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Designing Deeper Learning Experiences for Online Instruction

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Abstract

Deeper learning promotes students' active engagement in learning environments, so they can continuously explore, reflect and produce information to build complex knowledge structures. Consequently, deeper learning has become a major focus of scholarly investigation and debate. Multiple studies have been conducted to describe the characteristics of deeper learning and to determine methods for infusing it into the curriculum. The paper starts with a description of deeper learning, reviews the body of existing research and presents guidelines for deeper learning that can be used in online learning environments.

Deeper learning has been a focus of higher education discourse for more than three decades. The concept of *deep learning* was first mentioned in 1972 by Craik and Lockhart. They argued that deep learning involves higher level or active cognitive processing, as opposed to *surface learning* where students use lower level cognitive functions such as simple memorization or rote learning. Beattie, Collins, and McInnes (1997) furthered this idea and described deep versus surface learning in more detail:

> The deep approach, which implies that a student learns for understanding, is characterized by students who (1) seek to understand the issues and interact critically with the contents of particular teaching materials, (2) relate ideas to previous knowledge and experience and (3) examine the logic of the arguments and relate the evidence presented to the conclusions. The surface approach, which implies that a student learns simply to memorize facts, is characterized by students who (1) try simply to memorize parts of the content of teaching materials and accept the ideas and information given without question, (2) concentrate on memorizing facts without distinguishing any underlying principles or patterns and (3) are influenced by assessment requirements. (Beattie, Collins, & McInnes, 1997, p. 3)

In 1976, Marton and Saljo introduced the term *deep processing* to describe student engagement with learning tasks (Laird, Shoup, Kuh, & Schwarz, 2008). In their view, the adjective *deep* referred to looking beyond the surface and understanding the underlying meaning of knowledge. Over the course of 1970s and 1980s, other researchers studied the same phenomenon (Biggs, 1979; Entwistle & Ramsden, 1983; Marton, 1975; Pask and Scott, 1972) and proposed strategies and characteristics for each learning approach. For example, Laird et al. (2008) identified that students who use deeper learning approaches "read widely, combine a

variety of resources, discuss ideas with others, reflect on how individual pieces of information relate to larger constructs or patterns, and apply knowledge in real world situations" (p. 470). Table 1, below, summarizes some of the other differences between the two learning approaches.

Table 1
Learning Strategies for Deep versus Surface Learning

Deeper Learning	Surface Learning
Meaning Making and Comprehension	Reproduction and Repeat
Declarative Learning	Procedural Learning
Higher Order Thinking	Highly Influenced by Assessment
Meaningful Learning and Active Engagement	Engagement only when required
Intrinsic Motivation	Extrinsic Motivation
Knowledge Transfer	Difficulty connecting ideas to prior learning

In 2013, the term 'deeper learning' was adopted by the Hewlett Foundation to describe the concern that America's schools are failing to prepare learners adequately to overcome tomorrow's economic, technological, and societal challenges. After gathering leaders of the education community to discuss these issues, the Hewlett Foundation identified six outcomes or abilities associated with deeper learning:

- Master core academic content
- Think critically and solve complex problems
- Work collaboratively
- Communicate effectively
- Learn how to learn
- Develop academic mindsets

While these outcomes were originally proposed for K-12 students and traditional learning environments, they are also applicable to higher education and online environments. As online education is becoming more widespread, discussion about quality online learning environments is also gaining momentum. While deeper learning outcomes that were established by the Hewlett Foundation would not be any different in online classrooms, online learning environments provide instructors with special opportunities to achieve these outcomes. The purpose of this paper is to review the current literature on deeper learning and present guidelines to foster deeper learning experiences in the online learning environments.

Research on Deeper Learning

In a 2005 study, Smith and her colleagues examined the relationship between teaching practices and students' learning outcomes; their findings indicated that "a majority of the teachers (64 percent)… aimed instruction and assignments toward surface learning outcomes" (Smith, Gordon, Colby, & Wang, 2005, p. 205). In terms of learning outcomes, the findings suggested that a vast majority of the students (78 percent) were learning only at a surface level. The authors argued that these results were due to instruction provided by the teachers, which resulted in students memorizing, reproducing, and repeating information without much understanding. Although this study identifies a major issue related to deeper versus surface learning, other potential factors have been raised for discussion. Hill and Woodland (2002)

suggested that deep learning is not a one-sided process, but a two-way exchange between effective teaching and receptive learning.

