Using online rubrics to make project grading more standardized and efficient

Sandra Ann Groff O'Brien
Abstract
Rubrics make assessing student work standard and efficient, and they help teachers justify to parents and others the grades that they assign to students. This research project investigated the possibility of improving grading efficiency in project-based classes using online rubrics. Two research questions were studied: 1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria be more efficient in assessing their student projects and save them time in grading? 2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over?

A group of practicing high school teachers and college instructors were asked to use an online rubric to grade student project work. After completing the rubric, teachers were asked to evaluate the use of the rubric for speed and efficiency. Based on analysis of the data provided by the research participants, this research project concluded that grading projects can be done more efficiently saving the teacher time and making grades more standard using a standards-based, web-based rubric to score each project.
USING ONLINE RUBRICS TO MAKE PROJECT GRADING
MORE STANDARDIZED AND EFFICIENT

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ABSTRACT

Rubrics make assessing student work standard and efficient, and they help teachers justify to parents and others the grades that they assign to students. This research project investigated the possibility of improving grading efficiency in project-based classes using online rubrics. Two research questions were studied: 1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria be more efficient in assessing their student projects and save them time in grading? 2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over? A group of practicing high school teachers and college instructors were asked to use an online rubric to grade student project work. After completing the rubric, teachers were asked to evaluate the use of the rubric for speed and efficiency. Based on analysis of the data provided by the research participants, this research project concluded that grading projects can be done more efficiently saving the teacher time and making grades more standard using a standards-based, web-based rubric to score each project.
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CHAPTER 1

Introduction

When a final project is used to assess student understanding, quality of work can vary widely and assessment becomes problematic. In the traditional view of educational measurement, comparisons are allowed only when they are based on parallel forms of the same instrument (Talsma & Krajcik, 2002). The subjective nature of grading projects becomes a dilemma for teachers of technology in courses such as web design principles and desktop publishing. Grounded in constructivist theory, project-based instruction affords many possibilities for transforming classrooms into active learning environments (Krajcik, 1994). For technology courses, project-based assessment provides the teacher with a vehicle for students to demonstrate their knowledge of the subject matter authentically. When teachers assign projects as a way of evaluating student knowledge, standardizing the assessment becomes difficult. Rubrics have emerged as the logical choice for standardizing the evaluation of projects. Rubrics are objective assessment instruments that allow teachers to set clear expectations for grading projects. Using a rubric allows the teacher to standardize grading among all students completing the projects. Rubrics make assessing student work quick and efficient, and they help justify to parents and others the grades that teachers assign to students (Andrade, 2000). By creating a rubric that will assess the concepts covered in the course, teachers can grade projects consistently. Benefits to the teacher are a reduction in subjective grading and time devoted to grading (Loveland, 2005).

A way to further increase the productivity of a project grading system would be to make it web-based. A grading tool that is web based would allow teachers access to the
grading tools any time they have access to a computer. Using a computer-based system would eliminate the use of paper and reduce management time for the teacher.

Statement of Problem

The primary purpose of this research is to discover if using a web-based rubric with common, standards-based grading criteria will make grading projects more standardized among teachers in the research group and save them time grading projects. The results will show if using the web-based rubric will provide enough benefits for teachers to consistently use them to grade their student projects and provide that grade standardization for which we are looking.

This research project addresses the role of web-based rubrics in assessing projects in technology courses such as desktop publishing and web design applications. Many of the teachers participating in this study had no concrete standards for grading projects and used a somewhat arbitrary system for assessment.

The fact that the rubric was web-based using technology to assess their students was an element that should enhance the efficiency of the process. Glennan (1996) suggests that the use of technology to significantly affect classroom practice tends to be limited to small groups of teachers who are excited by the potential that they feel technology has to motivate their students or to access new resources.

The research project started with a hypothesis that using a web-based rubric to grade projects in technology courses would prove quite valuable to teachers in the study and they might continue to use it for their project-based courses and even expand the use of the web-based rubrics to other areas in the these courses as well as others. Two research questions were studied:
1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria would be more efficient in assessing their student projects and save them time in grading?

2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over?

*Definition of Terms*

There are a number of terms that are used in specific context during this research paper. Terms unique to this research that are vital to the understanding of the concepts are defined below. Each time these terms appear in this research, please apply the following definitions.

*Standards-Based Rubric*

A rubric is a scoring tool that lists the criteria for a piece of work, or "what counts" (for example, purpose, organization, details, voice, and mechanics are often what count in a piece of writing); it also articulates gradations of quality for each criterion, from excellent to poor (Andrade, 2000).

*Computer Aided Assessment*

Computer Aided Assessment (CAA) is described as "any instance in which some aspect of computer technology is deployed as part of the assessment process" (Tshibalo, 2005). For the discussion in this paper, CAA will be defined as the use of the computer to assist the teacher in assessing student work.
Authentic Assessment

An authentic assessment usually includes a task for students to perform and a rubric by which their performance on the task will be evaluated (Mueller, 2008).
CHAPTER 2
Review of Literature

Introduction

Grading is one of a teacher’s greatest challenges and most important professional responsibilities (Guskey, 2004). Struggling with assessment in project-based technology courses has been a rite of passage for technology teachers. Because projects can vary widely in their construction and the effort students invest in them, grading those projects becomes difficult. Accurately assessing the projects and returning the grades in a timely manner have been concepts not easily conjoined. Traditional, norm-referenced testing models offer a solution to the issue of timely grading but cannot accurately evaluate a student’s abilities in a skills class. Alternative assessment models which more accurately evaluate student skills are time consuming in their execution. Teachers grapple with ways to reward their students for good work and encourage more involvement with their next project. Making the grades valid and accountable to students, parents, and administrators requires following standards predefined for successfully completing the projects.

This review of literature addresses the role of rubrics as a way of assessing project work. It explores the use of assessment tools linked to technology standards and formatted into a rubric to see if this process could standardize grade assignment during evaluation. The overall question addressed is: “Will the use of an online rubric for grading student projects make the evaluative outcome more standardized and efficient?” The research questions focused upon are:
1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria would be more efficient in assessing their student projects and save them time in grading?

2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over?

**Review of Literature Methodology**

Research for this literature review was primarily done using the Internet. The EbscoHost searchable on-line database through Kirkwood Community College library and ERIC (Educational Resources Information Center) online were primary sources for research articles. General keyword searching on the Internet also found articles for use in this literature review. Key words used in the search included: *accountability, alternative assessment, authentic assessment, computer aided assessment, credibility, efficiency of use, grading, online rubrics, project grading, project-based assessment, reliability, rubrics, standards-based evaluation, technology education, and validity*. The initial research was done to clearly define the process of creating and authenticating rubrics. A thorough understanding of using rubrics in grading was vital to the completion of this project. Because using rubrics for grading is a concept drawing rave reviews and growing acceptance, it was not difficult to find excellent information regarding rubrics. Many articles discussed the importance of creating rubrics that accurately evaluated the criteria for which the assignment was completed. Validity and accountability were very important subjects in the research for using rubrics. Once a thorough understanding of
creating and refining the rubrics was gained, research started on the connection between assessment and technology.

