Student Growth in Asynchronous Online Environments: Learning Styles and Cognitive Development

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As online courses become more popular with college students, it is important for student affairs professionals to understand how this unique environment influences student learning and growth. This paper examines the impact of the asynchronous online learning environment on student cognitive development. Kolb's (1984) Experiential Learning Theory of Development is used to explain this influence and further inform student affairs practice in a previously unexplored realm.

Higher education institutions throughout the United States are increasingly offering online courses to meet the growing student demand for distance education (Smart & Cappel, 2006; Song, 2010). Based on a 2011 survey of 2,500 colleges and universities, 65% responded that online education was a critical component of their long-term strategic plan (Allen & Seaman, 2011). Ramage (2002) defined online education as the method of instruction in which the students and faculty are physically separated but connected through an Internet link. These online learning environments allow students the flexibility to enroll in courses without being physically present on the college campus. Approximately one in three college students enrolls in at least one online class (Allen & Seaman, 2011). These courses can be delivered through synchronous or asynchronous methods. Synchronous instruction is time- and place-dependent while asynchronous instruction is characterized by students working independently, generally at their own pace, and in separate spaces (Bernard et al., 2004). Both methods of instruction create unique learning environments, but asynchronous online instruction is especially distinct from traditional, face-to-face instruction on college campuses.

Much of the existing research on the asynchronous learning environment compares it to traditional course environments, but these studies focus primarily on measuring student learning outcomes using grade comparisons, student satisfaction surveys, and end-of-term course evaluations (Bernard et al., 2004; Diaz & Cartnal, 1999; Summers, Waigandt, & Whittaker, 2005). Meta-analyses of these data produced "no significant difference" between online course instruction and traditional, face-to-face instruction (Bernard et al., 2004; Russell, 1999). However, the aforementioned statistics do not accurately portray the student experience in asynchronous online education. Many students may encounter dissonance in the asynchronous learning environment when there is a mismatch between their learning style preferences and the online environment (Logan, Augustyniak, & Rees, 2002; Lu, Jia, Gong, & Clark, 2007; Terrell & Dringus, 2000). This dissonance impacts how students learn in online courses, challenging them to gain new cognitive skills as they adapt to the online learning environment. Alternately, students may struggle to adapt and therefore disengage from the developmental process. Thus, the way in which students engage in asynchronous online environments can have implications for their cognitive development.

This paper will examine the asynchronous online learning environment and its potential impact on students' cognitive development. Kolb (1984) defines four interrelated learning dimensions that shape how students engage and process experiences and problems: concrete

experience, reflective observation, abstract conceptualization, and active experimentation (see Figure 1). Challenging students to strengthen their non-dominant learning dimensions and integrate all learning dimensions in ever-increasing complexity promotes cognitive development (Kolb, 1984). The author posits that students who are not adequately challenged to employ non-dominant learning dimensions in the asynchronous online learning environment may not develop higher orders of learning, and these students may stagnate on their path to achieving a balanced learning styles profile. This paper proposes a model for understanding how asynchronous online

learning can inhibit or promote development based on Kolb's (1984) Experiential Learning Theory.

Literature Review

Kolb & Kolb (2005) suggest that learning is the "major determinant of human development, and how individuals learn shapes the course of their personal development" (p. 195). How individuals make meaning of information and experiences influences their cognitive development. A review of the current literature on asynchronous online course environments and experiential learning
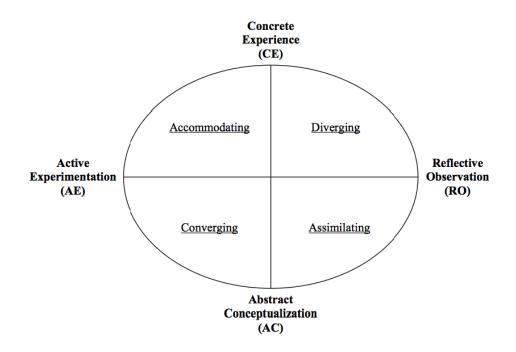

Figure 1. Kolb's (1984) learning dimensions and associated learning styles. Learning dimensions, listed on the outside of the oval, are cyclically integrated to make meaning of information or experiences. Learning styles, listed within each oval quadrant, represent an individual's preferred processing and grasping learning dimensions along each axis. Adapted from *KOLB, DAVID A., EXPERIENTIAL LEARNING: EXPERIENCE AS A SOURCE OF LEARNING & DEVELOPMENT, 1st, ©1984.* Printed and Electronically reproduced by permission of Pearson Education, Inc., Upper Saddle River, New Jersey.

theory provides a foundation for analyzing the impact of online learning spaces on this developmental process.