In order to better understand teachers' classroom practices and depth of teaching and learning outcomes, Biggs and Collins (1982) developed a research-based framework: structure of the observed learning outcome, or SOLO. In this model Biggs and Collins describe five levels of complexity in student learning outcomes: pre-structural (unconnected informational elements); unistructural (some connections of information without grasping the meaning); multistructural (some connection among information networks but relational meaning is missing); relational (students understands the relationships among informational elements) and extended abstract (student moves from relational understanding to transfer and generalization). Biggs and Collins suggest that by using the SOLO framework, instructors can determine whether learning outcomes and teaching activities will promote deeper learning experiences.

Biggs' work on 'deeper learning' was used by many researchers (Smith & Colby, 2010). Rosie (2000) studied the learning experiences of post graduate students utilizing web-based resources and examined whether these resources contributed to deeper learning. While Rosie used Biggs' idea of *functional learning* he also used a dialectical approach in developing web-based instructional materials. In the dialectical approach, students worked through a position, an argument or a procedure and were then confronted with an alternative (Rosie). After interviewing the participating students, Rosie suggested that using dialectics can reduce the differences between academic outcomes and professional expectations, resulting in deeper learning.

In order to ensure deeper learning experiences some researchers have suggested the use of more synchronous experiences for online students. Offir, Yev, and Bezalel (2008) argue that synchronous learning, with its emphasis on active learning and student engagement, results in deeper learning experiences. "When the students are more active in the learning process, the material becomes more relevant and more significant for them, they remember it better, understand it, and as a result their achievements improve" (p. 1181). The authors also propose that students with a high level of cognitive ability (e.g. personal goal setting, reflective thinking, time management skills, etc.) are more likely to overcome the transactional distance between course participants and the instructor regardless of the type of learning approach.

Using synchronous features in online courses is supported by other studies. Osman and Herring (2007) conducted a study in which online chats were utilized to foster deeper learning in the context of a cross-cultural online program. They applied three rubrics (functional moves, social construction of knowledge, and teaching presence) in a longitudinal content analysis of chat sessions among four adult learners and their facilitators. The findings revealed that "although the quality of the interaction was limited by the nature of the task, language difficulties, and differing cultural expectations about instruction, conceptual negotiative activity making use of higher-level cognitive skills increased over time" (Osman & Herring, 2007, p. 126). This study points out that synchronous chat can facilitate deep learning by increasing collaborative learning and online interaction. At the same time, however, chat is not an automatic solution for issues already existing in the learning environment such as language and cultural barriers.

As online learning becomes more widespread the researchers have shifted their attention towards designing effective online learning environments that promote deeper learning. Du, Havard, and Li (2005), for example, proposed a framework for dynamic online discussions and studied the impact of these discussions for deeper learning experiences. They identified

information, methods and cognition as the foundations of the learning process. "A structure for dynamic discussions within the framework provides three types of online discussion; flexible peer, structured topic and collaborative task discussion" (Du, Havard, & Li, 2005, p. 207). In this framework learners first acquire knowledge, which represents a surface level of understanding, and then move to methods or skill development by engaging in drill and practice. These first two levels encompass surface learning procedures in which a very limited understanding of the material occurs. At the cognition level, learners begin to comprehend and use what they have learned and propose solutions to problems or relate them to other knowledge structures and problems. These three foundations align with the five online interaction types identified by Oliver and McLoughlin (1996): social, procedural, expository, explanatory and cognitive. Du, Havard, and Li used their three-process framework to structure online discussions for students in their graduate multimedia design course. Through the application of this framework, over the course of the term, students were able to engage in flexible peer, structured topic and collaborative task discussions. The authors conclude that the framework they proposed encouraged active participation and deeper learning in their students as well as provided "an environment in which students learn beyond the course goal" (p. 217). The main challenge for the students was collaborating with each other at distance using both asynchronous and synchronous technologies so they could work collaboratively to complete complex cognitive tasks.

