Using Learning Philosophies to Develop Self-Regulated Learners
A Project Proposal for the Teaching and Learning Enhancement Fund

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Key Words: learning philosophies, metacognition, self-regulation, scholarship of teaching and learning

Abstract: Metacognition has been shown to improve general student learning outcomes, but little evidence is available for its impact on learning specific course material. Learning philosophies are a possible approach to developing student metacognition. This TLEF project builds on McCalla research in following the Fall 2015 cohort of biology majors through to their biology capstone course, and additionally gathering data from other student cohorts. This project will determine whether students' intellectual development, measured by the Learning Environment Preferences survey, and learning outcomes, as indicated by exam scores, changes with the development of their learning philosophy. This study addresses the question of whether the maturation of students as learners can be affected by their development of a learning philosophy.

Project Description

Relationship to Educational Theory and Practice: This project assumes a constructivist understanding of learning. In contrast to a behavioural approach, constructivist learning theory posits that students are active in the construction of their own knowledge structure or mental models of the world (Weimer, 2013). Rather than passively accumulating knowledge, a constructivist approach involves students actively deconstructing and reconstructing their internal knowledge structure such that their current learning is integrated and synthesized with their prior learning (Hartle, Baviskar, & Smith, 2012). The difficulty with learning and teaching from a constructivist understanding of how learning works is that learning on the part of the student cannot be forced and takes time (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010c). As suggested by the Perry Scheme of intellectual development, students typically enter the first year of their university studies with a dualistic understanding of knowledge (answers are either right or wrong) and develop, over their four years of higher education, a more nuanced understanding of knowledge in which context and evidence matter when developing an appropriate solution for a particular problem (Kloss, 1994).

Thus, if students learn by constructing their own knowledge structure, students must then be engaged and active in their own learning in order to achieve positive learning outcomes (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010b). One way of increasing students' engagement may be to involve students in metacognition while learning course content. Theory suggests that developing students' metacognition may improve students' academic achievement (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010a; Girash, 2014; Tanner, 2012) as a result of developing their critical thinking (Magno, 2010). When students are not metacognitive, their ability to assess their own knowledge and academic abilities is compromised (Bell & Volckmann, 2011; Dunning, Johnson, Ehrlinger, & Kruger, 2003). Attending to metacognition

through the use of personal response systems, in-class discussion and writing assignments improves student learning outcomes (Brady, Seli, & Rosenthal, 2013; Mynlieff, Manogaran, St. Maurice, & Eddinger, 2014). Improved student learning outcomes correlate with students whose goal is to master course content rather than obtain a good course grade (Coutinho, 2007). Long term benefits of using metacognitive prompts during students' learning have been shown for primary and secondary school students (Adey & Shayer, 1993) but not for post-secondary students. However, student learning outcomes are not affected if metacognitive prompts are not accompanied by cognitive prompts (Berthold, Nuckles, & Renkl, 2007). In addition, the usefulness of metacognitive prompts decreases as student skill increases (Nuckles, Hubner, Dumer, & Renkl, 2010).

My teaching experience suggests that even though students may know what is best for learning, they may not have the drive or will to implement these practices (Ambrose et al., 2010b). While they may develop their intellect as measured by the Learning Environment Preferences (LEP) survey (Moore, 1989), this development may not translate into improved student learning outcomes for a particular course. The result is that students need to be supported in developing habits of mind that focus their attention on the task at hand (Fox & Riconscente, 2008). Applying effective learning strategies might be one way to focus their attention on learning outcomes. The LEP surveys students' beliefs and understanding of how learning works and what is important to them ranging from dualism (knowledge or answers are either right or wrong; correct or incorrect) to multiplicity (students are aware that there are a variety for worldviews in existence but that one is as valid as another – students don't yet have the tools to evaluate different points of view) to relativism (students are able to contextualize information and arguments and are able to evaluate the worth of different opinions) (King, 1978). However, even though students may develop an understanding of what entails an excellent learning environment or practice, that metacognitive ability or level of intellectual development may not translate into using learning practices that will benefit them when mastering the content of a particular course. If students approach their learning with a performance orientation (goal of obtaining a grade) rather than a mastery orientation (goal of mastering the course content) their learning outcomes may be less than desired (Coutinho, 2007). Learning philosophies are intended to conjoin students' metacognition with mastery goals for learning: Asking students what, why, and how they are learning (Haave, 2014) may enable students to make the connection themselves between how they learn and their reasons for learning (i.e. their educational or life goals), which will affect their ability to learn.