**Analysis**

**Authentic Assessment**

Educators have long recognized the limitations of traditional tests that include fixed-choice question types (e.g., multiple choice, matching, and true/false) (Oakleaf, 2009). Technology teachers face a challenge in grading student work using traditional grading tools. Norm-referenced questions cannot accurately assess the ability level of a student in a skills-based, technology course. Authentically assessing students in skills courses requires students to be effective performers of their acquired knowledge. Traditional, norm-referenced tests tend to identify what the student can recall and “plug in” words to complete a sentence. Choosing the right multiple-choice answer does not allow the student to demonstrate skills and knowledge gained through education in a skills-based technology course. Norm-referenced questions are one-time measures of knowledge that rely on one correct answer. There is limited potential for traditional tests to measure higher-order thinking skills since, by definition, those skills involve analysis, interpretation, and multiple perspectives (Liskin-Gasparro, 1997).

**Alternative Assessment**

An alternative form of assessment must allow students to demonstrate the knowledge they have acquired. Alternative assessment can be defined as an alternative to standardized, norm-referenced testing. Alternative assessment implies that there needs to be new formats for gathering information about students’ achievements, that there have to be new processes through which such information is synthesized (in order to
determine/diagnose achievement) and that the formats and processes should seek to serve the welfare of each student (Maclellan, 2004).

When evaluating student work in production or skill classes an alternative assessment is more authentic because it allows a student to demonstrate the level of skill he or she has attained. Many educators and members of the public fail to grasp the distinctions between criterion-referenced and norm-referenced testing; it is common to hear the two types of testing referred to as if they serve the same purposes, or share the same characteristics. Much confusion can be eliminated if the basic differences are understood (Huitt, 1996). Criterion-referenced tests are done to determine how much each student knows and if each student has achieved a certain skill level where norm-referenced tests discriminate between high and low achievers based on a wide range of knowledge areas. Alternative assessment would thus reject the fairly fundamental beliefs that have informed traditional assessment: that there can be universality of meaning as to what any grade or score represents. Predetermined levels or standards of performance became the basis for comparison in order to be able to provide explicit information as to what students can and cannot do (Maclellan, 2004).

Using an evaluation tool that also informs the student of where skills are lacking provides important feedback for the student during the duration of the course. Through the use of rubrics, strengths, weaknesses, and areas of improvement are provided to students in a more consistent and useful format (Anglin, 2008). The student is the primary beneficiary of the assessment system; a system that seeks to educate the student as it assesses the student’s ability to perform the skills being assessed can be an asset to the student.
With alternative assessment, students are expected to participate actively in evaluating themselves and one another. Learners who are used to traditional teacher-centered classrooms have not been expected to take responsibility for assessment before and may need time to adjust to this new role. Students who are taught using alternative assessment systems that establish criteria for quality performance and then allow the students to work toward those criteria are taught to take an active role in their education. Alternative assessment methods work well in learner-centered classrooms because they are based on the idea that students can evaluate their own learning and learn from the evaluation process (National Capital Language Resource Center (NCLRC), n.d.). Students are encouraged to think and talk about their learning and how they will be evaluated. Students who are allowed to think for themselves are more likely to act independently. Using criterion-referenced grading encourages students to help each other understand the teacher expectations rather than compete for grades as they would in a traditional norm-referenced grading system. Grading on the curve makes learning a highly competitive activity in which students compete against each other for the few scarce rewards (high grades) distributed by the teacher. Under these conditions, students readily see that helping others become successful threatens their own chances for success (Guskey, 2000).

Once a teacher chooses to use an alternative assessment, the teacher must decide what form that alternative assessment should take. Increasingly, alternative assessment systems are gaining acceptance in classrooms all over the United States. Learning is now understood to proceed in many directions at once and at an uneven pace (Maclellan, 2004). Evaluation strategies such as group or individual projects, journal or research
assignments or portfolios have been replacing standardized tests as the tool to assess student knowledge of course material in a skills course. Authentic assessments require students to be effective performers with acquired knowledge. Traditional tests tend to reveal only whether the student can recognize, recall or "plug in" what was learned out of context (Wiggins, 1990). Assessing project work or activities where the student performs a skill provides detailed information about what the student knows and can do rather than how much the student does not know and cannot do.

Alternative assessment tools offer the student the opportunity to demonstrate his/her thought processes as well as revision of materials and communication with the teacher. The search for a grading tool that accurately assesses student abilities in technology courses demands that the teacher discover a system that authentically evaluates those abilities. The realization of what is involved in meaningful learning together with the recognition of the role of social context in shaping higher-order cognitive abilities and dispositions suggests that what is important in assessment is evidence of how and whether students organize, structure and use information in context to solve complex problems (Maciellan, 2004).

Accurately assessing skills in technology courses begins with the decision to use standards norm-referenced or criterion-referenced assessment. Traditional grading practices dictate that student work be compared to that of all other students in the group. In this norm-referenced grading model, teachers use traditional grading methods that assign performance standards, which identify the top-ranked students and then segment out the rest of the students in a typical bell-shaped curve. Because students do not achieve high grades by performing well, but rather by doing better than their classmates, learning
becomes a game of winners and losers, and because teachers keep the number of rewards arbitrarily small, most students must be losers (Guskey, 2001). Criterion-referenced standards, in contrast, compare each student’s performance to clearly stated performance descriptors that differentiate levels of quality. Teachers judge students’ performance by what each student does, regardless of how well or poorly their classmates perform (Guskey, 2001).

A traditional evaluation model with a bell-shaped grading curve would follow norm-referenced standards judging student performance based on the members of the student group as a whole. Normative criteria or grading on the curve tells nothing about what students have learned or are able to do; they provide an inadequate description of student learning (Guskey, 2000). New types of assessment tools such as rubrics identify criteria which are used to set standards for student performance based on goals identified prior to instruction. In a standards-based system, teachers identify what they want their students to learn and demonstrate as evidence of that learning. Providing standards of achievement for students to use in preparing their work allows the teacher to make the grading process a learning experience. Grades based on clearly stated learning criteria have direct meaning and communicate that meaning (Guskey, 2001).

Assessments are authentic when they have meaning in themselves; when the learning they measure has value beyond the classroom and is meaningful to the learner (Kerka, 1995). Because normative criteria or grading on the curve tells nothing about what students have learned or are able to do, they provide an inadequate description of student learning (Guskey, 2000). Using projects to demonstrate mastery of a skill adds authenticity to the grading process in technology courses. Finding a way to score the
projects and assign grades is difficult. Authentic assessment achieves validity and reliability by emphasizing and standardizing the appropriate criteria for scoring (Wiggins, 1990).