While interaction and active learner engagement are essential in the context of deeper learning environments generally, another topic of research concerns deep learning approaches in the context of specific academic disciplines. Laird et al., (2008) studied the effects of disciplinary differences on deeper learning outcomes and investigated whether certain fields achieve better student outcomes because of an emphasis on deeper learning. They also argued that surface versus deeper learning is a matter of context. For instance: "a student studying for an exam in her major may take a deep approach, but may take a surface approach when studying for a multiple choice test in an elective course outside of her major" (Laird et al. 2008, p. 471). Contextual issues, however, still do not validate the clear impact of learning environments on learning outcomes. Laird et al. concluded that "students' majoring in fields with less consensus about content and methods of inquiry (soft fields) tend to use deep approaches to learning to a greater degree than those majoring in fields with greater consensus (hard fields)" (p. 489). Additionally, they discovered that faculty members in the applied sciences use deeper learning approaches more often than faculty in other disciplines. Finally, this study demonstrated a correlation between students' exposure to deeper learning experiences and their overall satisfaction with collegiate learning.

Another relationship between online learning environments and deeper learning concerns overall course design rather than individual strategies and technologies. Nijhuis, Segers, and Gijselaers (2005) redesigned an existing online course to increase the depth of student learning. The researchers used elements of problem based learning in the course design and integrated multiple strategies to foster student understanding. Most students in the redesigned course found the material harder and the learner environment more challenging. Rather than adjusting their learning strategies towards deeper learning, students used more surface learning strategies than the students who had taken the course in the previous format. Hill and Woodland (2002) conducted a similar study, using a more structured approach to course design. They stated goals, learning objectives and assessment criteria clearly at the outset, so that students knew the purpose and goals of the course. Course content and major themes were introduced in

preparatory lectures and then students pursued field experiences in three foreign countries. The field experiences were carefully planned, although they also provided opportunities for experiential learning. After evaluating their students' achievement level following course completion, Hill and Woodland found that students can progress successfully from descriptive-explanatory learning to predictive-analytical learning. Student response to the course indicated that course assessments were meaningful, connected to their major field of study and rewarding.

Promoting the goal of deeper learning will require a comprehensive strategy that involves faculty training, curricular restructuring, and a wide range of learning opportunities for students. In addition, "epistemology, or ways of acquiring knowledge, should be addressed" (Hill & Woodland, 2002, p. 540) in the learning environment. In other words, educators and instructional designers should be aware of student learning modalities and use a variety of paradigms (e.g., rationalistic, interpretivist, naturalist) in their learning and teaching models and strategies. Although this is a potentially difficult task, it is important to underscore the need for college graduates to possess the competencies consistent with deep learning. "This means that, amongst other competencies, graduates should be capable of dealing with the complexity of the tasks in which they will engage in professional situations" (Nijhuis, Segers, & Gijselaers, 2005, p. 67).

Table 2
Other Studies that Illustrate Deeper Learning in Online or Blended Higher Education Courses

Author/s	Purpose	Methodology	Relevant Findings
Serby, T. (2011)	Replacement of a traditionally taught (i.e. lectures, workshops, tutorials) law course with online collaborative learning experience using simulation and role play	Survey research to gather student opinions	Interactions with peers resulted in deeper learning
Maurino, P. S. M. (2007)	The author synthesized and compared existing research studies on critical inquiry, deep learning, presence, and interaction in distance education.	Qualitative analysis of research literature	The results revealed that current literature touts the potential for development of deep learning and critical thinking skills through online threaded discussions.
Hughes, C., & Hewson, L. (2002)	The authors identified the instructional strategies that form the essence of successful classroom teaching by describing an online system, WebTeach™, that provides	Qualitative descriptive	The authors found the WebTeach™ an effective online technology because the program reduced the cognitive demands of learning new processes while focusing on strategies for deep learning related to the content of the course.

	structured teacher-learner interactions.		
Sitthiworachart, J., & Joy, M. (2007)	The authors developed a peer assessment tool for a programming course, and tested whether this tool is effective in increasing active and deep learning.	Mixed Method (Descriptive and comparative statistical analysis as well as questionnaire and interviews)	The results suggested that computer-mediated peer assessment is a valuable assessment approach which promotes active and deep learning and experiences of the students.
Nemanich, L, Banks, M., & Vera, D. (2009)	The authors identify enjoyment of the course and understanding of relationship as the demonstrations of deeper learning and compare a traditional course with an online one.	ANOVA and Regression Analysis	The findings revealed a complex interrelationship among instructor, content, student, and context that leads to deeper learning experiences.
Gormley, et. al. (2009)	Assessment of students' perceived IT ability and accessibility, and attitudes towards an online course	Questionnaire	While students value online courses they are not all prepared to be successful in online learning environments. The e-learning designers have to utilize media very carefully to encourage deeper learning approaches.

