Utilizing LMS Tools to Help with Student Assessment

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Abstract. Feedback is important to student progress. Formative assessments allow the student to adjust or improve their learning progress, but take valuable time. This paper describes how using available LMS tools can assist faculty in assessing student work and provide helpful feedback to students. The research measures the results of formative assessments on students' grades. The tools available for faculty to use can be set up to save time for the faculty during assessments. Students have the opportunity for multiple attempts at assignments and receive feedback on each to help measure their learning. The rubric tool was used to not only grade student papers but also to provide appropriate feedback for student performance on the levels of achievement. Quizzes can be automatically graded. Results from this study show the benefits of multiple attempts at quizzes and written assignments. Future research is discussed to help further this pedagogical approach.

Keywords: Assessment · Student assessment · Learning management systems · LMS · Rubric · Alignment

1 Introduction

Many times in education the assessment is an examination or a written paper. The examinations tend to test students' recall of facts and basic information, or their cognitive knowledge of the subject area. Written papers allow students to illustrate how they can apply what they learned in the course or analyze information based on their subject learning. Typically, the student only has one attempt on tests and papers, and their grade is based on assessment of this one attempt. With the technology available now, whether face-to-face or online, these assessments can be conducted electronically, typically utilizing a Learning Management System (LMS). Even so, these types of assessments provide some measurement and feedback without a subsequent opportunity to improve.

The research reported here illustrates a different approach from "one-shot" assessments to incorporate additional chances. This involves utilizing the technology built into the LMS and including rubrics for assessing writing assignments to give students appropriate feedback for improvement and later use. Specifically, this research explains how multiple assessments were implemented in courses and reports some results from exploratory analysis of this approach.

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2 Assessment

Virtual Instructors need to assess student learning. Assessments are classified or talked about in several ways. Lepi [1] reports on six different types of assessments, for example. But generally, the assessment can be considered formative or summative: formative in that it assists the student and instructor in knowing what type of progress is being made toward a goal, and summative as the "final" measurement of student learning used to assign grades. Biggs says, "In the course of knowledge construction, students inevitably create misconceptions, which need to be corrected. But, first, you have to find out what they are, by *formative assessment*" [2]. Jones and Harmon also emphasize that assessment can be an aid to student learning, and students who know how well they are doing can make needed adjustments [3].

Ramsden agrees, stating, "Giving really helpful feedback on students' work is an equally essential commitment" [4].

Ramsden tells us, "The aims and objectives of the course should be devised at the same time as the teacher thinks about their assessment . . . [then] the central purpose of the course . . . will have been carefully articulated and linked to the assessment methods used" [4]. This is often called alignment. Alignment of student learning activities with assessment of student learning is a key concept in Quality Matters (QM), a non-profit organization dedicated to quality assurance in Online Education (see https://www.qualitymatters.org). The instructor of the course was trained in QM principles and designed the online course using the QM approach and also revised the face-to-face course to implement many of the aspects from the QM approach. "The teacher with a well-developed understanding of assessment will strive to connect his or her goals for learning firmly with the assessment strategies he or she uses" [4].

Biggs discusses constructive alignment as a blueprint for teaching. This involves three aspects, (1) saying what the "desired outcomes" are (the objectives), (2) deciding if the outcomes are learned "in a reasonably effective manner" (the assessment), and (3) deciding what "reasonably effective" might mean in terms of our grading system [2]. In getting students to "engage in (appropriate) learning activities" we are teaching them effectively.

The objectives for this course state that by the end of this course, the student should be able to:

1. Identify the major theoretical approaches to communication;
2. Explain many of the specific theories used in studying communication; and
3. Apply theory to understand a communication event.

One difficulty is trying to balance the "cognitive" (learning the facts and basic information) and "application" learning assessments. Often, instructors assess student learning by examinations for cognitive learning and by written papers, case studies or extended examples for application of learning. In this course, the assessments included quizzes to assess student knowledge of theories and papers to assess students' application of theories to communication events.

Although assessment, or measuring student learning, sounds rather straightforward, there are problems with assessment. As Ramsden says, assessment "must be handled with infinite care" [4]. This paper does not focus on the problems related to development of quality assessments so much as the implementation of assessments.

