

Applying the Bioecological Theory of Human Development to learning: Enhancing student engagement in online learning.

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Abstract: This paper explores the application of the bioecological theory of human development to online learning and teaching. Bioecological theory advocates that by strengthening human relationships within supportive environments it is possible to increase the extent of development realised into positive outcomes. Likewise through strengthening human connectedness in supportive online learning environments, it is possible to increase the extent of learning realised into positive outcomes. In online learning environments, developing strategies that facilitate engagement is a key to strengthening learning outcomes. Through understanding the processes that inspire human development, our understanding of the processes that inspire online learning are advanced.

Key words: bioecology, student engagement, online learning and teaching

By enhancing proximal processes and environments, it is possible to increase the extent of actualised genetic potentials for developmental competence (Bronfenbrenner & Ceci, 1994, p. 568).

Introduction

Over the last decade, expansion of online teaching and delivery of learning material has been momentous. Opportunity to complete university study within any state of Australia from any place of residence abound. Yet many students articulate a hesitance to undertake online learning. Online learning and teaching however, is now an entrenched feature of the current university context (Krause, McEwen, & Blinco 2009). A teaching philosophy based on the bioecological theory of human development (Bronfenbrenner, 2001) can be used to inform understanding that learning is fundamental to realising human potential, placing an enormous opportunity for educators and institutions of education to help fulfil human rights and enhance inherent potential—we must do this well. Understanding the driving mechanisms of human development can provide insights into the driving mechanisms of learning. The bioecological theory of human development also provides a guiding framework useful in constructing innovative online learning materials and teaching strategies that meet student learning needs, motivate participation and enhance student engagement—a challenging task in online learning environments. This paper will demonstrate the applicability of the bioecological theory of human development to learning and teaching and present successful examples of online teaching strategies that enhance student engagement resulting in enhanced learning outcomes.

Overview of the bioecological theory of human development

The bioecological theory of human development by Bronfenbrenner (2001a) explains the drivers of human development as the interactions that occur between an individual (their biological being) and the interconnected systems surrounding them (their ecology). The precursor model, ecology of human development, first published by Bronfenbrenner in 1979, is an extension on the developmental systems framework of human development, which is 'useful for understanding the ways in which contextual extra-familial factors can influence child wellbeing' (Hetherington & Stanley-Hagan, 2002, p. 289). The significant advance introduced by Bronfenbrenner in understanding human development over other models is the holistic integration of interpersonal relationships with larger societal, cultural and political forces in the developmental processes (Brendtro, 2006; Swick & Williams, 2006). Applying this model of human development to online learning and teaching may promote a holistic approach that facilitates effective teaching strategies and promotes learning outcomes. Bronfenbrenner (2001a) advocated that by strengthening human relationships within supportive environments it is possible to increase the extent of development, and hence learning, realised into positive outcomes. This principle of human development is a key to developing holistic online learning environments that facilitate engagement and strengthens positive learning outcomes.

In accordance with bioecological theory effective learners are active participants in bidirectional interactions which occur within the environment. Bronfenbrenner conceptualised the environment in which development occurs as a series of interacting systems. Human development involves progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives. This process of interactions is affected by relations between settings and by the larger context in which the settings are embedded (Bronfenbrenner, 2001a). Within the interacting systems, interpersonal interactions that are sustained over time and committed towards maximising potential are known as proximal processes. Proximal processes are defined as 'enduring, reciprocal, highly interactive processes between a developing organism and other individuals or objects in the environment' (Ceci, 2006, p. 173). Proximal processes are bidirectional in their influence. The ecology changes the person and the person changes the ecology. Therefore, individuals are active in their own development through selective patterns of attention, action and responses with people, objects and symbols from within their environment.

The inter-connectedness between the interacting systems and the proximal processes is fundamental to the bioecological theory (Bronfenbrenner & Ceci, 1994, p. 572). One without the other is ineffectual. Excellent environments without functional proximal processes (relationships) fail to achieve positive outcomes. Together, connected relationships and functional environments are influential in achieving positive developmental and learning outcomes.

Propositions of the bioecological theory of human development

There are four inter-related components in the Bioecological Theory of Human Development. Together these four components constitute the 'process–person–context–time model (PPCT) for conceptualising the integrated developmental system and for designing research to study the course of human development' (Lerner, 2005, p. xv):

The *processes* encompass the dynamic bidirectional interactions between the person and other people and between them and their ecology. Proximal processes are the primary mechanism through which human potential is actualised. To be successful in stimulating effective continuous development, proximal processes need to be reciprocal, progressively complex, and occur regularly over an extended time period. These interactions are the most powerful forces determining human development and learning outcomes. The *person* is endowed with genetic, physical, psychological and behavioural characteristics necessary for development and learning. The *context* of human development incorporates the interacting systems and social characteristics (family, school, neighbourhood, or peers) surrounding the person. Together these components are the ecology of a learner, which consists of all the processes, relationships and external influences that impact on learning and human development (Spencer, 2006). As proximal processes are strengthened and as the environment improves developmental outcomes are enhanced—as seen in the person’s phenotype. The bioecological theory proposes that by enhancing human interactions and environments, it is possible to increase the extent of potential realised into positive developmental outcomes for example enhanced learning (Bronfenbrenner, 2001b; Bronfenbrenner & Ceci, 1994, p. 568). This review of bioecological theory has highlighted the importance of relationships (person–person and individual–context) and how these relations influence the individual’s quest for learning. The paper will now apply the bioecological theory to online learning and teaching.

