FOSTERING CRITICAL THINKING SKILLS IN STUDENTS WITH LEARNING DISABILITIES THROUGH ONLINE PROBLEM-BASED LEARNING

Kathleen Flynn
Faculty of Education, University of Ontario Institute of Technology

ABSTRACT

As a pedagogical approach, problem-based learning (PBL) has shown success for average and gifted students (Hmelo-Siver, 2004) and there are numerous incentives for its implementation in online learning environments (Savid-Baden, 2007; Chernobilsky, Nagarajan, & Hmelo-Silver, 2005). However, little research has been conducted regarding the impact of problem-based learning on higher order thinking skills of students with learning disabilities studying in online learning environments. This study examines the effects of an online problem-based learning course on critical thinking skills of university students with learning disabilities. Students participating in the study will be taking their first course in an online Bachelor of Arts degree at the University of Ontario Institute of Technology. Drawing on triangulation, this study includes a content analysis of reflective journals, a video analysis of a problem-based learning objective (PBLO) and semi-structured interviews with repertory grids, to observe the presence or absence of critical thinking skills among students with learning disabilities in an online PBL course.

1. INTRODUCTION AND IMPORTANCE OF STUDY

The 21st century is often referred to as the information based economy and is linked to technological growth, accessibility of information, and a need for higher order thinking skills such as problem-solving (Tan, 2007; Kalelioglu & Gulbahar, 2013). Dewey (1910) believed long ago that it is impossible to obtain knowledge without experience and that rote memorization approaches should be replaced with the development of problem-solving skills. Problem-based learning (PBL) has been promoted by numerous researchers (Gallagher, Sher, Stepien, & Workman, 1995; Gijbels, Dochy, Van den Bossche, & Siegers, 2005; Hmelo-Silver, 2004; Stepien & Gallagher, 1993) as a promising set of strategies that can nurture higher order thinking skills like problem solving and critical thinking among average and gifted university students (Barrows & Tamblyn, 1980). Recent studies have shown positive connections regarding the implementation of instructional strategies like PBL in online learning environments on critical thinking skills (Kalelioglu & Gulbahar, 2013) as a way to merge problem-solving skills and technological competencies (Savin-Baden, 2007). Unfortunately, there has been little research evaluating the influence of PBL as a pedagogical approach, attempting to foster critical thinking skills in students with learning disabilities in online learning environments.

2. CONTEXTUAL INFORMATION

Learning disabilities include a diverse cluster of neurological disorders that can alter the performance of the brain in a manner that affects how an individual stores, organizes, understands or uses verbal and non-verbal information (LDAC, 2002). The dysfunction in an individual's brain resulting from the neurological disorder causes impairments in one or more processes related to thinking, remembering, perceiving or learning (NCLD, 1999). However, in a technologically advanced, global and rapidly changing society of the 21st

century, there is an increased demand for individuals with higher order cognitive skills like problem-solving and critical thinking (Behar-Horenstein & Niu, 2011). Critical thinking is defined by Glaser (1942) as an outlook and analytical application toward problem solving. Current researchers have further suggested that critical thinking is necessary for problem solving, which requires purposeful reflection (Brookfield, 1987; Sternberg, 1986; Ennis, 1993; Facione, 1990; Paul, 1997), self-regulation, interpretation, analysis, evaluation and inference (Facione, 1990).

Online problem-based learning has demonstrated effectiveness in enhancing technological, problem solving and critical thinking skills (Savin-Baden, 2007). Jonassen, Davidson, Collins, Campbell and Hagg (1995) found that the PBL model demands complicated problem solving where learners define the problem, identify resources, set priorities, and investigate alternative solutions. These are the same skills and abilities necessary for all individuals to employ during real-life problem solving and decision-making activities. If all individuals require cognitive skills to be highly adaptable the fast-changing environments of the 21st century as Tan (2007) states, then it is extremely important to ensure students with learning disabilities are also achieving these skills. If the goal of education according to Bruner (1960) is to foster the development of problem solving skills and encourage the process of inquiry and discussion, then PBL online may be a possible approach to take.

3. METHODOLOGY

3.1 Research Design and Data Collection Techniques

This study will examine a set of ethnographic case studies and carry out a triangulation design. "The Triangulation Design is a one-phase design in which researchers implement the quantitative and qualitative methods during the same timeframe and with equal weight. This design is used when a researcher wants to directly compare and contrast quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data" (Creswell and Clark, 2007, p. 62).