**Standards-Based Assessment**

Using a process that sets standards for quality work and assigns scores based on levels of quality allows teachers to standardize grading for student projects. At all levels of education, therefore, teachers should identify what they want their students to learn, what evidence they will use to verify that learning, and what criteria they will use to judge that evidence (Guskey, 2000). Using the same standard grading tool to evaluate each student’s work takes out grade variations due to teacher error. Grades should not be a hodgepodge of factors such as student’s level of effort, innate aptitude, compliance to rules, attendance, social behaviors, attitudes, or other nonachievement measures (Allen, 2005). Creating a standard tool that allows the teacher to base grades on a set of criteria predetermined to evaluate each specific project makes the final grades more accurate and accountable to parents and administrators. A scoring rubric with well-defined score categories should assist in maintaining consistent scoring regardless of who the rater is or when the rating is completed (Moskal, 2000a). A grading tool that sets standards for student work and communicates those standards to students prior to completion of the work helps students understand their teacher’s expectations and guide their production. Standard criteria for student work allows a teacher to grade without emotion and compare student work to grading points predetermined to evaluate the student’s knowledge of the coursework. By developing a pre-defined scheme for the evaluation process, the subjectivity involved in evaluating an essay becomes more objective (Moskal, 2000b).
Individual student projects are not compared to each other, but compared to the standards the teacher determines will demonstrate that the student understands the curricular material. Rubrics improve student performance by clearly showing students how their work will be evaluated and what is expected (Andrade, 2001). Project grades are standardized and allow the teacher to provide grades to students, parents, and administrators, which can be validated for their accuracy in assessing the student’s knowledge. Rubrics can improve student performance, as well as monitor it, by making teacher expectations clear and showing students how to meet those expectations. This often results in marked improvements in the quality of student work and in learning (Andrade, 2001).

Grading standardized tests is quick and often very little work for the teacher. Many times the textbook for the course is accompanied by tests written based on the curriculum being taught. When a teacher chooses to forego the standardized tests and use an alternative assessment model to identify student mastery of a skill, concerns arise regarding time involved in creating and administering grading tools for the assessment model. Creating a grading tool that can accurately assess the skills demonstrated in creating a project is not as easy as writing a true/false question, but a well-constructed grading tool can give the student and teacher valuable insight into the true knowledge and abilities of the student. Andrade (2001) describes the use of rubrics to accurately assess student work as:

Teachers tend to find that by the time a piece has been self- and peer-assessed according to a rubric, they have little left to say about it.

When they do have something to say, they can often simply circle an item
in the rubric, rather than struggling to explain the flaw or strength they have noticed and figuring out what to suggest in terms of improvements. (p. 3)

Grades are relied upon to communicate important information to students, parents, and administration. If the grades are not accurate measures of the student’s achievement, then they do not communicate the truth about the level of the student’s academic achievement (Allen, 2005). Regarding standards use, Guskey (2000) suggests:

By providing consensus about what’s important for students to learn and what skills they should acquire, standards give direction to modern reform initiatives. In particular, they bring much needed focus to curriculum development work and provide the impetus for fashioning new forms of student assessment. (p. 20)

In a standards-based learning system, grading and reporting must be done in reference to specific learning criteria, rather than in reference to normative criteria or on the curve (Guskey, 2000). Each student’s work is judged individually based on his/her success in meeting the learning criteria for each project. This means that teachers must describe how they plan to evaluate students’ achievement, effort, work habits, and progress, and then must communicate these plans directly to students, parents, and others (Guskey, 2001). A grade cannot be a teacher’s merged judgment of the factors, since as a single letter or numeric mark; the reported grade must communicate a single fact about the student if it is to be a valid or accurate source of information coherently shared between the report of the grade and the grade report’s audience (Allen, 2005). When clear goals are established for student performance, important information about student
achievement can be gathered and communicated through the grading process. Identifying the specific learning goals or standards on which to base grades is probably the most important, but also the most challenging aspect of standards-based grading (Guskey, 2001).

Learning is driven by what teachers and students do in the classroom. Although students learn many things in the classroom, the primary objective is for students to learn academic content knowledge of a particular subject. In order for teachers to know if students are achieving this academic knowledge, they generally are required to not only assess students' knowledge in some way, but also eventually summarize that assessment into a letter or numerical grade (Allen & Lambating, 2001). Assessing student work by using a standards-based system can bring focus to developing curriculum that is accountable and using alternative grading systems to accurately evaluate student work. Teaching is often a balancing act of personal and professional responsibilities that must be kept in balance. By using a standards-based system to evaluate student work the teacher takes emotion out of the grading system and produces grades that are accountable to students, parents, and administrators.

Standards-based grading systems do have their problems. The most notable problem of standards-based grading systems is that they take a lot of time to create and use. Administering a test with norm-referenced right or wrong answers requires less work than does defining standards and identifying criteria to test those standards in evaluating a student project. Grading tools that predetermine criteria for grading projects must be regularly revisited to be sure that the criteria chosen still represents what the teacher intends to evaluate. Criterion-referenced grading tools may add considerably to the
teacher workload but the advantages of standards-based grading becomes evident when valuable assessment information can be gathered and communicated to students and parents in a way that is easy to understand.

**Rubrics**

One alternative assessment system that is rapidly gaining acceptance is a standards-based rubric system. Rubrics identify criteria or essential tasks that comprise successful completion of student work. Rubrics allow students to understand the expectations of their instructors before, during, and after they complete skills evaluations.

A rubric is usually a one- or two-page document that lists the criteria for a specific assignment and describes varying levels of quality, from excellent to poor (Andrade & Du, 2005). The performance criteria in a rubric identify the dimensions of the performance or product that is being taught and assessed (Tierney, 2004). When a quality rubric has been used to grade student work, the grading process becomes more valid and accountable. Rubrics are used to clarify learning goals, design instruction that addresses those goals, communicate the goals to students, guide feedback on students’ progress toward the goals, and judge final products in terms of the degree to which the goals were met (Andrade, 2005).

Describing performance criteria can be a challenging aspect of rubric construction, which is in itself a task that many teachers find time-consuming (Tierney, 2004). As educators look for help in creating effective rubrics, and doing so in reasonable amounts of time, many use the information and resources posted on the World Wide Web (Dornisch, 2006). Many sites are available where rubrics are offered for teachers to
create, download, and modify to fit their own grading circumstances. Some of those sites include:

- RubiStar (http://rubistar.4teachers.org) which is a site that allows teachers to search preexisting rubrics or use a portion of the website to generate a rubric for their specific assignment.
- Kathy Schrock's Guide for Educators (http://school.discoveryeducation.com/schrockguide/assess.html) is a site that has a large number of content-specific rubrics as well as associated articles for teachers.
- Rubrics for Teachers (http://www.rubrics4teachers.com) has rubrics available for download grouped by subject, terminology, discipline, and grade level.
- University of Wisconsin-Stout Rubrics for Assessment (http://www.uwstout.edu/soe/profdev/rubrics.shtml) includes quick links for rubrics by discipline and concepts such as collaboration and teamwork at all grade levels.