A bioecological model of learning & teaching

Recent research in human development has indicated that genetic makeup does not solely determine human traits; rather, genetic messages interacting with environmental experiences determine developmental outcomes (Beaver, DeLisi, Wright, & Vaughn, 2009; Rutter, 2006). This is an important concept for the science of human development that can be applied to maximise learning. Genetic endowment and ecological experiences interact to determine human functioning and developmental outcomes such as learning. The genetic makeup of an individual, called genotype, contains the blueprints for potential learning, but not the processes. The processes of actualising genetic potential are found externally within relationships. Thus learning occurs through interactions between the individual and the ecology of learning. Although genetic factors have an influence on developmental outcomes, including learning, most outcomes are not determined by genes. Instead individual achievements are due to the interactions between people in the ecology of learning, independent influences on the ecology such as financial matters and a genetic effect. A bioecological model of learning & teaching depicts the relationship between actualising genetic potential, bi-directional relationships, teaching, the ecology of learning and enhanced learning outcomes (see Figure 1).

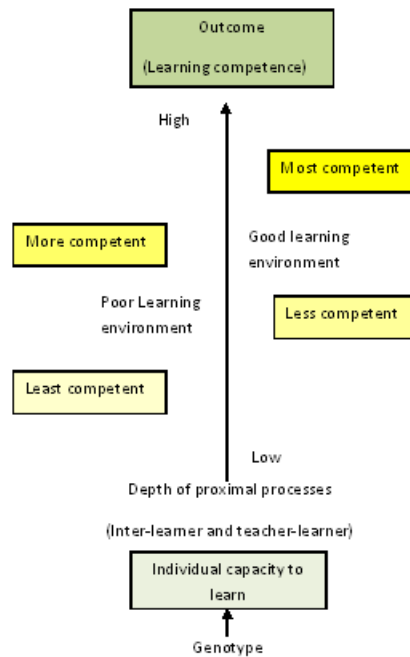


Figure 1: A bioecological model of learning & teaching

Applying the bioecological model of learning & teaching requires a focus on the mechanisms alongside the context of learning & teaching as equal determinants of the learning outcome. This establishes the basis for understanding learners within their ecology as active participants in their learning, where optimal learning occurs through interactions that are bidirectional and reciprocal. It also establishes that in learning the influential environment is not merely the immediate context in which the person seeks learning; it also includes the interactions between people and the influences from wider systems. The foremost feature of a teaching strategy stemming from this model is the incorporation of interpersonal relationships (between teacher-learner and learner-learner) within supportive online learning environments to create effective learning opportunities. The learner is central and relates to the learning environment in light of his or her own unique circumstances and life experiences. It is important to recognise that the subjective feelings and personal views of the participants are elements that influence the process of learning.

The context of learning is an outcome of the interacting systems in which learning occurs. This includes the institutional, political and societal systems governing learning. Holistically, learning environments will not only include excellent ‘content’ but also consider the way in which the context of learning is subjectively experienced by the unique person. There are many interacting influences and systems that impact on student learning. When values and expectations of each system positively support each other, the more likely it is that the learner will fulfil their potential and achieve salient learning outcomes. When systems are congruent, they reinforce each other. The learner however, is an active participant in these interacting systems and his or her personality, responses and life circumstances will influence other people in these systems. Strong, mutual connection within the learning environment motivates the engagement with the learning concepts and enhances learning outcomes.

Student experience with online learning should drive online teaching. Learning material made available online without embedded contextualisation will not enhance student outcomes and

experience. As expansion of online learning and teaching occurs, models and teaching strategies that enhance the student experience is essential. Together effective teaching strategies and learning resources can create a context through which effective engagement with students is possible in the online learning environment. Capability outcomes in tertiary education graduates are enhanced through a holistic design of learning experiences, assessment and feedback strategies (Lines & Muir, 2004) supported through improving the quality of bidirectional relationships experienced in online learning.

The remainder of this paper will present a reflective evaluation on how I have implemented this paper's proposed teaching philosophy, the bioecological model of learning & teaching, in one online unit CNA613 Project management for health professionals.

CNA613 has a student cohort of postgraduate health professionals from across the Faculty of Health Science. In CNA613 the student's major task is to develop a project proposal that can be implemented in health care practice. The curriculum has been developed around a series of group learning activities which create authentic challenges for students who are aided by peer and lecturer support and feedback. Students take on the roles of a project manager and project team member in various online activities throughout the semester.

