MOBILE PROBABILITY AND STATISTICS COURSEWARE REFLECTIONS

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ABSTRACT

Western Governors University has the mission to improve quality and expand access to post-secondary educational opportunities by providing a means for individuals to learn independent of time and place thus the mobility of our coursework is essential. Technological advances facilitate this mission. While all degrees are based entirely on the demonstration of competency, candidates come to their programs with varying skills. For this reason, our Probability and Statistics course is individualized to adapt with the candidate's learning style. Technology based learning resources are developed continuously to create non-traditional Probability and Statistical education resources.

KEYWORDS

Probability, Statistics, Mobile Probability And Statistics Learning, CMU OLI, WGU Math Courseware, Individualized Student Program

1. INTRODUCTION

Western Governor's University (WGU) mission includes expanding access to post-secondary education to those who would otherwise not have said access, and thus, our admissions policies are quite liberal. Consequently, our students' abilities and backgrounds vary widely. Therefore, it is essential that we are able to provide courseware that is easily accessible regardless of time and location.

Previous to our current probability and statistics courseware, our math faculty employed interactive e-texts to our students which provided a traditional text and skills check consistent with most standard math texts. Our expectations for improvement rose as a result of courseware that was not only free of cost but came with cognitively based platform to help improve student learning. The purpose of this paper is an exposition of what our competency based online university uses for probability and statistics courseware that is not only mobile via technology, but also consistent with current day learning theories about how students learn best. Thus, this paper contributes to growing literature on using student metrics to drive improved asynchronous learning.

2. UNIVERSITY AND TEACHERS COLLEGE BACKGROUND INFORMATION

"The vision and mission of both the University and the Teachers College were spelled out in our recent submission of our Conceptual Framework, as part of our NCATE accreditation application. Briefly, Western Governors University's (WGU) vision is to deliver exemplary, lower-cost higher education opportunities; and, as a result, be recognized as the premier competency-based, online, and truly national university. The mission of WGU is to improve quality and expand access to post-secondary educational opportunities by providing a means for individuals to learn independent of time and place and to earn competency-based degrees and other credentials that are credible to both academic institutions and employers. The vision/mission of the Teachers College (TC) of Western Governors University is to prepare teachers who are: competent and caring; respectful and embracing of diversity; reflective practitioners; collaborative professionals; technologically proficient; professional leaders and change agents; and as a result, both to be

recognized as the premier competency–based, online, and truly national teachers college, and to develop a cohort of teachers who meet the nation's need for highly qualified teachers." (WGU NCATE Conceptual Framework, 2012)

"All WGU degrees are based entirely on the demonstration of competency. Each candidate is required to pass multiple assessments in areas of knowledge recognized as essential by U.S. institutions of higher learning. In a traditional educational system, time (the credit hour) is the unit of progression. In a competency- or outcome-based system, the unit of progression is demonstrated mastery of competency through multi-dimensional assessment of performance. Because competency-based education focuses on mastery of integrated knowledge, skills, and abilities that enable the candidate to perform successfully in a given profession, assessments are designed to ascertain both candidate knowledge and the ability to apply that knowledge in a professional setting. A hierarchical structure of domains, subdomains, competencies, and test objectives defines a broad range of knowledge and performance elements for each program." (WGU NCATE Institutional Report, 2006) WGU maintains a database containing over 40,000 national, state, and professional organizations' standards. The domains, subdomains, competencies and objectives are derived from and aligned to those standards.

Mathematics teacher preparation programs at WGU Teachers College include initial licensure programs at both the 5-9 and 5-12 grade levels with 290 and 518 students respectively. WGU's TC offers mathematics endorsement and MA in Mathematics Education programs in these areas for already licensed teachers as well. The resources our students use while preparing to take assessments help them to both become technologically proficient, and to master the appropriate content knowledge. Technology based math resources allow students to learn on their own, at their own pace, and then to demonstrate their acquired competencies to us when they are prepared to do so. Thus, the need to be in the same place, at the same time, in order to acquire knowledge is eliminated via the use of technology-based learning resources which form the backbone of the WGU distance learning.

