Chapter 13

Student Epistemic Beliefs as a Catalyst for Online Course Design:
A Case Study for Research–Based eLearning

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EXECUTIVE SUMMARY

Online course development at Virginia Polytechnic Institute and State University (Virginia Tech) follows a structured development life-cycle methodology based on a sequential progression of seven phases. Each phase is distinguished by activities, techniques, best practices and procedures that combine to construct viable, sustainable, efficient, and useful online courses. In concert with online course construction, guiding heuristics and a philosophical foundation are required to optimize learning efficacy (Molenda, Pershing, & Reigeluth, 1996; Song & Keller, 2001). Influencing factors and criteria in online course construction generally involve instructional design, educational theory, technological infrastructure, and/or applied research from the scholarship of teaching and learning (SoTL). Foci in this case study include an investigation of student epistemic beliefs, establishment of research-based guiding heuristics, and establishment of a materialized rubric for use in construction of an undergraduate online course in Mechanical Engineering.

Student epistemic beliefs represent an important influencing factor in construction of efficacious eLearning. Epistemic beliefs are qualitatively related to self-regulated learning. Moreover, student epistemic beliefs are related to meta-cognitive standards and achievement of learning goals through positive affective foundations. Student reception and acceptance of pedagogy is largely shaped by predispositions, assumptions, experiences, and fundamental epistemic beliefs developed over time. Academic institutions should determine whether online course development should alter in response to existing student epistemic beliefs or strive to reshape student epistemic beliefs through curricular and pedagogical design.

The construct of this chapter (a research-based case study) provides detail regarding the analysis of research on undergraduate student epistemic beliefs to develop and apply a rubric for eLearning course development (Hannafin & Hill, 2007). According to Ravert and Evans (2007), students have differing epistemic beliefs regarding the nature of knowledge and knowing. In this chapter, the authors provide a methodology for determining the epistemic beliefs of a given student population and application of the findings in online course construction and pedagogy.

ORGANIZATION BACKGROUND

Founded in 1872, Virginia Tech is located in Blacksburg, Virginia and is home to nine colleges and a graduate school. Over 30,000 full-time students are enrolled in one of Virginia Tech's 65 bachelor's degree programs or 145 master and doctoral degree programs. Virginia Tech is a higher education and research institution, ranked 46th in university research in the United States. The main campus includes more than 125 buildings on 2,600 acres, including an airport. Virginia Tech also includes off-campus educational facilities in six regions, a study-abroad site in Switzerland, and a 1,700 acre agriculture research farm near the main campus.

University leadership is comprised of a board of visitors appointed by the governor of Virginia. The president of the university reports to the board of visitors and, along with the provost and vice president for academic affairs, leads the senior management team of the university. Governance at the university involves the University Council and University Commissions. University Commissions formulate and recommend policies to the University Council, which in turn presents recommendations to the president of the university. Virginia Tech's annual operating budget exceeds $1 billion. The budget funds operations for the university division and the Cooperative Extension / Agricultural Experiment Station division. A portion of the funds are appropriated from the state and the remainder originate from student tuition and fees, grants and contracts, sales and services, federal sources, user fees, and other fees. Virginia Tech's Foundation manages approximately $926 million in assets and managed funds and $527 million in total endowment.

Within the College of Engineering resides the Department of Mechanical Engineering, the venue for this case study. The department offers a wide range of undergraduate and graduate degree specialties, all with a focus on integrating classroom theory and practical hands-on projects. One of the largest departments within Virginia Tech's College of Engineering, the department now is venturing into undergraduate online education.

PROBLEM STATEMENT

Student Epistemic Beliefs and Online Course Design and Pedagogy

The problem examined in this study involves the use of epistemic beliefs in the design of an online

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