Specifically, the focus is how to deal with one of the biggest problems with assessment, particularly formative assessment throughout a course, and that is time. Many instructors fear they "don't have the time to provide the kind of feedback they would like to deliver" [5]. This problem can be overwhelming when an instructor has a large class or teaches multiple classes, and when the course includes writing assignments. Although instructors may complain about the time needed, Lepi reminds us that assessments do have value and have an important place in our learning structure [1]. In the approach described here, the classes were set up with multiple trials for tests and multiple trials for papers in the LMS by using the settings and tools in the LMS. First, we look at the assessment by quizzes then the assessment by written papers.

2.1 Assessment by Quizzes

Creating and grading examinations or quizzes is a regular activity for instructors. With the benefit of the LMS tools, quizzes can become less time consuming, whether in an online or face-to-face class. Quizzes and examinations easily measure the students' knowledge or comprehension levels, using Bloom's categories [6].

In this case, the instructor developed a test bank of questions for each unit of the course. For multiple assessments of a unit, multiple quizzes can be given without redundancy. The LMS quiz tool allows random selection of questions from the test bank for that unit so each quiz has unique questions and students are not simply taking the same quiz repeatedly. The LMS can be set up to automatically grade the quiz and provide the score to the student. Students then can decide, based on the feedback from that assessment, whether or not they should take another quiz. If they receive the score they need, even if not a perfect score, they may move on to the next unit. If their score is lower than they need or want they may study more and take another quiz over that unit.

According to Haskell, "In games, we experience a remarkable amount of failure. It is this ability to fail without long lasting penalties that serves as a central construct of the learning process. Moreover, mastery requires that we learn from this failure to move on" [7]. Ideally, students would study before taking a subsequent quiz, but there were not controls available to require that in this LMS. Yet they are not "punished" for failure. They simply receive feedback about their progress. The student receives feedback that helps the student determine whether or not their quiz attempt was a success or failure, which results in helping them know if they need to correct or add to their knowledge.

2.2 Assessment of Written Assignments

Whereas the quizzes measured knowledge or comprehension of information and concepts, the papers assessed the application or analysis levels of learning. In this course, the written assignments were applications of the theory where students had to provide an extended example from their own experience illustrating the theory and its concepts.

Students had opportunity to write multiple papers, receive feedback on each and use that feedback to improve their subsequent papers. Specifically, students were allowed to write up to eight papers, one per unit the second half of the term, but only the top four scores would be used in calculation of their final grade. "Formative assessment, as a vital function of teaching, should always be present, but the results should not be 'counted', unless the student agrees" [2]. This is the design of this assessment – students decide whether to use the score on a paper as their grade or to use that feedback to write a better paper and better fulfill the assignment goals.

Any assessment of written work tends to be time consuming. Yet Grey says, "When assigning written projects, it is wise to require more than just the final product" [8]. Using a rubric for the written assignment helps assure that the assignment is instructionally relevant and focuses on the learning outcomes. Rubrics are often used to grade student work, but they can serve another, more important, role as well. According to Andrade, "Rubrics can teach as well as evaluate. When used as part of a formative, student-centered approach to assessment, rubrics have the potential to help students develop understanding and skill, as well as make dependable judgments about the quality of their own work" [9].

Students can use the rubric to clarify standards for quality and to guide their progress toward those standards. Basically, a rubric describes levels of achievement for stated objectives or standards of performance. For example, each objective or standard could have a description of identifiable performance characteristics reflecting a beginning level of performance, a developing level of performance and a mastery level of performance.

"Students are understandably angry when they receive feedback on an assignment that consists only of a mark or grade" [4]. The LMS allows for a rubric with feedback for each level in every category, so students receive specific feedback instead of just a score or grade. "Of all the facets of good teaching that are important to them, feedback on assessed work is perhaps the most commonly mentioned" [4], so the feedback function in the LMS rubric tool was used. In this course, students had the opportunity to write multiple, short papers (2-3 page), receive feedback on each through the rubric and improve their subsequent papers. Rubric categories included (1) writing style and mechanics, (2) accuracy of the theory explanation, and (3) specificity and accuracy of the example provided as an illustration of the theory. With these categories and various levels in each, students received specific feedback on their paper instead of simply an overall score or grade. The instructor simply clicks on the level of achievement for each category and the LMS calculates the score for the paper and provides the appropriate feedback to the student. For example, the rubric expectation for writing and grammar at one level was, "OK – several errors in spelling, grammar or punctuation making it difficult to read due to these distractions," and if selected by the instructor would automatically provide the feedback, "Many errors; you must proof read more closely; have someone else read it before turning it in." An example of the rubric expectation for the "Theory Example" criterion is, "OK – some details provided; but not enough or not accurate," and the automatic feedback provided read, "Too few details provided; make sure your explanation is accurate." Using this information from the assessment, the student will then know what areas do or do not need improvement for subsequent papers.