When choosing rubrics created by others, it is important to understand that the original purpose of the rubric may have resulted in design features that are not suitable for the current purpose. An existing rubric for use in grading student projects should be a template and time should be spent adapting the rubric to the specific project. Many of the rubrics that are accessible online were created by teachers for specific tasks, and others were originally designed as holistic rubrics for large-scale assessment, where the goal is to create an overall portrait of the performance (Tierney, 2004). Software and web-based
systems are also available, which assist teachers in writing criteria for rubrics that are tied to standards provided by state or national programs. Many of the software programs available have been developed using teachers to write and evaluate the criteria for the rubrics. While these criteria may be well written they still should be evaluated for relevancy regarding the specific project to be graded. Creating or modifying the rubric may be time consuming, but once a quality standards-based grading tool is created time is saved using the system. The rubric tool should make a student’s work go faster because the teacher has communicated the grading criteria to the student prior to completion of the work so the student knows if the criteria has been met or not. Rubrics make assessing student work quick and efficient, and they help teachers justify to parents and others the grades that they assign to students (Andrade, 2000). The submitted work should be closer to the vision the teacher had when assigning the work. Having student work that follows the original assignment specifications takes less time to evaluate. The rubric should anticipate all or almost all of the variations in quality and design present in student work. Additional comments by the teacher should be very short if needed at all. Having a standard format for grading would allow the teacher to efficiently move from one project to the next with the grading criteria in mind and apply equal standards to all graded projects.

Rubric Validity

Grading systems used by teachers vary widely and unpredictably and often have low levels of validity due to the inclusion of nonacademic criteria used in the calculation of grades (Allen & Lambating, 2001). The most fundamental measurement principle related to meaningful assessment and grading is the principle of validity (Allen, 2005).
Allen (2005) defines validity by asking the following question: Do the assessment procedures and assignment of grades accurately reflect and communicate the academic achievement of the student? Accurately assessing student work and issuing a grade that communicates the student’s ability to meet the course goals is the target for which teachers are aiming. If the grades are not accurate measures of the student’s achievement, then they do not communicate the truth about the student’s academic achievement or level of mastery of a subject (Allen & Lambating, 2001). Since establishing validity is dependent on the purpose of the assessment, teachers should clearly state what they hope to learn about the responding students (i.e., the purpose); they also should explain how the students will display these proficiencies (i.e., the objectives) (Moskal, 2000a).

Students, parents, and administrators frequently misunderstand norm-referenced letter grades. Since norm-referenced grades do not always reflect the ability of the student to meet the course goals but rather are awarded based on the student’s ability to achieve a higher score than other students in the course, a criterion-referenced grade tends to be more accurate in reporting the student’s abilities and valid in its assessment of student learning. Students come to see assessment as a source of insight and help instead of its being the occasion for meting out rewards and punishments (Shepard, 2000). Grades based on predetermined, standardized criteria and communicated to students, parents, and administrators are more valid than grades based on the student’s ability to find the right word to complete the sentence. Because normative criteria or grading on the curve tells nothing about what students have learned or are able to do, they provide an inadequate description of student learning (Guskey, 2000). A grading tool that predefines standards-based criteria for completion of a project more accurately assesses student work and is a
valid evaluation of student knowledge and skills. Students appreciate having the scoring criteria prior to completing their projects. In a study done by Andrade and Du (2005) students said that using rubrics helped them focus their efforts, produce work of higher quality, earn a better grade, and feel less anxious about an assignment.

Rubric Reliability

Alternative assessment is concerned with complex multifaceted performance/products. Because alternative assessment allows student choice and negotiation and can find manifestation in a range of heterogeneous devices, it is not difficult for irrelevant variables to be used in making judgments about achievement (Maclellan, 2004). Teachers who write the criteria for alternative assessment grading tools must clearly define what they wish to evaluate and edit the criteria until they can be confident in the validity of their grading points.

The whole point of alternative assessment is not to award a single score or percentile rank, but to judge a multifaceted accomplishment; the issue of human judgment becomes significant. And since human judgment about any particular event can differ, dramatically, both within persons across time and amongst persons, the reliability of alternative assessment is a serious issue (Maclellan, 2004). Using a standards-based rubric as an alternative assessment tool to evaluate a group of projects creates a uniform standard for the grading process from student to student, class to class, school to school. Rubrics describe specific characteristics of a product, project, or performance at varying levels of achievement in order to clarify expectations or feedback and to limit misunderstandings in expectations or assessment (Dornisch, 2006). The ability to replicate the grading experience from one project to the next makes a grading tool
reliable. Once created, a quality-constructed rubric that is standards based can be used to evaluate every project submitted for grading in a specific area.

Rubrics help the teacher to clarify and refine instructional assessment objectives; they help illustrate to students (or other stakeholders) the desired growth in skills and knowledge (Dornisch, 2006). Using a standard grading tool to assess a number of projects, the teacher can systematically assess each project based on the same grading criteria. Using the same grading criteria provides the teacher with a system to grade student work fairly and accurately. Rubrics allow for consistent grading of subjective work. They establish parameters for assignments that will look different student to student and therefore allow for fairness in grading across the board (Hempeck, 2009).

Valid and Reliable

At a minimum, an instructional rubric must be aligned with reasonable and respectable standards and with the curriculum being taught in order to be valid. It must pass a test of reliability by resulting in similar ratings when used by different people (Andrade, 2005). Rubrics are used to clarify learning goals, design instruction that addresses those goals, communicate the goals to students, guide feedback on students’ progress toward the goals, and judge final products in terms of the degree to which the goals were met (Andrade, 2005). If the grading criteria are well defined and focused on evaluating specific objectives for the project, the teacher can be confident that the grade produced through use of the grading tool is a valid assessment of the required skills needed to complete the project or the concepts taught in the lesson. Using that same tool to evaluate multiple projects, while confident that each individual project will receive the same evaluation experience, is using a reliable grading tool.
Rubric Creation Process

A well-constructed rubric identifies the criteria for a successful performance and describes the qualities of strong, adequate, and weak performances (Yoshina, 2007). One rule of thumb is that if the teacher must add comments to the rubric on a regular basis, the rubric needs to be refined to address the issues needing comment by the teacher. Rubric development can be challenging, and the rubric design must be thoughtfully matched to its purpose. Consistency is an important technical requirement that should be considered carefully for all scoring rubrics designed or adapted for classroom use (Tierney, 2004). Variations of rubrics can be used in a variety of ways. Rubrics can be used strictly as tools for scoring projects but they can also be used to instruct students on grading policies and gather educational data. For the purpose of this paper the discussion regarding creating rubrics will include a basic overview of steps in writing rubrics.

The first step in rubric creation would require the creator to have clear objectives and expectations prior to development. To be useful, a rubric must clearly convey standards for evaluating student performance. Rubrics do that by outlining specific criterion on which the student activities and products are to be assessed, and offering benchmark descriptions of what the students’ efforts might look like at different levels of quality (Dornisch, 2006). Using national, state, or school district standards for creating benchmark descriptions will help produce a final product that is more accountable to educational standards.

Once benchmark descriptions are written, they can be arranged into a document that allows the rubric user to efficiently evaluate multiple examples of student work using the same criteria for each grading experience.
The available literature also discusses the benefits to the teacher and student in using a quality-constructed, standards-based rubric, which has been refined and clearly assesses curricular goals. Creating rubrics for specific assessments is time-consuming and labor intensive, but the advantages offered by a well-written rubric make them worth the effort. They lead assessment to be more objective and consistent, and require the instructor to clarify his/her learning outcomes and criteria for evaluation (Cochran, 2006). By presenting students with the grading criteria prior to completing the projects, students have an understanding of how their projects will be assessed. Teachers find that when a student has the grading standards at the time a project is being created the completed project closely resembles the outcomes the teacher expected. Rubrics give students a consistent point of reference as they work through their assignment due to the clearly outlined expectations (Hempeck, 2009). Teachers have fewer suggestions for improvement because they have communicated their expectations to the students prior to the project being completed. When teachers do have something to say, they can circle an item in the rubric that describes areas where the student work needs improvement. For this reason, rubrics make grading projects more standardized and efficient saving teachers time when grading student work. When used correctly, they serve the purposes of learning as well as of evaluation and accountability (Andrade, 2000).