3. WGU TEACHERS COLLEGE STUDENT CHARACTERISTICS

The average age of WGU TC students is approximately 36. We have students from all over the country. In fact, all fifty states are represented in our student body, as is the District of Columbia, two U.S. Territories, and nine foreign countries. The majority of our students work full-time, and many have family commitments. WGU's mission includes expanding access to post-secondary education to those who would otherwise not have access and thus our admissions policies are very liberal. Consequently, our students' abilities and backgrounds vary widely including students who have never attended college before, students with Associates degrees, some who are returning to finish a once-started but never completed Baccalaureate degree, and even some who seek a second or even third Master's degree. Many students are career changers, and we also have a high percentage of existing teachers as students, who seek either formal licensure, or else a Master's degree in order to maintain existing licensure. Some students come to the university needing only a brief content review prior to demonstrating their competency. Others require much more support, and need greater interaction with a variety of learning resources in order to gain the required knowledge, skills, and dispositions outlined by our standards-based competencies. They do this in a variety of ways. WGU TC assessments include series of performance tasks; comprehensive, proctored, computerized competency examinations; and projects in which students synthesize their acquired knowledge.

Candidates come into their programs with varying competencies. They complete diagnostic pre-tests of competencies applicable to their program. Faculty Mentors use the pre-test, transcript, and interview results to recommend a sequence of learning resources to help candidates attain the required competencies for program completion. The University made an early decision not to develop courses, but to contract with Education Providers, i.e., learning organizations already offering online courses and e-texts aligned to our math competencies. Textbooks, study guides, websites, tutorials, and other independent learning resources help candidates prepare for assessments. Each degree has a "standard path" identifying learning resources that experience and feedback have shown to be most closely aligned to and most successful in preparing candidates for the competency assessments required by the math program. Faculty math mentors individualize the program in a manner consistent with each candidate's learning style, experience, and competencies. (WGU NCATE Institutional Report, 2006)

Because WGU decided early on not to "reinvent the wheel" by developing our own mathematics courses, it became necessary to either identify existing resources; or to develop our own, using third party providers. We then had to ensure that the learning resources aligned to our competencies; and then to form agreements that would allow our students access to those resources. The model works as we identify and develop a well-aligned, online technology based mathematics learning resource to make the resource available to our students.

Students make use of the resource and only after fully engaging and interacting with the materials, demonstrate mastery of the material via several types of WGU assessments.

4. PUBLIC DOMAIN EDUCATIONAL WEBSITES

WGU Teachers College is then free to pursue agreements with a wide variety of Education Providers. We make use of a wide array of free web-based content and reference resources. One resource is the Carnegie Mellon's Open Learning Initiative (OLP) http://oli.cmu.edu/. Our current Probability and Statistics Courses uses this open courseware which uses learning analytics to drive adaptive teaching and learning, support iterative improvement and demonstrate effectiveness. The course materials are based on leading-edge cognitive research which focuses on understanding where the students are with respect to their current conceptions and bridging to improved understanding. A team of cognitive scientists develop and test new learning theories about ways in which students grasp probability and statistic concepts. By continually collecting student data the OLP course is always being adapted to improve and evaluate these theories on student learning. In collaboration with the OLP researchers, our Western Governors University math teachers can quickly see which probability and statistics topics are most difficult for our students and drive our mentoring practices. For example, we can use the Learning Dashboard tool to see individual student progress in the modular units and review these topics on an individual basis. We also provide 56 hours of helpline tutorial services for additional mathematics tutorial support.

5. CONCLUSION

Valuable assessments of students' thinking include examining the understandings and models that students construct during the learning process. Our WGU teacher college students come better prepared for our competency based probability and statistics assessments because OLP focuses on helping students to assess their own learning and develop effective study strategies. The probability and statistics courses provide clear learning objectives, many opportunities for self-assessment, and timely and contextual feedback on student progress.

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