The Asynchronous Online Learning Environment

The asynchronous online course setting represents a relatively new and unique learning environment in higher education. Terrell and Dringus (2000) explain the online learning environment as a comprehensive structure that supports the process of learning through the implementation of a variety of instructional and communication technologies. Many face-to-face college courses utilize learning management systems, such as Blackboard or eCollege, to manage a proportion of course content and delivery through a computer-mediated interface; however, online classes deliver at least 80% of the course content online and typically do not involve face-to-face meetings (Allen & Seaman, 2011). Textbooks may not be available online, but syllabi, readings, assignments, and supplementary materials are posted on course websites, and students are able to access the information and submit course assignments from any computer with an Internet connection at any time. Typical asynchronous online courses require students to independently review course materials and use online discussion forums in place of face-to-face content delivery and discussion (Allen & Seaman, 2011).

Issues and features of asynchronous online education include "instructional design, student motivation, feedback and encouragement, direct and timely communication, and perceptions of isolation" (Bernard et al., 2004, p. 382). Collectively, these features represent the inherent differences between asynchronous online instruction and face-to-face instruction (Bernard et al., 2004). Many studies attempt

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to differentiate between these instruction methods, specifically with regard to student learning styles and academic achievements (Diaz & Cartnal, 1999; Lu et al., 2007; Smart & Cappel, 2006; Terrell & Dringus, 2000), but few have successfully evaluated the online environment as a catalyst for student cognitive development.

Kolb's Experiential Learning Theory

Experiential Learning Theory (Kolb, 1984) describes cognitive development as a function of integrating increasingly complex learning modes. Kolb (1984) defines the learning process as a series of four cyclical learning dimensions that build upon each other to create meaning. In foundational order, these steps are concrete experience, reflective observation, abstract conceptualization, and active experimentation (see Figure 1). Concrete experience and abstract conceptualization are polar opposites and form a processing dimension while reflective observation and active experimentation form a dichotomy for the grasping dimension (Kolb, 1984). An individual's learning style is based on his or her preference for one of the poles of each learning dimension. However, these learning styles are not stagnant, and cognitive development occurs when the student builds adaptive competencies in each of these learning dimensions.

Learning styles are categorized into four primary forms of meaning-making: convergent, divergent, assimilation, and accommodative (Kolb, 1984). Convergent learners utilize abstract conceptualization and active experimentation and are "inclined to be good problem solvers and decision makers" (Evans, Forney, Guido, Patton, & Renn, 2010, p. 139). Divergent learners are people-oriented and rely on concrete experience and reflective observation to generate solutions to problems utilizing

diverse perspectives (Kolb, 1984). Students employing the assimilation learning style use abstract conceptualization and reflective observation to guide the creation of sound theoretical reasoning (Kolb, 1984). Accommodative learners emphasize concrete experience and active experimentation and use a perceptive trial-and-error approach to solve problems (Kolb, 1984). Cognitive development occurs when students begin to integrate additional learning dimensions into their preferred learning style.

Kolb (1984) introduced three stages of cognitive development through maturation: acquisition, specialization, and integration. The goal of this development is to achieve competency in using all learning dimensions rather than relying on a single preferred dimension. The acquisition and specialization stages are seen from early childhood through adulthood, and individuals in these stages acquire and utilize a dominant learning dimension to process information and experiences. The final stage, integration, culminates in the ability to adapt to any learning situation by effectively using all four learning dimensions in a balanced learning styles profile (Kolb, Boyatzis, & Mainemelis, 2001). Moving from specialization to integration is a process of strengthening skills in non-dominant learning dimensions through three increasingly advanced orders of learning styles. Much of the existing research on Kolb's Experiential Learning Theory has focused primarily on learning style preferences and impacts on student achievement (Aragon, Johnson, & Shaik, 2002; Garity, 1985; Lu et al., 2007). These studies utilize learning style assessment tools that are readily available and easy to execute; however, they do not assess whether students are achieving the desired cognitive growth associated with integrating additional learning dimensions into their learning styles profile.

