

Learn while Tested: An Approach to Integrate Self-Directed Learning and Examination

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Abstract

My innovation addresses the pedagogical area of "active and self-directed learning" that aims at improving the students' self-directed learning by providing them the opportunity of taking multiple versions of an exam on a specific topic until they improve both their knowledge and grades.

This model allows for a smooth transition and overlap between learning and being assessed, instead of keeping a striking line between learning and testing.

The approach was implemented in Spring 2011 resulting with observed improvements in students' learning and grades. However, there is considerable room to improve the model for more frictionless implementation.

Focus and Objectives

The model focuses on teaching stochastic models in Operations Research to undergraduate students at junior level. This is one of the most challenging courses in the Industrial Engineering curriculum. The advance use of probability and statistics requires first hand exercising and digestion of the topics.

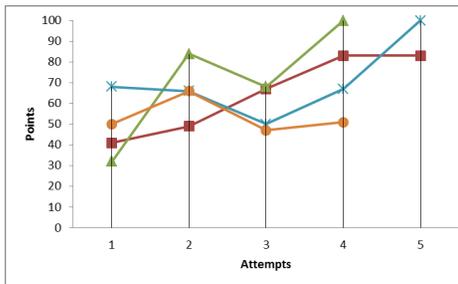
The main objective is to provide the students with incentive and methodology for effective self-learning beyond contact hours.

The model was designed during my involvement in Faculty Learning Community at University of Miami.

Learning Activities and Materials

- Learning is integrated into online examination
- A database of problems was developed for each sub-topic.
- The online exam questions are supplied from this database.
- The numeric parts of the problems are generated randomly
- Students have the option of taking the exam with multiple attempts (7 to 10) within a reasonable time frame (7 to 10 days).
- Each time different sets of problems are to be solved
- The exam grade is calculated by averaging the highest and the last scores
- Pools of questions and calculated formulas are embedded in the Blackboard System.

Current Grade:	100.00	
Number of Attempts:	100.00	
Number of Questions:	100.00	
Number of Questions:	100.00	
Mar 20 2011 1:03:09 AM	100.00	Clear attempt
Mar 20 2011 1:04:47 PM	97.00	Clear attempt
Mar 20 2011 4:01:05 PM	95.00	Clear attempt
Mar 20 2011 4:01:46 PM	95.00	Clear attempt
Mar 20 2011 4:02:34 PM	95.00	Clear attempt
Mar 20 2011 4:03:09 PM	95.00	Clear attempt



Execution

- The model was implemented in Spring 2011
- It was used for the first midterm exam covering topics on probability, utility theory and decision making under uncertainty
- Overall exam grades improved
- The evolution of the grades and the observed progresses of the attempts were instrumental in assessing student learning
- The method helped students understand and digest the fundamentals of the subject matters
- However, there remain important issues that must be resolved for a perfectly seamless implementation

Major Issues to Resolve

- Partial credit or no credit? Automation of grading by developing an intelligent mechanism for partial grading
- Is the evolution of grades from multiple attempts sufficient for learning assessment?
- The "collaboration" factor in self learning. How can we make sure of individual effort? Or should we?
- The determination of effective pool size for problems. Should we prevent same problems with different instances across attempts?
- Need for a stand-alone domain independent of the Blackboard system for increased control and application flexibility
- The first attempt effect. Orientation of students for the new examination format

Discussion

The developed model introduces a new paradigm for student examination as well as learning. With this application, exams transform from "check points" to "check areas" for the students. The goal is to assure that students absorb and internalize the knowledge at a self-determined phase.

I am looking forward to design and develop components for this model to streamline its implementation and increase its acceptance by the students.

Acknowledgments

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