of today’s students, more options should be given for measuring their learning outcomes (Reynolds, 2005; Reynolds, 2006).

To apply the UDL expression principle, assessment tasks take on a new dimension. For example, built into a course that offers several learning objectives centered on several classroom assignments (to match the objectives), learners are given a choice between multiple ways to complete assessments that are used toward their final grade. It is not uncommon in this format to have learners complete several types of learning tasks – tests and quizzes, writing assignments such as discussion postings and papers, interactive online assignments to include personality assessments and other evaluative tools, and integrative exercises such as group projects and speeches – appropriate for the class being taught. Offering learners a variety of assessments integrated throughout the course provides each with a chance of choosing multiple means of expressing what has been learned.

In another popular assignment offered in the lead author's "Interpersonal Communication" course whereby students explore their self-concepts by developing their own Johari Window, students are given choices not only in how they develop their window but also in how the assignment is submitted for evaluation. They may write their assignment in a reflective paper or present the assignment as a videotaped speech. Students may present work in less traditional formats as well, such as a personal scrapbook or pictorial – or even as a YouTube video. The idea is for the students to decide how best to express what they have learned in a format that fits their interest.

Finally, learners are asked to complete other assignments in the course, such as online course discussions and quizzes, proctored exams, and a group assignment. These assignments include WebQuest searches asking learners to explore their self-concept, group projects, and individual speeches, personal discussion reflections, and the like. Within these assignments, learners have flexibility in how they will present the final product (usually a choice of completing the project as a speech, paper, or some other Web-based form), which encourages learning choices in expressing their knowledge. In many cases, they submit the final project online in Blackboard so classmates can read, comment on, and gain from each learner's work. Offering learners choices over how they express what they have learned is a key component of the UDL construct.

Principle Three: CAST (2008) contends that one of the options for this learning principle is to "increase individual choice and autonomy" (p. 24). Historically, the learning goals and objectives in most educational environments have been under the control of the teacher. One way to shift the control to the learners is to target their interests. Duffy and Kirkley (2004) captured this UDL principle when they wrote the following:

[E]ven with curricular requirements, we can still engage the student in authentic inquiry either by finding the link between the course goals and the student interests or by developing the students' interests in an inquiry that is consistent with the prespecified goals of the course. (p. 111)

It is not uncommon for instructors to present learners with a list of learning objectives for a course and expect learners to meet *all* of the objectives. Allowing learners to select learning objectives from an expanded list is one way to shift the learner's interest to the course's learning goals. In one online student development course (Reynolds & Morra, 2001), learners were able to create their own learning contracts by selecting learning topics that were useful for them and also the level of knowledge they needed. This

allows students to increase their individual choices and their autonomy (see Appendix for an example of an Online Learning Contract).

The UDL principle of creating multiple means of engagement can be produced by strategies that are used to give students choices in courses developed by the lead author. The design of these technology-enhanced courses is intended to provide students with an array of choices in regards to the way they access course information and in the assignments they complete throughout the learning process. The idea is for students to have multiple means of engaging in assignments and activities that interest them while satisfying their personal and professional needs for learning about communications, as well as meeting the course objectives.

An example of this choice can be seen when examining the interactive course discussion postings that are a hallmark of the communication courses developed by the lead author. Within the structure of these technology-enhanced speech courses, students come upon varying terms and ideas about which they can then choose to learn more by completing online course discussions and other relevant assignments. These discussion activities can vary depending on the class but can include personal journal questions, broad-based thought questions, video views, Web searches, or other topics students create in response to their thoughts on what they are learning in the course.

Another example can be seen through the small group assignment mentioned earlier. In the online “Interpersonal Communications” and “Intercultural Communications,” a slightly different approach has been developed in meeting the requirement of providing students with a small-group experience. Consistent with the UDL philosophy, students are given a choice as to how they complete their group requirement. Recognizing that not all students like (or are interested in) working in a group with their classmates, an alternative or individual group assignment was developed. In this individual assignment, students work to analyze a group they are a member of (which can be a work or personal group in the “Interpersonal Communications” or their cultural heritage/cultural group in the “Intercultural Communications” course).

These choices of how students engage in this assignment are centered on the student’s individual interest, motivation, and needs. The notion is that students work in or are members of groups in their personal or professional lives, and these groups can serve as the basis of understanding the communication norms and principles of small-group development.

Best Use

Colleges are facing many challenges as the use of information technology continues to transform the learning environment. One significant part of this change is to use technology for course design and delivery so as to reduce learning barriers and support the need of all learners. This will also provide colleges with opportunities to reach out to more students without the need for more physical classroom space. Using UDL principles, technology-enhanced course design is an effective way to create flexible learning environments for learners. This format adds a philosophical structure to technology-enhanced courses that can change the education landscape and create a more dynamic learning experience for all involved.

Currently, higher education is facing a challenge to do more with less; this challenge can be addressed in part by the use of technology. The technological transformations that are now occurring in our society, as well as in higher education, also require sound philosophical assumptions to guide these transitions. UDL principles can be used to impact the design of technology-enhanced courses. This philosophical paradigm shift further expands the reach and appeal of the college classroom and provides instruction in a way to meet the ever-changing needs of a wide variety of learners.

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Appendix: Sample Learning Contract

Please print the Learning Contract below and use it as a reference as you create your own contract.

Keep in mind that the first three course assignments are required assignments. You should select the course assignments that are of interest to you and meet some, or all, of your learning goals.

Learning Topics		Knowledge Levels			Course Goals			
#	Course Assignments	I	II	III	1	2	3	4
1	Online Course Communication	1	2	0	X			X
2	Course Learning Principles	1	2	0	X	X		X
3	Creating Your Learning Contract	1	2	0	X	X		
4	Learning to Use College Web Sites	0	2	3		X	X	X
5	Learning about Learning Styles	1	2	3	X	X		
6	Learning to Use Online Library Databases	0	0	3		X		X
7	Learning about Learning Skills/Strategies	1	2	3	X	X		X
8	Future Learning Assignment							
9	Future Learning Assignment							
10	Create Your Own Learning Topic	1	2	0		X	X	X
Learning Points =		6	14	12	Total = 32			

Note: The learning objective for knowledge level III for Assignments 5 and 7 is the same learning objective. You can earn six learning points for that one learning objective. Remember that your learning contract must contain a minimum of 30 learning points and cover *all four* of the course’s learning goals.