Qualitative and quantitative data will be collected through semi-structured interviews incorporating the use of repertory grids, content analysis of online discussion boards and video analysis. Observations will be recorded and analyzed using a variety of hardware and software in the EILab such as cameras, Adobe Connect, Noldus Face Reader and Observer XT.

3.2 Participants

The participants of this study will include five students from the online Bachelor of Adult Education and Digital Technologies (AEDT) program at the University of Ontario Institute of Technology. The group will be partaking in their first online PBL course in the program AEDT1120U Foundations of Digital Teaching and Learning Technologies. The five students range in age between twenty and thirty-five and all participants have a diagnosed learning disability

3.3 Research Questions

1. Can problem-based learning online foster critical thinking skills in students with learning disabilities?
2. Can problem-based learning online foster engagement in students with learning disabilities?
3. Does an online PBL environment support principals of Universal Design for Learning (UDL)?

4. CONCLUSIONS

The purpose of this paper is to discuss the preliminary research design of a study that will aim to analyze the presence or absence of higher order thinking skills demonstrated by students with learning disabilities in an online learning environment. Other areas of interest will focus on the level of engagement present in an online PBL learning environment and a gap analysis of Universal Design for Learning principals.

REFERENCES

Behar-Horenstein, L. S., & Niu, L. (2011). Teaching critical thinking skills in higher education: A review of the literature. *Journal of College Teaching & Learning*, *8*(2).

Brookfield, S. (1987). *Developing critical thinkers: Challenging adults to explore alternative ways of thinking and acting*. San Francisco: Jossey-Bass.

Bruner, J.S. (1960) *The process of education*. Cambridge: Harvard University Press.

Chernobilsky, E., Nagarajan, A., & Hmelo-Silver, C. E. (2005, May). Problem-based learning online: multiple perspectives on collaborative knowledge construction. In Proceedings of the 2005 conference on Computer support for collaborative learning: learning 2005: the next 10 years! (pp. 53-62). International Society of the Learning Sciences.

Creswell, J. W., & Clark, V. L. P. (2007). Designing and conducting mixed methods research. Thousand Oaks, CA: Sage.

Dewey, J. (1910). *How We Think*. Lexington, MA: Health.

Downing, K., Ning, F., & Shin, K. (2011). Impact of problem-based learning on student experience and metacognitive development. *Multicultural Education & Technology Journal*, *5*(1), 55-69.

Ennis, R. H. (1993). Teaching for higher order thinking. *Theory into Practice, 32* (3), 181.

Facione, P. (1990). Critical thinking: A statement of expert consensus for purposes of educationalassessment and instruction. Retrieved from http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED315423

Glaser, E. M. (1942). An experiment in the development of critical thinking. *Teachers College Record*, 43 (5), 409-410. Retrieved from http://www.tcrecord.org.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*, 235–266.

Jonassen, D., Davidson, M., Collins, M., Campbell, J. & Haag, B. (1995). Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, 9 (2), 7-26.

Kalelioğlu, F., & Gülbahar, Y. (2014). The effect of instructional techniques on critical thinking and critical thinking dispositions in online discussion. *Journal of Educational Technology & Society*, *17*(1).

Learning Disabilities Association of Canada. (2002). *Official definition of learning disabilities.* Retrieved from: defined/official-definition-of-learning-disabilities

National Center for Learning Disabilities. (1999). *Visual and auditory processing disorders.* Retrieved from: http://www.Idonline.org/article.6390?theme=print.

Paul R. C. (1992). *Critical thinking: What every person needs to survive in a rapidly changing world*. Santa
Rosa, CA: Foundation for Critical Thinking.

Savin-Baden, M. (2007). *A practical guide to problem-based learning online*. New York: Routledge.

Sternberg, R. J. (1986). *Handbook of Intelligence*. New York: Cambridge University Press.

Tan, O. S. (2007). Problem-based learning pedagogies: psychological processes and enhancement of intelligences. *Educational Research for Policy and Practice*, *6*(2), 101-114.

Tan, O.S. (2003). *Problem-based learning innovation: Using problems to power learning in the 21st century.* Singapore: Thomson Learning.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. & Trans.). Cambridge, MA: Harvard University Press (original works published 1930–33).