Learning philosophies are relatively new and unstudied and may be a strategy for developing student metacognition. Engaging students in the why, what, and how of their learning may encourage them to align their personal and learning goals with the teaching goals of their educators. When personal, learning, and teaching goals are aligned, students become engaged in their education by becoming receptive to implementing effective learning strategies (Ambrose et al., 2010b). However, this process requires time, because it requires the development of habits of mind (Fox & Riconscente, 2008) which involves rewiring the brain (Carr, 2010).

Project Questions: The proposed project will investigate the following questions: Does engaging students in the development of their learning philosophy impact their intellectual development (general learning outcomes) and does it also impact the student learning outcomes in the particular course in which the learning philosophy is assigned (specific learning outcomes)? Is

there a sustained impact on student learning over time similar to what has been shown for the impact of undergraduate research on student learning outcomes (Haave & Audet, 2013)? Does students' consideration of their learning philosophy impact their learning outcomes throughout the four years of their degree program?

Methods: Students will be guided in their consideration of why and how they learn using the questions developed during Augustana's e-portfolio pilot (Haave, 2014). These questions will help students' develop their learning philosophy. The study participants will be the students in the courses I teach in Augustana's biology major (AUBIO 111, 230, 280, 336, 381, 388 and 411). A comparison group will be established by making the learning philosophy assignment one option toward completion of course requirements. The outcomes of students developing their learning philosophy will be measured in two ways: 1. Students will complete the Learning Environment Preferences (LEP) Survey which determines level of intellectual development in the Perry Scheme (Moore, 1989); 2. Students' course work and marks within and between the courses listed above will be compared between those students who complete the learning philosophy assignment versus those that do not. GPAs will also be considered as others have reported no impact of metacognitive prompts on this parameter of student learning outcomes (Zeegers, 2004). There are a variety of approaches to assessing the results of the study ranging from comparing majors vs non-majors to comparing between years to a consideration of the impact of prior GPA on how developing a learning philosophy affects students' ability to learn. The types of analyses for this study are:

- Paired t-test of students' MT and final exam marks within a course
- Paired t-test of students' initial and subsequent course marks over the course of their degree program
- T-tests of course exam marks for student cohorts that complete the learning philosophy assignment vs those that do not
- Qualitative analysis of students' learning philosophies to determine the extent of students' use of mastery versus performance language and indicators of depth of reflection on their learning
- Correlation of students' cognitive complexity index from the LEP survey with their course marks and learning philosophy statements

The influence of student character on each of these parameters will be considered by sorting students into appropriate groups: biology majors vs non-majors, high vs low prior GPA, senior vs junior students, female vs male.

Project Significance: Learning philosophies are a strategy to engage students in considering how they learn and whether the learning strategies they use are effective for achieving their personal goals. Guiding students towards their learning philosophies is different from simply teaching students the course content. The course content becomes the vehicle by which students learn how to learn. Focusing on metacognitive learning practices places a different emphasis on teaching: the goal is not just mastering course content but rather teaching students how to become independent learners.

Thus, this project has the potential to impact how all instructors across the university support student learning. Often instructors are focused on ensuring that the specific course content is delivered to students in an organized and comprehensible format without explicit consideration

of how students might master the material (i.e. what learning strategies students use). Learning philosophies may help students consider how the material aligns with their life goals and thus why it may be worth students' time and effort to implement learning strategies that are known to promote deep rather than superficial learning (Brown, Roediger III, & McDaniel, 2014). As a result, the potential impact of this project is transdisciplinary and university wide.

Dissemination: The results of this project will be presented widely at scholarship of teaching and learning conferences both disciplinary (e.g. Association of College and University Biology Educators, Society for the Advancement of Biology Education Research) and general (e.g. Society for Teaching and Learning in Higher Education, International Society for the Scholarship of Teaching and Learning) in nature. Research findings will also be presented locally (e.g. University of Alberta Catalyst event, Festival of Teaching, Augustana Teaching Seminar). Manuscript versions of these presentations will be submitted to appropriate journals: Canadian Journal of the Scholarship of Teaching and Learning, Bioscene: Journal of College Biology Teaching, College Teaching, and the Journal on Excellence in College Teaching.

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