Creating a quality rubric is difficult. A quality rubric is one that accurately assesses the concepts taught in the lesson. Many times a rubric must be evaluated and rewritten to truly evaluate the intended skills. Teacher training in creating quality rubrics can make the process of writing and administering rubrics a common practice in a teacher’s classroom. Using technology to facilitate the process and provide access to
teachers and students can greatly increase teacher use of both rubrics and technology to make grading more standardized and efficient.

**Rubric Critics**

Rubrics can be difficult to write and time-consuming to implement so there are critics of using rubrics to grade student work. Some believe that rubrics are a good asset for a teacher to use occasionally but should be used only as an alternative. Using a variety of grading tools to assess student work might be the best alternative if the teacher can attest to the validity and reliability of all grading tools used. Some critics believe that using a standardized tool to grade student work minimizes a teacher’s ability to reward outstanding work.

An article written by Kohn (2006) takes a negative view on standardization of grading tools:

> Rubrics are, above all, a tool to promote standardization, to turn teachers into grading machines or at least allow them to pretend that what they’re doing is exact and objective. Frankly, I’m amazed by the number of educators whose opposition to standardized tests and standardized curricula mysteriously fails to extend to standardized in-class assessments.

(p. 12)

One of Kohn’s objections is derived from teachers who have adopted rubrics as the only grading tool used in their classrooms. In his writings, Mr. Kohn, discusses a teacher who stopped using rubrics to grade student work because the students came to expect being provided with the grading criteria prior to starting a project. She realized that her students had, presumably, grown accustomed to rubrics in other classrooms, and they now seemed
unable to function unless every required item was spelled out for them in a grid and assigned a point value. She felt that her students did not have the confidence in their thinking and writing skills and were unwilling to take risks. Mr. Kohn had to admit, however, that rubrics can play a valuable role as an addition to a teacher's grading toolbox. As long as the rubric is only one of several sources, as long as it doesn't drive the instruction, it could conceivably play a constructive role (Kohn, 2006).

Creating a standardized grading tool to evaluate student writing or other student project work eliminates subjectivity from the grading system. When student work varies in quality and design it is difficult to set standards for excellence. Mr. Kohn believes that teachers who use a standardized grading tool to evaluate student writing or other student work might find it too difficult to establish criteria that assesses the work appropriately and resort to grading construction of the work rather than content. Agreement of evaluators is more easily achieved for the construction of a project than the content of that written work. Spelling and grammar become the focus of a quality project rather than the meaning and content of the writing. Kohn (2006) states that his objections assume only that teachers rely on rubrics to standardize the way they think about their student's assignments.

Mabry (1999) expressed concern that standardizing the grading process by using a rubric will focus the grading attention on the construction of the written work and not the subjective practices of measuring quality writing. She states:

Although rubrics promote reliability, they may simultaneously undermine validity, the more important determinant of the quality of an assessment.

Writing rubrics can fail to predict the actual features of a student's writing,
thereby creating a mismatch between scoring criteria and actual performance. In cases in which the overall effect of a student performance is achieved by means not anticipated in the scoring criteria, criterial analysis of the quality of writing will deflect a scorer's attention away from the actual writing, and the score will not support valid inferences about the student's achievement. (p. 677)

Rubrics used to evaluate projects following a standardized set of criteria created to evaluate the concepts taught in the lesson can be an asset to many teachers, especially teachers of technology. When teachers use rubrics to teach students what is expected, both students and teachers benefit. Kohn (2006) agrees that rubrics sometimes can be an asset to teachers when he states, despite my misgivings, I can imagine a scenario where teachers benefit from consulting a rubric briefly in the early stages of designing a curriculum unit in order to think about various criteria by which to assess what students end up doing.

A final point of dissent in the discussion of using rubrics for grading is that using a rubric stifles the creativity of student work. Baloche’s (2005) research suggests that when teachers give students a sample product or a detailed rubric, they are likely to complete their own work in a similar way or, if the teacher points out the work of one group, other groups are likely to proceed in quite similar ways. As one sixth grader put it, “The whole time I’m writing, I’m not thinking about what I’m saying or how I’m saying it. I’m worried about what grade the teacher will give me, even if she’s handed out a rubric. I’m more focused on being correct than on being honest in my writing.” Kohn (13)
Computer-Aided Assessment

For the purpose of this paper, Computer-Aided Assessment (CAA) will be defined as the use of the computer to assist the teacher in assessing student work. The computer will be used as a tool to make the assessment materials more accessible for the teacher. Various articles have been published which report results of using technology in the testing process and in classroom management, but it was difficult to find research which outlined teachers using technology in the grading process. Computer-aided assessment has a history dating at least as far back as 1959 (Winters, 2006). For most teachers, using technology in their teaching practices means using a computerized grade book for recording grades and email for communicating with parents. Research and practice suggest that, appropriately implemented, computer- and network-based technology can contribute significantly to improved educational outcomes (Glennan, 1996). A number of studies have indicated that the successful pedagogical use of technology depends on teachers’ attitudes and acceptance towards technology (Yuen, 2008). Through many government programs technology is available to all students. According to surveys carried out several years ago, the availability of technology in schools serving poor, minority, and special-needs populations does not appear to lag substantially behind the averages of schools as a whole (Glennan, 1996). Even though CAA has been accepted as a useful tool in the grading process and the use of the Internet has been made widely available, there is still a hesitation by teachers to fully adopt the use of the computer in a routine grading process.

The successful use of computers in classrooms depends on the teachers’ attitudes toward computers. In order to predict and understand teachers’ technology use and
acceptance a well-defined framework is essential (Yuen, 2008). Gressard (1985) found that the perceived usefulness of computers can influence attitudes towards computers and the amount of confidence a teacher possesses in using computers may influence his or her implementation in the classroom. One reason for this may be a paradigm mismatch: although there has been a lot of time invested in CAA systems, we collectively have much more experience with the “red-pen” style of grading (Winters, 2006). Trying something new, even if it will save time and make the process more efficient, tends to be harder than continuing the way it always has been done. The International Society for Technology in Education [ISTE] survey also suggests that the student teachers’ classroom skills and the actual use of IT during teacher training are critical predictors for IT integration in the future (Wang, 2004). A culture that is perceived by faculty as nurturing technology innovation will encourage faculty use of technology (Lan, 2001). The paradigm shift in teacher education requires an incentive for teachers to incorporate technology use into their daily routine. For faculty to share the vision and goals, they must perceive the vision and goals to be relevant to their discipline and profession (Lan, 2001).