The online unit has as the primary communication tool a 'Questions to the Lecturer' discussion group, a feature of all School of Nursing & Midwifery online units. In this discussion group student post any questions related to the learning material and the unit overall. To avoid student disappointment and unrealistic expectations about when a response to their question will be given, I notify students of set days and times throughout the week when I will be online and responding to their questions. This provides a specific day and time expectation for a response and also provides those who have the availability to also be online at the same time a more synchronous experience. I also encourage other students to provide some suggestions to the posted questions, given the guarantee that I will also confirm or add to their response. This strategy encourages peer support and collaboration, a necessary attribute in a later online activity in the unit.

Early in the semester I implement a second teaching strategy that encourages the development of connectedness between the students and lecturer. In an online brainstorming activity I supplement the online curriculum material with examples that demonstrate the application of the concepts. I encourage students to present challenges to me in an online discussion group related to their developing project proposal ideas. I then brainstorm the challenges and present to the discussion group various project management skills and solutions in response to the challenges provided. At this early stage in the semester, students have not worked through much of the learning material and my responses not only address their questions related to the current scheduled learning but also provide a signposting to subsequent learning.

In the third group learning activity, commencing around week 6 of the semester, students present to fellow students in small online tutorial groups their developing project proposal ideas. This presentation is called a work-in-progress (w-i-p) project proposal. The group collectively (asynchronously) brainstorm the proposal, offering suggestions pertinent to the project. During these brainstorming sessions, the student who is submitting the w-i-p takes the role of the project manager whilst the other students in the group are project team members. This process draws on the professional knowledge from various areas of health care possessed by the group and provides an opportunity for team work and peer review. The brainstorming activity also forms an integral part of the unit's assessment process, which assesses project

management skills of leadership, collaboration, and communication skills as well as understanding of the project management methodology covered in the learning material.

The final assessment for the students is the submission of their final project proposal. A few weeks prior to this submission, CNA613 hosts the Annual Showcase of Project Proposals in an online conference activity. For the showcase, students are required to develop an electronic poster of their project proposal that summarises the most significant aspects of their project proposals. These posters are displayed electronically for all other students to access. Similar to poster displays at a conference, the conference participants are encouraged to ask the presenter, the project manager, questions and make comments on the presented work. The project manager is encouraged to respond to these questions. This activity provides an opportunity for students to learn collaboratively and encourage each other just prior to the completion of the final assessment for the unit.

These teaching strategies create early in the semester a rich and rewarding online discussion environment, fertilise individual project proposals with ideas from multidisciplinary perspectives and demonstrate the value of inter-professional collaboration. The level of student interaction with the learning material and the online discussions is particularly high. During semester one 2011, 200 participants in the unit (staff and students) generated the following system generated user statistics:

Table 1: Online user statistics

Statistic	Value
Total user sessions:	15599
Average user session length:	17 minutes
Average user sessions per day:	110
Average user sessions per day on weekdays:	122
Average user sessions per day on weekends:	78
Most active hour of the day:	10:00 - 11:00 AM
Least active hour of the day:	5:00 - 6:00 AM

Table 2: Online communication statistics

Tool	Sessions	Average Time per Session
Discussions	16137	0:03:50
Mail	6095	0:02:06
Average no. of online communication post per person during semester		111

These teaching strategies motivate students, enhance student engagement and encourage:

- the development of a cohesive community of learners who are connected and engage in meaningful learning activities that promote active learning online,
- communication and feedback that is timely, formative and tailored to meet individual learning needs, and
- an enjoyable and motivational learning environment.

The learning experiences and assessment activities:

- create opportunities for student engagement and the development of connectedness with peers, teaching staff and the ideas presented in the learning material,

- stretch the student's professional capabilities in project management, leadership and communication skills,
- promote active learning and student created learning resources which enhance the units online learning material,
- encourage peer review and collaborative problem solving in areas of health care outside of their own area of expertise,
- support active engagement in learning tasks that develop in complexity throughout the semester,
- simulate challenges and roles experienced in health care project work in a safe and enjoyable learning environment,
- present authentic learning and assessment which is scaffolded with peer and teaching staff support and feedback, and
- provide opportunities for reflection and self-assessment.

The application of the bioecological model of learning & teaching in the outlined teaching strategies not only impacts on student motivation and engagement, the capability of the graduates to respond to a rapidly changing health care industry through the acquired project management skills is enhanced. A source of great personal satisfaction is the awareness that the teaching strategies which support learning ultimately benefit health care clients through the enhanced competence of health professionals. The enhanced capabilities are evidenced by the successful implementation of numerous projects in clinical practice first proposed in CNA613, as this unsolicited feedback demonstrates:

I just thought that I'd let you know that yesterday I received notification my submission for funding (based on the project proposal developed in CNA613) was successful. Thank you for a very practical subject, which was professionally interesting and personally very worthwhile. (July 2008)

This paper has reviewed the bioecological theory of human development and identified that by enhancing human interactions and as the learning environment improves, learning outcomes can be enhanced. Understanding the bioecological theory of human development provides a lens through which our understanding of the process of learning and teaching can be further understood and summarised in the proposed bioecological model of learning and teaching.

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