Deeper Learning in the 21st Century

Deeper learning has been studied and researched widely since the 1970s and there is a consensus that "deep learning is not a function or attribute of the learner but is a strategy that people can adopt" (Rosie, 2000, p. 45). By 2013, however, deeper learning research had evolved significantly. First, knowledge structures in the context of the pervasive World Wide Web are more complex and interwoven. When Biggs (1979) discussed declarative versus procedural knowledge this terminology was a useful way to distinguish between deeper and surface learning experiences. These two types of knowledge are deeply interconnected, however, and the relationship between them is particularly complex. When a student uses declarative knowledge (i.e. knowledge that comes from research) to solve problems, he or she also uses procedural knowledge which in turn is linked to prior declarative knowledge (i.e. knowledge that comes from experience). Additionally, in the highly interconnected digital environment created by the Web, information is absorbed quickly, used globally and transferred immediately to building new structures. In the knowledge economy, the need for deeper learning is not diminished;

rather, it became an acute necessity (Gibson, 2013). Formal and informal communities of practice have created global information contexts by pushing deeper learning to the forefront.

Learning environments have also evolved, becoming less structured, more open and virtualized, in line with broader societal changes. Personal or open learning environments have become a new target for learning designers. Gibson (2013) states that the unique affordances of these learning environments opened new possibilities for learners such as:

- Find distributed communities in narrow topical niches that may not exist locally;
- Engage in and influence communities asynchronously and at their own pace;
- "Learn by lurking" and easily find their way into open communities as observers;
- Engage models, simulations, and other forms of assessment that may be automated;
- Manage personal reputation within a community (often as an outcome of assessment);
- Inexpensively publish portfolios of work to an audience of peers or a broader public;
- Accumulate the community wealth of resources, specialized language, answered questions, practices and know-how over time in taxonomic, searchable and shareable forms (Gibson, 2013, pp. 459-460).

Another change in today's deep learning framework is its emphasis on assessment procedures that are deeply integrated with teaching and learning processes. Teaching and assessment are no longer considered as separate activities: they intersect and occur simultaneously within learning environments. Additionally, self or peer assessments have emerged as requirements for deeper learning. In online environments, learners are not satisfied with quick or casual comments but require quality feedback that helps them understand topics at a deeper level. Reflective practice, learning-by-doing, active discussions and decision making have become common practices in online learning environments.

Deeper learning supports the 21st Century Skill of collaboration in learning environments. As Gibson (2013) suggested "working with others to solve complex real-world problems entails increased use of deeper learning capacities as well as a need for broad, multiple measures to validate learning and achievement" (p. 462). It is only recently, however, that online communities have been able to offer learners deeper learning opportunities in which information is accessed, processed, shared and discussed in collaboration with others. Along the same lines, Lave and Wenger (1991) developed the concept of a 'community of practice' (CoP) in which information is shared through social interactions and active participations of its users, whether novice or expert. At the heart of CoP is sharing knowledge among the learning community and validating one's understanding in relation to others, resulting in deeper learning. CoP and other frameworks developed to capture connectivity among learners and the shared nature of knowledge require collaborative learning not merely as a preference but as a skill that all community members must master.

Encouraging deeper learning has been a long time interest of college educators. "The cognitive engagement of students with learning material to the extent that they uncover deeper meaning and associations, appraise material critically, and generalize their learning from one context to another" (Day, Humphreys & Duncombe, 2010, p. 3) has always been a desired learning outcome. The following section discusses some strategies that may be applied to promote deeper learning in online instructional design.

Deeper Learning and Online Instructional Design

The six deeper learning outcomes, or abilities, highlighted by the Hewlett Foundation derive from the need for functioning in a complex society where problem solving, critical thinking and learning to learn are crucial. These abilities help learners to tackle complex social issues, while cultivating competitive employment skills for a global market. One question that needs to be determined is if these abilities are being taught adequately at institutions of higher education. By definition, higher education provides knowledge and skills essential to a particular discipline, but may fail to offer any skills beyond content mastery. Another question relevant to higher education settings is whether (and how) principles of deeper learning are applied to the design of online learning environments.