Teachers feel that adding technology use to their normal workload, even if in the long run it will save them time, will take too much time to implement. There are many benefits linked to CAA, some of which are objectivity and consistency of standards; automatic, immediate, and detailed feedback to all students; staff time is saved when marking and allocating marks (Tshibalo, 2005). By combining the use of rubrics to assess student work and technology to deliver the rubric grading system, an efficient process becomes highly efficient.
An application that is accessed via web browser over a network such as the Internet is defined as web-based. A web-based system can be accessed on any computer that has an Internet connection; this makes the application available almost anywhere. Teachers who use a paper grading system for student work run the risk of leaving their materials at school during grading time making the materials unavailable to them when needed. If that teacher is using a web-based system, the materials can be accessed when the teacher needs them and where the teacher needs them.

Traditional grading of assignments often lacks speed and consistency. An instructor for a large class often spends most of his time and effort in retrieving student assignments and manually grading them on paper (Jenq, 2006). Anglin (2008) found that professors can be more efficient (i.e. faster) in their subjective grading of students’ responses to assignments by using a computer-assisted grading rubric. He also states that while it is believed that using rubrics can enhance the efficiency and effectiveness of the evaluation and grading process, it is also thought that using an electronic-based rubric will produce even more observable benefits during the grading process. Using the computer enables the teacher to grade student work and then make the files available to the student electronically so paper is not used to report grades to the students. Making the graded student work available electronically adds an instant-access feature to the grade reporting. In this age of Instant Messaging and ubiquitous cell phones, students have come to expect, and in many cases demand, instant feedback (Anglin, 2008). It would be possible for a teacher to post grades for projects immediately when grades are completed. The student would not have to wait until the next time class was held to find out what grade they received on a project and, in effect, could receive instant access to grades
posted online. Anglin (2008) found that the scores and comments for the assignment were available to the student immediately upon completion of the grading, which was three days before the paper-based treatment groups had access to this information.

Most commonly used grading systems available electronically are limited in scope and function. Many of these grading tools have focused on completely automatic grading of functional requirements, leaving no room for subjectivity, and generally eschewing human feedback in favor of total automation (Winters, 2006). For the purpose of this research, online grading discussions focus on a system which allows the teacher to add comments and give additional feedback to the student.

Developing a grading system that combines the efficiency of online grading tools with the authenticity of grading rubrics in an online rubric grading system provides the teacher with a powerful grading tool. In research regarding student use of online resources, Sanders (2007) found that using online formative assessment with automated feedback enhances student learning as measured by end of semester exam performance. Combining rubrics and online accessibility, teachers can give students in depth feedback on student work that is available to students, parents, and administrators any time they have access to a computer with Internet access.

Discussion and Conclusion

Well-written, standards-based rubrics can be used to grade student work and produce reliable and valid evidence of student achievement. This evidence can be used to provide in-depth information to students, parents, and administrators of each student’s abilities. When criteria has been established and communicated to the student prior to completion of a project the student is able to produce work that meets or exceeds the
teacher expectations. Rubrics, which focus on accurately assessing criteria taught in the lesson, are time-consuming and difficult to write but provide a tool for teachers to reliably evaluate multiple student projects based on quality-related criteria.

Rubrics must be regularly evaluated to refine the criteria to reflect the concepts being taught in the lessons. There is no "one size fits all" quality rubric because every lesson is different and project requirements differ. If a teacher is attentive to project requirements and accurately assessing work completed, rubrics can enhance the grading process for them and their students.

Making rubrics available online for teachers to use any time and anywhere creates a situation making grading less cumbersome and more efficient for teachers. Allowing students to access their grades online provides timely feedback for students. The stumbling block seems to be prompting teachers to use the technology and access online options. Teacher training in creating quality rubrics and using technology to communicate feedback online can greatly increase teacher use of both rubrics and technology to make grading more standardized and efficient.
CHAPTER 3

Methodology

Six teachers and instructors participated in this study. The participants included four high school teachers who taught college classes at their schools and two college instructors who taught the same courses at the community college level. All participants held full-time teaching positions at their respective schools. Teaching experience among this group of teachers and instructors ranged from 5 years to 24 years. Five of these participants were female and one was male. All of the participants earned teaching degrees in the area of business and computer education and had previously participated in curriculum training for the courses they were teaching.

Each of the participants in this study had access to computers with Internet connections to use for the research. Each participant was currently teaching or would be teaching a course in which projects were used as the primary means to assess student knowledge.

Materials

The following materials were used to carry out the action research process:

1. Pre-Study Survey: Work began with a pre-study questionnaire to participants to identify baseline starting points among the study group (See Appendix B.1). Results from this survey were used to tailor the pre-study training given to participants.

2. Study Survey 1: Research participants were first asked to complete a survey to identify their confidence in the grading process they currently use to grade projects (See Appendix B.1).
3. Checklist: Participants were asked to complete a checklist rating system tool while using an online rubric grading program to evaluate a common student project (See Appendix B.4). The checklist questioned the participants about the process of using the rubric and not the actual content of the rubric.

4. Post Use Survey: The final tool used in this research study was a post-use survey for teachers and instructors to evaluate the use of an online rubric compared with their previous project-grading process (See Appendix B.5).

Procedures

The action research design model was used in this study. Action research is defined as the process of studying a real-school or classroom situation to understand and improve the quality of actions or instruction (Johnson, 2005). This type of research provides teachers with a method for observing their daily teaching or to explore a problem and a possible course of action within their normal classroom setting.

A local program exists which allows area high schools to offer community college courses taught at the local high school. Each summer participating local high school teachers are asked to attend curriculum training sessions taught through the community college. These sessions educate the teachers on curriculum being used at the community college and coordinate the instruction among the high school and community college courses. During a training session when the majority of the teachers and instructors were present, the primary researcher presented information on using a web-based rubric to grade projects in project-based courses. After this presentation, information was given on the research study. At the time of this study the primary researcher was not involved in
the group that coordinates courses between high school and community college in the area so there was no pressure on the research participants to join the study; their participation was purely voluntary. An initial pool of participants was identified at this meeting and was sent the pre-study survey (See Appendix B.1) and a letter asking for their participation in the project (See Appendix A.1). The letters were sent through the mail at teacher and instructor schools so no person was singled out or identified individually. No school administrators were contacted about the study or their employees’ participation in the study.

After agreeing to participate in the project, the teachers were sent paper copies of the participation agreement forms and asked to return them through regular mail (See Appendix A.3). Contact was made one time during the signing period through electronic mail to encourage the teachers to complete their forms and return them to the primary researcher.

Participation in the study was confidential and information gathered through the study was only viewed by the primary researcher in the study. Participants were assigned a number for identification and responses were labeled through that numbering system. Individual responses were never viewed by anyone other than the primary researcher. Aggregate and summarized data was used for the purpose of writing this paper. No data was used from teachers or instructors who did not agree to participate in the study.

One additional short instruction session was held to instruct participants on procedures for accessing the online rubric website. Information on accessing the online rubric was provided to participants earlier so this session was voluntary and only two participants attended this session.
Participants were asked to complete the remaining surveys and checklist in one week from the date of the instruction session. Each of the participants complied with the request and submitted their completed materials within the time limit. There were no restrictions placed on participants regarding where or when they completed the study work. The only constraint was access to a computer that had access to the Internet.

