Chapter XVIII

Learning by Doing: Four Years of Online Assessment in Engineering Education Research

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Abstract

This chapter describes the experiences of a team of researchers in the College of Engineering at Penn State who have spent the past several years using the Internet to collect student data. From surveys that were created and posted with little regard for their utility, the authors have reached the point in which they routinely use the Internet to gather quality data from alumni, graduating students, and other populations beyond the college. This chapter will acquaint the reader with these experiences and expose him or her to practical applications of online social science instruments in a higher education environment.
Introduction

There is worldwide interest in the improvement of education in the science, technology, engineering, and mathematics (STEM) disciplines. Evaluating and assessing the effects of various innovations is critical to the sharing of effective techniques. This chapter will describe the experiences of a team of researchers in the college of engineering at The Pennsylvania State University (Penn State) who have spent the past several years gathering student data through use of the Internet. Beginning from a naïve approach in which surveys were created and posted with little regard for their utility, the authors now routinely use the Internet to gather quality data from alumni, graduating students, and other populations beyond the college.

The objectives of this chapter are to acquaint the reader with these experiences and to expose him or her to practical applications of online social science instruments in a higher education environment. Four different projects relating to assessment are briefly described, emphasizing how online data collection was used for each. Further details on each project, if desired, can be found through the references.

Background

The world of engineering education changed with the advent of the Engineering Criteria 2000 (EC2000), instituted by the Accreditation Board for Engineering and Technology (ABET). EC2000 redefined accreditation criteria for engineering programs, launching an increased emphasis on the assessment of student learning and the effects of the educational experience. When the authors began to look at educational research and assessment needs within the college, they immediately saw a need to use respected instruments with sufficient reliability and validity. Two possible approaches for assessment were: (a) to continue to pay on a per-use basis for commercial instruments with established credentials, or (b) to develop instruments that were tailor made to meet needs. Initially, the authors looked beyond the established instruments and tried to bring some newer ones into play. Eventually, a combination of the two approaches was adopted.

This chapter reports on an attempt to measure intellectual development using an online version of a newer and objectively scored instrument, the evaluation of a new minor within the College of Engineering using both online data collection and supporting qualitative measures ("mixed-methods"), a classroom-level study to measure the effect of a new instructional method on students’ self-directed learning, and an effort to establish validity and reliability using online data collection. The format will be to describe the purpose of each project, summarize the experience, and list the “lessons learned.”
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