

# Performance Based Testing: Can a Web-Based, Simulated Environment Assessment Tool Measure Student Ability in Application Software Programs?

Kathleen Voge, University of Alaska Anchorage, 3211 Providence Drive, Suite 224, Anchorage, AK 99508, USA; E-mail: afklv@uaa.alaska.edu

Minnie Yi-Miin Yen, University of Alaska Anchorage, 3211 Providence Drive, Suite 224, Anchorage, AK 99508, USA; E-mail: afmyy@uaa.alaska.edu

## INTRODUCTION

The College of Business Administration (CBA) offers a comprehensive business computer literacy and application software skills course. This MIS 110 course is required for our Business Administration (BBA) degree. The course covers hardware, the information processing cycle, ethical computing practices, and problem solving using popular business application software. The applications covered include Excel, Access, Word, and PowerPoint.

Eighty percent of the course is focused on using the computer as a tool to solve business problems. Developing intermediate-level application software skills is an important course goal for two reasons. First, the course is a prerequisite for other upper-division BBA required courses. As computing topics and software usage in these other courses becomes more extensive and required tasks more complex; a higher prerequisite knowledge and problem-solving skill level is mandatory for success. Second, CBA faculty members believe that businesses hiring BBA graduates place high value on computing skills proficiency.

Our University is an open enrollment institution and MIS 110 faculty members have witnessed increasing diversity of incoming student skill levels. To help identify students needing a more introductory course, we have investigated using simulated environment assessment programs such as SAM, SimNet, and TAIT for course placement purposes.

We believe that to use a tool as a means to measure performance, there must be an established correlation between the tool's outcome, or student score, and actual performance (Witnah, 2004). Performance-based testing (PBT) methods which "show us what you know by showing us what you can do" (Childers, 2000), are how we prefer to approach skills measurement in this course. PBT was originally designed to assess whether students can put knowledge to use, or demonstrate application of knowledge (Vaglio-Laurin, 2006). In other words, according to industrial psychologist Ruth Clark, "To establish that a person can use a procedure, the person must be able to actually perform it." (Stolovitch & Keeps, 1999)

## PERFORMANCE-BASED TESTING METHODS

There are two popular methods for testing performance in software: simulation and live application. Each is an alternative to the most authentic means of measuring performance – on-the-job evaluation. (Vaglio-Laurin, 2006)

### Simulation

A simulation approximates the live application environment--often by presenting a series of screen captures in response to the student's keystrokes / mouse clicks, thereby giving the appearance of actual interaction with the software. Simulations typically do not approximate the entire functionality of a live application, and required examination tasks are completed *independently* of each other.

### Live Application

Live application approaches have students using actual software and/or hardware to perform a series of required tasks. Using the live application method, required

tasks are *dependent* upon each other. The correct result of one task is needed for successful completion of subsequent tasks, much like on-the-job situations.

Though the labor and time intensive nature of developing and evaluating our live application examinations may seem excessive, we believe that simulated assessment environments do not adequately measure a student's ability to use these tools in real-world, on-the-job environments. However, resource shortages and an ever-expanding curriculum are forcing us to reconsider using simulated environment assessment tools as not only a placement mechanism, but possibly a way to reduce the time-intensive nature of our current assessment environment. If we can demonstrate that:

1. simulated environment test results are positively correlated with live application project-based test results, and
2. these results measure the learning outcomes we expect from our students, then

simulated environment assessment tools should be included as a part of our course curriculum / delivery and should be used for student performance evaluation.

## EXPERIMENT DESIGN AND DATA ANALYSIS

Subjects for this study will be MIS 110 students in spring 2007. Subjects will be freshmen or sophomores and will belong to one of three sections taught by the same instructor. Each section may enroll up to 35 students. In this study phase, we will focus on two applications: Microsoft Excel and Microsoft Access. These two applications are the most important components of MIS 110. The simulated environment tool we will use is TAIT (Train and Assess IT), a Prentice Hall product. The live application examinations (LAE) are developed in-house by experienced instructors. Our formal design with three subject groups combines a factorial design with repeated measures and counterbalancing. Group 1 subjects will take a TAIT examination before taking the LAE examination. Group 2 will take the LAE examination before the TAIT examination. Group 3 is our control group and will take only LAE examinations.

At the beginning of the semester, subjects in all three groups will complete a survey gathering general demographic data such as gender, age range, self-reported current GPA range, level of comfort with Microsoft Excel and Microsoft Access, and years of computing experience.

For Group 1 subjects, after both Excel examinations have been scored and feedback received, a survey gathering feedback on the perceived benefits of completing TAIT prior to the LAE examination will be administered. Group 2 subjects will receive a similar survey gathering feedback on the perceived benefits of taking the LAE examination before the TAIT examination. Group 3 subjects will take only the LAE examinations and will have no exposure to the TAIT environment. This process will be repeated for the Access examinations.

Individual student examination scores will *not* be identifiable. Only categories of students and their score data will be collected, analyzed, and reported on. Score analysis for different tasks in each group will be made to determine whether the TAIT examinations enhanced student performance on LAE examinations, or vice

Table 1. Research activities

		Excel Examinations			Access Examinations		
Group 1	General Demographic Survey	TAIT	LAE	Excel Perceptions Survey	TAIT	LAE	Access Perceptions Survey
Group 2	General Demographic Survey	LAE	TAIT	Excel Perceptions Survey	LAE	TAIT	Access Perceptions Survey
Group 3	General Demographic Survey	LAE			LAE		

versa. Our data analysis can also be used to test the hypothesis of whether the simulated environment tool – TAIT, can be used as a viable student performance assessment tool. See Appendix A for a comparison of sample TAIT and LAE task instructions.

### CONCLUSION

We believe this research will assist us in determining whether simulated environment assessment tool results can provide sufficient evidence of student ability within a live application. Given increasing emphasis on measurement of student learning and attainment of student learning goals, the identification of more efficient, reliable, time-saving, and cost-effective assessment methods will benefit both CBA faculty and students.

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### APPENDIX A

#### Sample of TAIT Examination and LAE Task Instructions

	<b>NOTE:</b> TAIT tasks are <i>independent</i> of each other and may be presented to students in random order.	<b>NOTE:</b> LAE tasks are <i>dependent</i> on each other and it is recommended that students perform each task in the order presented.
Excel Software Function / Task	TAIT Sample Task Instruction	LAE Sample Task Instruction
Open correct workbook	Open the "Judson Ford Realty.xls" spreadsheet.	Locate the Excel_HO_2_Template.xls file located on the H: drive. Open the workbook.
Merge and center cells	Merge cells A1:D1 and center "Expenses" in the merged cells.	Merge and center the heading in row 1 across columns A through E.
Sorting	Perform a multiple sort on the spreadsheet: first by Description and then by Member Company (both in Ascending order).	Using the appropriate menu command option, sort the list by both Destination (in ascending order) and Trip Cost (in descending order).
AutoFilter	Apply an AutoFilter to this sheet, and show only figures from the year 1850 or later.	Using AutoFilter, display the data for trips with a Trip Length of 7 Nights and a Trip Cost greater than \$2,300.
Average function	In cell B20 of the current worksheet, create a function by typing in cell references to display the Average Monthly Sales for the six-month period covering January to June.	In cell E23, determine the average of Trip Cost for the displayed data. Use the appropriate Excel function to accomplish this.

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