Analysis

Descriptive statistics were used to analyze the data. Measures of central tendency (mean and median) were used to provide information about the data. Descriptive statistics can be used to gain insight into the data and to communicate findings more clearly (Mills, 2003). A Study Checklist and three surveys were used to gather data: (a) Pre-Study; (b) Study Survey 1; and (c) Post-Study Survey. These instruments were used to identify participant responses to the use of the online rubric.
CHAPTER 4

Findings

Research Questions

1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria would be more efficient in assessing their student projects and save them time in grading?

2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over?

Study Findings

Pre-Study Findings

Data gathered from the Pre-Study Survey was used to organize training needed to prepare study participants to begin the study. Answers to the participant survey questions were used to tailor the preliminary training to make participant preparation for the study irrelevant as a variable in the study results.

The answers to the pre-study survey were used to set baseline levels for teacher current practices. The findings from this pre-study survey were significant because they identified starting points for the participants. If all the participants were currently using rubrics for grading projects the studying might not be as effective. The more participants who identified their current practices as time consuming and non-standard, the more likely the teachers would have positive outcomes. This technique was useful because it identified the participant perspectives of their current project grading practices.
Participants were asked to complete a pre-study survey before using the web-based rubric for grading one grading event (see Study Table 1: Pre-Study Survey). This survey gathered data on each participant’s current practices for grading projects and their interest in using the web-based rubric for grading.

Participants were asked to complete a checklist rating tool (see Study Table 3: Checklist) while using the grading tool to evaluate the ease of using the tool, the standardization of grading from project to project, and the efficiency of the grading process. The projects represented a typical student assignment the teacher would grade in the course.

The data from the Pre-Study table indicates that all participants identified themselves at the expert level in using computers so no instruction was provided on using the computer prior to starting the research (see Pre-Study Survey Table). All participants agreed that grading projects was difficult because grading is so subjective. One of the participants reported spending more than ten minutes grading each project while five out of six participants spent between five and ten minutes grading each project. These questions were used to identify an interest in making the grading process more efficient (see Study Table 1: Pre-Study Survey).

Only one of the study participants had used a rubric to grade project work prior to the study so pre-study instruction included a definition of rubrics and how to use them. The rubrics used in this study were created by the primary researcher so no instruction was given in writing rubrics, just what they are and how to use them. One hundred
percent of the participants were at least somewhat interested in using technology to assist them in grading projects.

Study Table 1: Pre-Study Survey Table

| Do you agree with the statement, “Grading in a project-based course is difficult because of the subjectivity of grading projects?” |
|---|---|---|
| Yes | No | Unsure |
| 6  | 0  | 0 |

| When you grade projects, approximately how many minutes do you spend per project on grading? |
|---|---|---|
| More than 10 | 5-10 | 1-4 |
| 1  | 5  | 0 |

| Have you ever used a rubric for grading? If yes, what did you grade? |
|---|---|---|
| Yes | No | Unsure |
| l(final project) | 5 | 0 |

| How would you rate your computer expertise? |
|---|---|---|
| Expert Knowledge | Working Knowledge | Novice |
| 6  | 0  | 0 |

| How interested are you in using technology to assist you in grading projects? |
|---|---|---|
| Very Interested | Somewhat Interested | Not Interested |
| 4  | 2  | 0 |

Study Survey 1

The data collected in the first survey consisted of current teacher practices for grading projects and teacher willingness to use technology for grading projects. The data collected in the Study Survey 1 sets some starting points for the researcher to identify changes in participant responses (see Study Table 2: Study Survey 1).

All participants in the study (100%) spent at least five-ten minutes grading each student project. Two-thirds of the participants identified that their grading method needed some changes but overall the participants were confident that their grading method assessed the concepts they taught in their courses.
### Study Table 2: Study Survey 1

**When you grade projects, approximately how many minutes do you spent per project on grading?**

<table>
<thead>
<tr>
<th>More than 10</th>
<th>5-10</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**How confident are you that your grading method assessed the concepts you taught in the lesson?**

<table>
<thead>
<tr>
<th>Very Confident</th>
<th>Confident, but some minor changes need to be made</th>
<th>Not Confident, major changes need to be made to accurately address the concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

**How confident are you that the same grading standards were applied to each project that you graded?**

<table>
<thead>
<tr>
<th>Very Confident, I feel very comfortable defending the grading criteria I used on all the project</th>
<th>Confident, although there may be some variations in the grading criteria</th>
<th>Not Confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

**Have you ever used a rubric for grading? If yes, what did you grade?**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (final project)</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**How would you rate your computer expertise?**

<table>
<thead>
<tr>
<th>Expert Knowledge</th>
<th>Working Knowledge</th>
<th>Novice</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**How interested are you in using technology to assist you in grading?**

<table>
<thead>
<tr>
<th>Very Interested</th>
<th>Somewhat Interested</th>
<th>Not Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Most of the participants (83%) identified the possibility that some variations in standards were present in grading multiple projects. This reflects that only one of the participants felt very confident that the same grading standards were applied to all projects graded for a specific assignment when they used their current method of grading. Only one of the teachers had used a rubric for grading projects prior to the study. Every participant (100%) identified themselves as expert computer users and all (100%) were at least somewhat interested in using technology for grading future projects.
Checklist

During the grading event the teachers completed a checklist evaluation form. The checklist data identified ease of use, efficiency, and validity of the rubric grading tool when using it to assess a project. This data was used to make a connection between the participants’ grading practices prior to trying the web-based rubric, their willingness to try the new technology, and their perception of how easy it was to use the web-based rubric for grading (see Study Table 3: Checklist).

The checklist that was used to rate the usefulness of the online rubric was an appropriate choice to gather data during the research project. Using a checklist to assess the three areas of ease of use, efficiency, and validity of the rubric made the evaluation quick and easy. Data was gathered using a Likert scale identifying four as strongly agreeing with the research statement and one strongly disagreeing with the statement. The response numbers were averaged to identify a group assessment of the ease of use, efficiency, and validity of the rubric.

Average score for the Rubric Ease of Use category was 3.63 out of a possible 4.0 that was equivalent to every member at least agreeing that the rubric was easy to use. All these participants found the web-based rubric easy to locate, access, and use. Providing a tool that is easy to access is important to the long-term use of this instrument. In the Ease of Use category, no participants scored the instrument lower than a three which meant they agreed with the statement in any of the question items.

Rubric efficiency was the next category scored while using the web-based rubric. The researcher believed that if the participants found the web-based rubric more efficient and time saving than the system they were using; they would see an advantage to using
the web-based rubric and adopt it after the study was complete. The score for Rubric Efficiency was high with an average of 3.92 out of a possible 4.0 showing a definitive belief that the online rubric was efficient to use.

