

Project-Based Assessment of Learning in Online Microsoft Office Application Courses.

**Douglas A. Kranch
Carmen Morrison
North Central State College
2441 Kenwood Circle
Mansfield, OH 44906
(419) 755-4788
dkranch@ncstatecollege.edu**

Abstract

Over the past six years, courses in Microsoft Word, Excel, Access, and PowerPoint at North Central State College have evolved from face-to-face to online courses. In the face-to-face courses, students were assessed via proprietary computer-based multiple-choice exams and skill assessments, as well as solving identical problems. These assessments were transformed into four individual projects that allowed maximal creativity within rigid specifications that met the course objectives. The four Microsoft applications placed special demands on students and the projects attained varying degrees of success in meeting the goals of the courses. Most notably, the higher the familiarity students had with the concepts behind the application being taught, the greater the success of the method. There is evidence that the addition of a peer assessment exercise decreased the proportion of students withdrawing from the courses, but it did not affect the proportion of students unsatisfactorily overall.

Introduction

Courses at North Central State College use to teach students the Microsoft Office suite are divided by major application: Word, Excel, Access, and PowerPoint. Six years ago these courses were taught using the face-to-face methodology and employing a fixed set of exercises and test instruments. A single publisher's books were used for all four applications, all of which were divided into eight chapters. The courses lent themselves to being divided into two units of four chapters each, with the midterm examination coming after the fourth chapter and the final examination after the eighth.

The book for each application contained labs within each chapter, each with detailed instructions and copious illustrations showing students how to complete the lab tasks. The labs built well on each other so that, if the student worked through the labs from beginning to end, they would be assured of a smooth and thorough grounding in the principles and skills developed by the labs. Each chapter also had a series of exercises and projects at the end that mirrored the chapter labs. The exercises were in recipe form similar to the labs so that, when completed, all students would have produced identical products. Students were asked to submit these exercises, differentiating their work from others by adding a header or footer with their unique information.

An online exam was also supplied by the publisher. It consisted of selectable questions in several formats, including multiple choice, true false, and skill questions which simulated the interface of the application being tested. These skill questions were generally well conceived, but they fo-

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cused on single, small skills and sometimes did not include some features that were available in the actual application, such as right-click menu options. Students sometimes found these questions somewhat “rigid” as they forced them to perform tasks in what they considered an unnatural manner.

In summary, the Microsoft Office courses as they were taught six years ago consisted of an instructor demonstrating the labs in each chapter to students of various entry level skills. Some would find the pace too slow, others too fast, and for those for whom this was the first course ever working with computers, it was overwhelming. While the exercises were easy to grade, they provided no real demonstration of the scope of skills the students were learning. They also could be easily copied, providing abundant opportunity for students to submit the work of others. The online exam questions were also easy to grade, but they tested at the individual skill and concept level and did not let students demonstrate what they knew about combining the skills and concepts to create a finished product.

The First Changes

Several important steps were taken six years ago to address the problems students were having in the Microsoft Office courses for two reasons. First, some students were finding the courses at too difficult a level initially. These students either did not have the necessary skills with the Windows operating system interface (e.g., moving among multiple windows, file management), or they lacked the keyboarding speed to keep up with the course. Second, the administration had requested that these courses be offered in an online format. This posed a problem with using the online exam as students taking it online could easily refer to their books to answer the questions.

As a solution to the first problem, a pretest was initiated that all students wanting to take their first Microsoft Office course would need to pass. The pretest comprised a test of knowledge about the Windows operating system and a test of keyboarding speed. Students not receiving the minimum score in either test were required to take a course on the Windows operating system or keyboarding as needed. This requirement has essentially eliminated students dropping out of the Office courses for lack of preparation.

The second problem proved more difficult to solve. The first version of the online course simply took the elements of the face-to-face course and carried them over into the online environment. The students were required to complete the problems at the end of each chapter the same as face-to-face students. This was before the college had adopted an online course management system, so all communication between students and the instructor was through email, and assignments were submitted as email attachments. Three on-site visits were required of these online pioneers: the first for an orientation, and the second and third to take the midterm and final exams, respectively. Thus the face-to-face instructional design was carried over into the online world as closely as possible. This provided instruction that was as close to the face-to-face experience as possible and also allowed time for the mechanics of the online teaching process to be mastered.

The Conversion to a Project-Based Assessment

The goal of each of the Office application courses is to bring the students from the novice level to some level of competence short of expertise. Dreyfus and Dreyfus (1986) described acquiring expertise as a process that moved problem solving from conscious analytical thinking to intui-

tion. Novices learn rules and heuristics and then following them to the letter as they complete tasks. Experts on the other hand become unconscious not only of how in detail they perceive the situation (the perception becomes simply a feeling) but also of the performance needed to react to it. An expert performer is immersed within the performance and responds smoothly and intuitively.