Cognitive Development in the Asynchronous Learning Environment

The asynchronous online learning environment impacts the transition from specialization to integration in Kolb's (1984) experiential learning theory. Most students have reached the specialization stage, or first order of learning, by the time they enroll in college courses, and the college environment is where these students develop their non-dominant learning styles to achieve integration (Kolb, 1984). Since most students begin college specializing in a particular learning style, situations and environments they encounter on a college campus can help them transition to the second order by providing opportunities to develop non-dominant learning dimensions. First order learning style preferences can predict specific implications for individual students and their opportunities for growth in distinct learning environments (Kolb, 1984).

Current research states that convergent learners and assimilators are more likely to succeed in, and be satisfied with, the asynchronous online learning environment than divergent learners and accommodators (Aragon et al., 2002; Lu et al., 2007). Aragon, Johnson, and Shaik (2002) speculate, "by design, an online Internet environment will require students to utilize reflective observation (learning by watching and listening) and abstract conceptualization (learning by thinking) simply due to the way the course materials are organized and delivered" (p. 9). Alternatively, face-to-face courses facilitate learning through more hands-on approaches where students are likely to use the learning dimension of active experimentation (Aragon et al., 2002) associated with the accommodative learning style. This observed discrepancy between the asynchronous online and face-to-face

environments can have a strong impact on student cognitive development.

Given the influence of individual learning style preferences and environmental factors on cognitive growth, individuals with different learning styles may uniquely experience development in the asynchronous online environment. Convergent and assimilative learners' development may stagnate in an online environment while divergent and accommodative learners are challenged to develop skills in abstract conceptualization, prompting a movement into the second order of learning. The following section describes this phenomenon for each of the distinct learning styles.

Asynchronous Learning for Convergent and Assimilative Learners

Students who specialize in the convergence and assimilative learning styles may experience the asynchronous learning environment similarly because these two learning styles share the processing dimension of abstract conceptualization. Students who use abstract conceptualization value scientific approaches to solving problems instead of the artistic approach characteristic of the concrete experience dimension (Kolb, 1984). Since the way in which students engage in the asynchronous online environment is constrained by limitations of the computer-mediated interface and structured content, the scientific approach allows students to easily process course material. Furthermore, Kolb (1984) explains that these students are good at systematic planning and value "precision, the rigor and discipline of analyzing ideas, and the aesthetic quality of a neat conceptual system" (p. 69). The asynchronous learning environment requires students to analyze ideas and independently process concepts and thus preferences the abstract

conceptualization processing dimension to make meaning of the material.

The abstract conceptualization strength of the convergence and assimilative learning styles are aligned with the requirements of the asynchronous online learning environment. Therefore, these students are not challenged to develop their non-dominant learning dimensions and are more prone to feel "safe and satisfied" with the environment (Evans et al., 2010, p. 30). Sanford (1966) claims that an unchallenging atmosphere can inhibit development, and online courses are no exception. While convergent and assimilative learners succeed academically in the asynchronous online environment, the lack of sufficient mental challenge can inhibit their cognitive development. This implies that convergent and assimilative learners may not move to the second order of cognitive development through their experience in the asynchronous online environment.

Asynchronous Learning for Divergent and Accommodative Learners

Divergent and accommodative learners experience the online learning environment differently than their convergent and assimilative counterparts. The concrete experience learning dimension is a shared strength of the divergence and accommodation learning styles (Kolb, 1984). Students adept at the concrete experience learning dimension enjoy handling situations in a personal way and use intuitive, artistic approaches to solve problems (Kolb, 1984). As previously mentioned, the asynchronous online environment does not align well with these approaches because there is little to no personal interaction and the structured online delivery of course materials does not allow for experimentation or creativity. The time and space separation characteristic of this environment precludes students from

personal interactions and creative, artistic problem solving. Kolb (1984) states, "The person with this orientation [of concrete experience] values relating to people and being involved in real situations" (p. 68). Since the strengths of divergent and accommodative learners center around feeling and personal interaction (Kolb, 1984), elements not found concretely in the asynchronous environment, these learners may gain the most from interacting with the asynchronous online learning environment.