3 Subjects

Subjects included two fully online sections (n = 46) and two face-to-face sections (n = 164) of the same communication theory class in 2012 and 2013 taught by the same instructor to help assure consistency of teaching styles, materials, and assignments across sections. Students at this university in the USA registered for classes on their own, so there is no randomization of students nor classes, and no control group, limiting generalizability of the results. The majority of students were communication majors who needed a 'C' or better in the course (70 % or higher) as a requirement for their major, so earning a particular grade was more important than simply passing the course (with a D- or 60 % or better).

4 Results

The LMS and technology provides a simpler or quicker way for instructors to assess student work. This research utilized the LMS tools for this purpose. This was an exploratory study to examine the utility or benefit of providing multiple attempts of an assignment. The specific assignments include quizzes and written papers in both online and face-to-face courses.

The students' GPA prior to this course was measured. Overall, there was a significant difference in the students' grade point average (GPA) upon entering the course ($t = -2.13$; $df = 200$; sig. $< .05$). Students in the online sections had a mean GPA of 3.05, and the face-to-face students' GPA was 2.87 (on a 4-point scale). There was also a significant difference in the final grade between the two groups ($t = -6.74$; $df = 116.14$; sig. $< .001$) with the online students' mean grade of 89.6 percent and the face-to-face students mean grade of 81.2 percent.

There was some question as to the impact of a student's GPA on their success in the course (their final grade). To try to determine if the better students (as measured by GPA) would get better grades Pearson Correlations were run. The students' prior GPA was significantly correlated to their Course Grade overall and for both the online ($r = .440$; sig. = .05) and face-to-face student groups ($r = .570$; sig. = .001).

4.1 Quizzes

There were 13 quizzes in the courses, one for each unit. Overall, the final mean score on quizzes was 80.38 percent. Students in the online course could repeat any quiz as many times as they liked. Students in the face-to-face course did not have that option and were used as a comparison (a type of control group) for this analysis.

Online Results. Only two students of the 47 did not repeat any quizzes in the online class. On average, students took 23 quizzes. The mode was 18 (14.9 %). The average final quiz score (as opposed to the average first attempt score) was 89.64 %. The difference between the first attempt and the final quiz grade showed an improvement of over

10 % on average. There was a significant difference between the grade on the students' first attempt and the students' final quiz grade (t = 9.707; df = 46; sig. = .000).

Did this have any relevance to the students' success or final grade in the course? Students improved their quiz scores by three to 43 percent by re-taking quizzes. The rate of improvement (the difference between the first and final scores) was not correlated to the student's final course grade (r = -.167; n = 46; sig. = ns). There was a significant correlation between the students' course grade and the score on the lowest quiz that was not re-taken (r = .481; sig. < .001). This relationship signifies that the lower the score on a quiz that the student did not re-take, the lower the student's grade in the course. This seems to suggest that it was advantageous to re-take quizzes. However, the number of quizzes taken was not significantly related to the final quiz grade (r = -.173; ns) nor the course grade (r = -.182; ns). The number of quizzes re-taken also were not significantly related to the final quiz grade (r = -.031; ns) nor the course grade (r = -.090; ns). It did not seem to matter how many quizzes the student took or re-took.

The results showed a significant correlation between the students' final quiz grade and their course grade (r = .885; sig. < .001). It must be noted, however, that quizzes were not the only graded assignments in the course. Final grades for the course included the quizzes, papers, and participation in online discussions. For the online students, neither the number of quizzes taken nor the number of quizzes re-taken were significantly correlated to the students' prior GPA. It seems that GPA is not an indicator of effort in this case (as indicated by retaking quizzes).

Comparative Results. This research studied whether or not having multiple attempts would benefit the student. Comparing the online student (those with multiple attempts possible) with the face-to-face student (those without multiple attempts possible) showed that there were significant differences in their final quiz grades (t = -9.53; df = 144.09; sig. < .001). Online students received a mean of 89.8 percent while face-to- face students received a mean of 77.8 percent on quizzes. This would suggest that providing multiple attempts for quizzes may increase student success.

4.2 Papers

The students were required to write at least four papers. Both online and face-to-face students were able to write up to eight papers, and the top four grades were to be used in the calculation of their course grade. Most students (73.2 percent) wrote the minimum number of papers. Students who wrote more than the minimum number of papers improved their scores on papers by one to 35 percent overall.