Zeitz and Spoehr (1989) found that the mental organization of their learners went through three developmental stages to reach the level of expertise. In this early stage, the few knowledge chunks novices acquire are generally small, disconnected, poorly organized, and centered on surface characteristics. The domain seems overwhelmingly complex and learners grasp for hooks that relate what they are learning to knowledge in domains they have already mastered. During the second stage, learners wean themselves from borrowing knowledge from outside the domain to cope with the new learning. They have now mastered the scope of the domain and arrange its knowledge in an “orderly, hierarchical fashion” (Zeitz and Spoehr, 1989, p. 328). During the third stage of expertise, continued application of learning to real-world problems and the unique demands those problems make uniquely reworks the domain’s cognitive organization and produces complex, personalized expertise. Thus, as expertise develops, learning slowly shifts from acquiring surface knowledge to constructing deep knowledge.

Reflecting on this theory of expertise development, the use of the assignments at the end of each book chapter and the online exam questions with their emphases on individual skills was an appropriate way to begin teaching novice students how to use the Microsoft Office applications. The surface elements of fonts, colors, words, and their placement in documents, cells, or slides is a proper emphasis for these novices. The problem is that the demands of these assignments and exam questions did not lift the students beyond this novice level. It did not give them the opportunity to demonstrate mastery of the knowledge of each application through the creation of some product that required the arrangement of those elements. That seemed to require a project of some sort.

Yet students could not simply be given a project and told to demonstrate the skills they learned without guidance. Kirschner, Sweller, and Clark (2006) note that research shows students need adequate information to learn effectively and efficiently. Problem solving in a domain is a skill experts have mastered, not novices. To be effective, “learners should be explicitly shown what to do and how to do it” (p. 79). Thus, an assignment was needed that told the students exactly what to do and how to do it while leaving them enough flexibility to apply what they were learning in a creative way.

A guided project was chosen both to guide the learning and to assess course content mastery. The students are given a scenario for the item to be produced as well as a detailed list of specifications that they must meet within the project, providing the detailed *what to do* for the assignment. This is similar to the process worksheets discussed by Van Merriënboer (1997) that give the steps required to solve a problem, along with hints and heuristics for completing the assignment. The *how to do it* for the assignments would be given in recipe-like instructions in the textbook and online tutorials, along with personal help via email as needed.

To keep the workload manageable, course content is spread across four projects to be completed over the life of the course, one project for each pair of chapters in the textbook. The scenario and the specifications are carefully linked to the skills and knowledge taught in each pair of chapters

so that all of the information needed by students to meet the specifications can be found in the current two chapters under consideration.

Peer Evaluation

During the 2005-2006 academic year, the guided projects were instituted in both the online and face-to-face formats of all Microsoft Office courses: Word, Excel, Access, PowerPoint, and Advanced Excel. A study done in the summer of 2006 ($N = 173$) found some interesting comparisons between the grades earned by students in the two delivery formats. Since no students took the same course in both formats, an independent-measures T-test was performed to see if there was any difference between the two groups in the average GPA of students at the start of the course or the average grade earned. The starting GPA of face-to-face students who did not withdraw ($N = 23$, $M = 2.67$, $SD = .715$) compared with online non-withdrawing students ($N = 106$, $M = 3.12$, $SD = .537$) was significantly lower, $t(127) = -3.143$, $p < .001$ (2-tailed). The average grade earned by face-to-face students ($M = 2.36$, $SD = 1.25$) was also significantly lower than that earned by online students ($M = 3.02$, $SD = 1.30$), $t(127) = -2.196$, $p = .03$ (2-tailed). Since the face-to-face students began with a lower starting GPA, it is also natural to expect them to earn a lower grade on average. When the difference between entering GPA and earned grade is averaged for both groups, the difference is not significant, $t(127) = -.697$, $p = .487$ (2-tailed). Thus, it seems safe to conclude that the difference in grades earned by both groups is due largely to the previous academic success of each group as reflected by the entering GPA rather than the instructional method used.

What is of greater concern is the large number of students withdrawing from the course or receiving a failing grade. The principal reason why students fail these courses is for not submitting projects. Of the 173 students tracked during the 2006 academic year who took both face-to-face and online courses, 42 (24.3%) withdrew and received a grade of W, while 27 received a grade less than a C, 14 (8.1%) of those an F. The total number of students receiving a W or F was 56 (32.4%). On the other hand, 104 (60.1%) of the students received a grade of C or better, 51 (38.9%) earning an A. In courses such as these based on clear expectations within the reach of nearly all college students, such a pass/fail bifurcation was expected. What was desired was an additional method that would increase the number of students passing and receiving A's.

One essential behavior needed for gaining expertise in any area is critical self-appraisal. It seems true that we can often see in the work of others errors that we are blind to in our own. In that spirit, a peer review was initiated in Microsoft Office courses for the 2008-2009 academic year. These required students to submit their projects to a discussion board after they had submitted them to the instructor for grading. They were then asked to evaluate the project of one other student and, after reading the comments made about their own project, to critically review it, also. The students were asked to highlight one excellent substantive aspect of the project, and one significant area that could be improved along with a suggestion on how to improve it.