Asynchronous online courses prefer independent thinking due to the self-regulated, individual processing that these courses require of enrolled students. Engaging in asynchronous online learning may challenge students to increase their competency in individual thinking and conceptual approaches to learning. For example, students who prefer to process new learning through discussion and intuition are required instead to learn material independently and analyze the given information. Sanford (1966) qualified this type of challenge by stating that adequate support must also be available to the student to encourage optimal development in the environment. While defining "adequate support" for all students in any environment is difficult, instructors and administrators must be conscious of students' needs and provide students with personal and structural support in the asynchronous online environment. Building student-to-student and student-to-faculty relationships and creating opportunities to acquire or request additional help can provide the support students need in the asynchronous online learning environment. As long as this support is present, divergent and accommodative learners have the potential to further develop their cognitive skills and move into the second order by acquiring the strength of abstract conceptualization.

However, if adequate support is not present, students will disengage from the learning experience and their development may stagnate.

Implications and Future Directions

How a student learns is central to their personal development, and individuals who do not achieve proficiency in multiple learning styles as well as the understanding of how to adapt these techniques to new environments can inhibit their own learning and developmental progress (Kolb, 1984). Understanding the differences between learning styles allows faculty and student affairs professionals to provide both challenge and support in multiple environments to advance student development through learning. As universities increasingly turn to online education as a means of educating and developing students, understanding the developmental impact of these environments will become more central to the student affairs profession. Faculty, administrators, and professionals need to be cognizant of how they design online interactions with courses, workshops, and student services. Ensuring these environments are offering a balance of challenge and support will provide a positive foundation for interaction between students and the asynchronous learning environment, encouraging further cognitive development and integrated learning styles. University faculty and staff should intentionally design online courses and workshops keeping diverse learning styles in mind. Consulting resources on best practices in online education can inform curriculum design and learning outcome development. For example, Graham, Cagiltay, Lim, Craner, and Duffy (2001) discuss principles for effective online instruction that should be implemented in asynchronous courses in

order to enhance the educational experience for all online students. These principles include encouraging student-faculty contact, communicating high expectations and giving prompt feedback, providing opportunities for interaction and cooperation between students, and respecting the diverse learning styles that are present in the course. Educators and administrators can use this information to better implement engaging online education for their students. Facilitating students' development and integration of non-dominant learning dimensions in person can ease the transition for students into the asynchronous online environment. Student affairs professionals can help their students succeed in online courses by supporting their cognitive development out of the classroom. Implementing programs and activities that encourage the integration and development of non-dominant learning dimensions may help students develop these skills in a comfortable environment prior to engaging in the asynchronous online environment. Student affairs professionals can also advocate for students on an administrative level to ensure that faculty and the general campus community understand the challenges that students face when taking online courses. This will ensure that campus decision-makers are informed when deciding how to integrate asynchronous online courses into the academic curriculum. Further research is needed to validate the conclusions presented in this paper. Studies comparing the unique interactions between each individual learning style and the asynchronous online environment will limit generalizations made by assuming that different learning styles engage in the environment in the same way. Implications for curriculum development for online courses and the integration of pedagogy grounded in theory should also be

incorporated. Furthermore, comparisons between asynchronous and synchronous delivery methods are also necessary to evaluate the effectiveness of each of these environments in advancing student development. Studies that include mandated asynchronous and synchronous online courses would provide useful data on the impact of these courses on student development. Since a vast majority of the existing literature is based on self-selected, graduate level, asynchronous education, there is a significant need for additional studies to examine the online undergraduate level courses that many current and future students may be required to take as colleges and universities shift to online education.

Conclusion

Asynchronous online learning offers a unique environment in which different learning styles may influence cognitive development. Developmental outcomes are a product of the interaction between individuals and the asynchronous learning environment. Since convergent learners and assimilators may be more comfortable in the asynchronous learning environment, they may not experience the challenge associated with transitioning to higher orders of cognitive growth. Conversely, the asynchronous learning environment challenges divergent and accommodative learners, prompting a shift into a higher order of cognitive understanding. Although possessing a divergent or accommodative style may assist learners with cognitive development, convergent and assimilative learners may experience little to no development due to the lack of challenge to develop non-dominant learning dimensions. The mismatch between the specialized learning styles of divergers and accommodators and qualities of the

asynchronous learning environment facilitates further development. Students who are able to increase their competency in their non-dominant learning dimensions are consequently able to advance to higher orders of learning and cognitive growth. This paper presents a strong case that the asynchronous learning environment may impact student cognitive development, and alternative ways to evaluate cognitive development should be developed and utilized to assess student learning in online courses.

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