Online learning design uses the principles of instructional design to arrange effective and efficient teaching and learning experiences to meet learner needs. In instructional design, "instructional designers start with the analysis of the learners, then determine learning goals, arrange learning activities and finally develop and implement assessment procedures. All these activities are driven by the learning theories and instructional methods and strategies" (Czerkawski, 2013, p. 10). In designing deeper learning experiences, the same principles apply, but McGee and Wickersham (2005) warn that "The deeper learning principles indicate a higher degree of learner control, decision-making, and organization than exists in current CMS thus requiring well conceptualized instructional design, but also adaptability and flexibility in order to address the uniquely contextualized reality of the learner" (p. 2205). This view is supported by Du, Yu and Olinzock (2011). The challenge, then, is to find a balance between the flexibility available within online learning environments and the pre-planned, structured and sometimes moderated learning activities required for students to experience deeper learning.

In the context of providing deeper learning environments, instructional designers should pay attention to the following considerations:

- *Providing students authentic learning experiences*. Deeper learning "requires that the learning design take into consideration the learner's context of practice, ways of learning, as well as experience in the world" (McGee & Wickersham, 2005, p. 2206) . For this reason, it is crucial to design learning materials with real life experiences in mind and situate them in authentic tasks.
- *Asking questions* that will result in problem solving, establishing relationships, evaluation, judgment and choice. Smith and Colby (2007) argue

  > . . . students who move beyond of surface learning consider any given task as a series of internal rhetorical questions: What do I know about this subject? How does this information relate to what I already know? What is the broader implication or significance of what I've learned? (Smith & Colby, 2007, p. 207).

- *Increasing meaningful dialogue between course participants.* Dialogue occurs in environments in which participants are open to other people's views and acknowledge each other's roles and feelings. This permits groups to suspend prejudices and convictions and move to 'collective mindfulness' and common ground (Chapman, Ramondt & Smiley, 2006). Many researchers support dialogues in online learning environments as they encourage deeper learning (Offir, Yev, & Bezalel, 2008). According to Smith and Colby (2007), "one way to accomplish (deeper learning) is to engage all members of the community in intentional, substantive, and inclusive dialogue

about student learning" (p. 207). Along the same lines, instructors should include various community building activities for their students.

- *Examining teaching and learning tasks:* Smith and Colby (2007) found that teaching materials and design of the overall course were limiting students to surface learning. If a learning environment is designed around tasks that promote surface learning, deeper learning outcomes cannot be expected. Therefore, existing courses should be regularly revised to incoporporate learning tasks that will result in deeper learning experiences.
- *Providing frequent feedback through formative assessments:* Feedback is considered to be one of the most effective strategies to promote student achievement (Rushton, 2005). Feedback includes information about one's learning from experts or other peers. In online learning environments students need validation of deeper learning and traditional methods of assessment (such as multiple choice exams) may not be the best way to provide this validation. Allowing students to provide formative feedback on a regular basis is more likely to increase effectiveness of instruction.

These considerations are not new to highly effective educators. Innovative delivery of rich core content to students so they can learn and apply what they have learned has been around for decades (Alliance for Excellent Education, 2011). What is new is that this framework is now widely promoted as normative. Perhaps it is not surprising that "a shift toward all students mastering the kind of advanced skills embodied in deeper learning comes at a time when many schools continue to struggle to teach even basic skills" (Alliance for Excellent Education, 2011, p. 3). Therefore, the importance of a few effective practices for online learning was stressed in this section.

Conclusions

Implementing learning environments that support deeper learning is a necessary but difficult goal to achieve. At the higher education level, using a well conceptualized instructional design is the best approach in applying deeper learning principles. For instructional design to be successful, a fine balance between pre-structured activities of instructional design and consideration for unique learner needs should be considered. To foster deeper learning, strong support systems, effective pedagogical methods and online community building activities should also be considered. For online environments, course planning, design, development and assessment procedures require careful planning by instructors. As Gibson (2013) argues "deeper learning emerges from the dynamic interplay between people with specialized knowledge, working together to solve problems, in a community that is formed by shared interests and practices" (p. 464). Both expert and novice perspectives on course materials should be taken into account as well as the complex nature of knowledge in a deep learning context. To make the most of the affordances and opportunities offered by online communities, creative and meta-cognitive activities should be strongly emphasized in the online learning environments (Turvey, 2006). Successful implementation of deeper learning will require changes across curriculum, instruction, assessment, teacher preparation and professional development (National Research Council, 2012); instructors and instructional designers should, therefore, be prepared to approach implementing deeper learning environments by planning sustained changes across a multitude of pedagogical elements.

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