In one sense, evaluating the projects of others became what Kirschner, Sweller, and Clark (2006) called a worked example, an instructional method that seemed especially appropriate for guiding novice learners to master the behaviors needed to successfully complete the projects. Worked examples are fully complete and correct examples of work the learner is learning to do. Such examples decrease the load on working memory, freeing more cognitive load to apply toward learning how to solve problems. The examples constructed by others similarly reduce cognitive

load as the students are not engaged in constructing the projects. This frees up working memory that students can apply toward deconstructing the projects to see how they fulfill the project requirements. Performing such “reverse engineering” is expected to enhance the learners’ insights into applying the skills learned in the course in more critical ways.

The peer evaluation has been met with general approval by the students. During the winter quarter, participants in online sections of Word, Excel, and PowerPoint were asked to rate their agreement with the statement *Viewing and evaluating the documents posted by classmates (on the Discussion Board for Peer Evaluations) was an effective assignment to learn new, different, or better ways to use the tools in Microsoft Word/Excel/PowerPoint*. Of the 105 learners who entered a rating, 85 (81%) agreed or strongly agreed with the statement. Students provided comments about their experience with this learning activity, and the most common opinion (50%) was that it helped to see how others applied the skills and to gain a new perspective of how to do the project. Also, by reading the evaluation that was posted for their own project and by studying their classmates’ worked examples, the students were able to improve their work on future assignments (38%). There were a number of students (17%) that felt they were able to help their peers with their suggestions and comments. And there were some (4%) that felt this assignment gave the course a “classroom feeling” and it allowed them to connect with their classmates. However, Kirschner, Sweller, & Clark (2006) explain that the worked-example effect will reverse as the learners’ expertise increases. The advanced students who were very proficient in the application reported that this activity was not helpful (2%).

A further indication of the usefulness of the peer evaluation is the decrease in the number of students withdrawing from the Office courses as shown in Table 1. During the 2008-2009 academic year, a total of 462 students were tracked. Of those, 47 (10.2%) received a grade of W, while 73 (17.7%) received an F for a combined total of 120 students (26.0%). Thus, the proportion of students receiving a W or an F was reduced by 6.4%, with the proportion withdrawing dropping by 14.1%. The number of students receiving a grade of C or better was 310 (67.1%), an increase of 7.0% over the 104 (60.1%) of the 2006 group. Overall, then, the withdraw rate was greatly reduced and the pass rate slightly increased. Student performance has been pushed more toward the A level, indicating greater mastery of the knowledge and skills of the applications being learned. As neither the projects being used nor the course content have been altered between the 2006 and 2009 offerings of the courses (other than changing from Office 2003 to Office 2007), these changes are considered generally to reflect the effect of the peer review on the performance of students in the courses.

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Table 1
Grades Earned by Students in Microsoft Office Courses, 2006 and 2008-2009

Grade	2006	2008-1009
Total Students	173	462
Number of W's	42 (24.3%)	47 (10.2%)
Number of F's	14 (8.1%)	73 (15.8%)
Number of W's + F's combined	56 (32.4%)	120 (26.0%)
Total Below C (including W's)	69 (39.9%)	152 (32.9%)
Number of A's	51 (29.5%)	179 (38.7%)
Total C and Above	104 (60.1%)	310 (67.1%)

The addition of the peer review may have had an effect on the percentage of students withdrawing from the Office courses. The drop in the percentage of withdrawals from courses between 2006 ($M = 27.32\%$, $SD = 14.861$) and 2009 ($M = 11.08$, $SD = 4.497$) was significant, $t(17) = 3.447$, $p = .003$. Unfortunately, the increase in the percentage of students receiving an F in these courses between 2006 ($M = 1.75$, $SD = 1.282$) and 2009 ($M = 6.64$, $SD = 4.433$) was also significant, $t(17) = -3.006$, $p = .008$. As there was no significant change between 2006 and 2009 in the combined total percentage of W and F grades, it is tempting to make the observation that students who may have dropped in 2006 opted to continue their enrollment in 2009 but may have ended up failing. This apparent swapping between F and W grades bears further study. There was no significant difference in the percentage of students receiving grades less than C and C or greater between 2006 and 2009, nor in the percentage of students receiving an A in the courses.

Conclusion

The conversion of courses teaching the Microsoft Office applications to a project basis seems to be successful with the majority of students taking the courses. Two-thirds of students complete the courses with a grade of at least a C, and the percentage is steadily increasing. The addition of a peer review to the courses has been accepted with enthusiasm by the broad majority of students and seems to fulfill its purpose of stimulating self-reflection by allowing students to apply their mental energies to evaluation rather than application. The peer review may be one reason why the number of students withdrawing from the courses has decreased significantly. Further work is needed to find ways to ensure that those students who persist in the courses have an even greater opportunity to succeed.

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