Did this have any relevance to the students' success in the course or final grade in the course? The final score on the papers was significantly correlated to the student's final grade in the class (r = .532; sig. < .001). However, there was no significant difference in the final paper scores between the students who wrote the minimum number of papers and those who wrote more than the minimum number of papers (t = - 1.170: df = 208; sig. = ns). Also, there was no significant difference in the final grade for the course between the students who wrote the minimum number of papers and those who wrote more than the minimum number of papers (t = -1.688; df = 208; sig. = ns).

The lower initial paper scores was significantly and negatively correlated to the amount of improvement in papers (r = -.698; n = 46; sig. < .001), meaning that the lower the initial paper score, the more the improvement in the scores. But the improvement in the students' paper scores was not significantly correlated to the student's final course grade (r = -.086; n = 46; sig. = ns).

5 Conclusion

This study was about how to use LMS capabilities to help manage instructors' time investment involved in assessment while still providing helpful, multiple assessments and feedback to students as they continue their learning, not just a single, final assessment. It is important, then to have the assessment that leads to or helps the students learn. According to Shuell, "It is helpful to remember that what the student does is actually more important in determining what is learned than what the teacher does" [10]. In this study, students were provided the opportunity to do activities more than once with feedback from the assessment of those activities.

Results indicated that students (in the online class) were able to take advantage of the feedback from assessments (grades on tests, and grades and rubric comments for papers) to decide if they needed (or wanted) to try again. This agrees with findings from Casey et al., who found that those students who "submitted much more than the minimum criteria typically reaped the most benefit in terms of academic performance" [11].

There is evidence in this study showing that providing students multiple attempts can benefit them. Those students who did multiple attempts showed increases in their scores on both quizzes and papers. As Jones and Harmon stated about assessment aiding student learning, it appears that students who took advantage of their feedback and decided to try again were aided by the feedback and made needed adjustments [3].

However, in this study there were some mixed results concerning the advantage of multiple attempts. While the results showed that the final quiz score was significantly higher than the initial quiz attempt, the results also showed that the number of quizzes re-taken or the total number of quizzes taken were not correlated with the final quiz grade nor the course grade. For papers, students were able to improve their scores if they wrote more than the minimum number of papers, and their scores were positively correlated to their grade in the course (better paper score – better course grade), but there was no evidence in this study that writing additional papers improved their course grade more than not writing additional papers. It did appear that writing the additional papers helped bring those students' scores up to where other students' scores were. Further study is certainly warranted.

Sims, Dobbs and Hand state that computer-based technology can "respond meaningfully to user actions and manipulations" yet this is often not discovered nor used [12]. Educators need to take advantage of the improving capabilities of the various learning management systems to assist in meaningful and helpful assessments for their students, and to find ways to do so without increasing their own time commitments.

This study was limited in that the classes measured were not randomly selected and had no control group for comparisons. Ideally, establishing more stringent divisions of students would allow statistical comparisons, but classes are rarely scheduled in such a manner to allow random groups to compare. There was also a limitation due to the format of the courses offered. One was scheduled during a shorter summer term and the other during a full 15-week semester. Some students may not have felt they had the time to write more than the minimum number of papers during the shorter term while they may have during the longer term. However, results showed that the actual number of papers written in these two formats was not significantly different, so having more or less time did not seem to influence students' decision to write additional papers.

The approach allowed more student choice or control of their learning path. Future research should also gather student perceptions of multiple attempts at assignments and quizzes. Is it seen as being helpful or as simply additional work? Do students find this feedback helpful, too little or general, or do they even use this feedback for subsequent work?

This study was a step toward better understanding of how to use LMS tools and technology for better assessment of our students' learning. Particularly this study also involved a large class. "In large classes, lecturers find it difficult to provide this level of individual feedback quickly on practical reports or essays" [4]. Using the LMS for automatic grading of quizzes and the rubric tool allowed specific feedback to be provided to students.

This study assumed the assessments (the quiz questions) were good indicators of student learning or that the score on a quiz or paper was a valid measure of student learning. As stated earlier, this research did not focus on the problems related to development of quality assessments so much as the implementation of assessments using capabilities of the LMS. It provided ways that do not increase instructor workload. These results should help other educators, online or face-to-face, as they consider using technology for assessment approaches, whether final assessments or formative, developmental assessments to help students gauge their progress in the course and make decisions accordingly.

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