The final category, Rubric Validity, was also high with an average score of 3.94 out of a possible 4.0. The score for validity reflects the ability for teachers to defend the scores the students earned for projects. Grading projects is difficult and very subjective so providing a means to explain a specific grade helps the teacher be accountable for student scores. All the participants identified that having specific grading criteria in the form of a rubric made grading projects more standardized from one project to another. The participants also identified a feeling that they could justify the grades they assigned if they used a set of standardized grading criteria to evaluate projects. All but one of the participants strongly agreed that the rubric assessed the concepts presented in the lesson. One participant who chose agree rather than strongly agree identified an issue with rubrics using criterion that is too general to accurately assess the concepts taught. Generally, rubrics become more accurate the more they are used.
<table>
<thead>
<tr>
<th>Study Table 3: Checklist</th>
<th>RUBRIC EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>RUBRIC EASE OF USE</strong></td>
</tr>
<tr>
<td></td>
<td>Key: 4 = strongly agree; 3 = agree; 2 = disagree; 1 = strongly disagree.</td>
</tr>
<tr>
<td></td>
<td>Write the number of the rating that best identifies your experience using the web-based rubric.</td>
</tr>
</tbody>
</table>
|                          | The web-based rubric was easy to locate and access. | 4=3  
|                          |                         | 3=3  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Directions for using the rubric were easy to follow. | 4=4  
|                          |                         | 3=2  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Scoring procedures were easy to understand and follow. | 4=6  
|                          |                         | 3=0  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | It was possible to save work in progress and easy to access incomplete files. | 4=3  
|                          |                         | 3=3  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Once complete, project grades were easy to access. | 4=3  
|                          |                         | 3=3  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Having standard criteria for grading projects made the scoring of projects faster. | 4=6  
|                          |                         | 3=0  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Having standard criteria for grading projects made the scoring of projects easier. | 4=6  
|                          |                         | 3=0  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Using an online rubric made the process more organized and efficient. | 4=6  
|                          |                         | 3=0  
|                          |                         | 2=0  
|                          |                         | 1=0  |
|                          | Making the process paperless is an advantage | 4=4  
|                          |                         | 3=2  
|                          |                         | 2=0  
|                          |                         | 1=0  |
RUBRIC VALIDITY

Key: 4 = strongly agree; 3 = agree; 2 = disagree; 1 = strongly disagree.

Write the number of the rating that best identifies your experience using the web-based rubric.

Using a rubric made the grading process more accurate and standard from project to project.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Justifying project grades is easier when a rubric is used for scoring.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The rubric accurately assessed the concepts presented for this lesson.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Post Study Survey Results

The Post Survey was similar to the first survey but gathered data on the participant opinions of using the online rubric as opposed to their current grading practices. The survey was appropriate because it allowed the participants to identify their opinions of the scoring tool they tried. Data gathered had a numeric value that could be averaged to identify results but participants were also given the opportunity to record anecdotal information about the use of the scoring tool.

The average number of minutes the participants used to grade each project was 7.92 average minutes per project without the rubric and 2.75 average minutes per project while using the rubric for grading projects. None of the participants had difficulties using the web-based rubric for this study. All of the participants believed that the rubric saved them time in grading projects. All participants were interested in using the web-based
rubric for grading future projects while two-thirds ranked themselves as very interested (see Study Table 4: Post Use Survey).

The Post Survey allowed participants to give general comments about using the web-based rubric. The majority of the comments dealt with standardization and ease of use while grading projects. Participants felt that using the web-based rubric made their grading easier because they had access to their grading tool from anywhere without having to carry a large number of papers with them. They appreciated giving students more in-depth feedback on the grade they were awarded. The rubric added consistency to the grading system and the Internet access made using the tool convenient.
Study Table 4: Post Use Survey

When you graded projects using the web-based rubric, approximately how many minutes did you spend per project on grading?

<table>
<thead>
<tr>
<th></th>
<th>More than 10</th>
<th>5-10</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

As you were grading the projects, how would you rate using the web-based rubric?

<table>
<thead>
<tr>
<th></th>
<th>Very easy to use; No difficulties</th>
<th>Easy to use; Had some difficulties</th>
<th>Difficult to use; Had many difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

How confident are you that the rubric assessed the concepts you taught in the lesson?

<table>
<thead>
<tr>
<th></th>
<th>Very Confident</th>
<th>Confident, but some minor changes need to be made</th>
<th>Not Confident, major changes need to be made to accurately address the concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

How would you characterize the time you spent grading using the web-based rubric?

<table>
<thead>
<tr>
<th></th>
<th>Using the web-based rubric saved a great deal of time grading projects in my class.</th>
<th>Using the web-based rubric saved some time</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

How interested are you in using this web-based rubric for projects in the future?

<table>
<thead>
<tr>
<th></th>
<th>Very Interested</th>
<th>Somewhat Interested</th>
<th>Not Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

What advantages do you see in using the web based rubric for grading projects?

<table>
<thead>
<tr>
<th>General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using a rubric made grading projects from project to project.</td>
</tr>
<tr>
<td>2. Consistency in grading from student to student.</td>
</tr>
<tr>
<td>3. Standardizing grading for all sections.</td>
</tr>
<tr>
<td>4. Feedback for the students on what their grade means.</td>
</tr>
<tr>
<td>5. Accessible from anywhere you have Internet access.</td>
</tr>
<tr>
<td>6. Paperless so I don’t have to carry printouts of student work. It saved me time in grading.</td>
</tr>
</tbody>
</table>

What disadvantages do you see in using the web-based rubric for grading projects?

<table>
<thead>
<tr>
<th>General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Logging into the site takes time to do and teach the students.</td>
</tr>
<tr>
<td>2. Print outs of work I can take anywhere but with the online I need Internet access.</td>
</tr>
<tr>
<td>3. Taking time to learn how to use the website.</td>
</tr>
</tbody>
</table>

What changes would you suggest to improve the rubric?

<table>
<thead>
<tr>
<th>General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Include a point range for grades.</td>
</tr>
</tbody>
</table>
Negative comments about using the web-based rubric included one participant who felt that accessing the rubric through a computer connection made it less accessible because they would have to find an online connection while having print outs of the student work could be taken anywhere. Other negative comments involved learning and teaching the use of the website for accessing the rubric and student grades. One participant felt the rubric could be improved by including a point range for scoring the rubric.
CHAPTER 5

Discussion

Grading in a project-based curriculum is subjective and time consuming. Participants in this study taught on and off the community college campus causing little opportunity for grading discussions. Grading between the students enrolled in these courses varied radically. Action research methodology was used to explore whether grading could be more standardized and efficient if done using a web-based rubric. A checklist and three surveys were used to gather data. Descriptive statistics were used for data analysis. The research questions addressed included:

1. Would the teachers feel that using a standards-based rubric with predetermined grading criteria would be more efficient in assessing their student projects and save them time in grading?

2. Would the use of technology in the grading process be of enough value to the teachers that they would be interested in using a web-based rubric after the study was over?

A review of the literature examined the link between using rubrics for grading projects to make the grading more standardized and using technology to make the grading more efficient. There was a great deal of literature that supported the standardization of project grading using rubrics, but computer-aided grading literature discussed testing of students rather than teacher evaluation of student work.

As rubrics grow in popularity of use, the understanding of their impact on education also grows. With the implementation of the No Child Left Behind legislation,
accountability has been a major focus of educational leaders in reforming the educational system. Rubrics can play a major part in standardizing grades and documenting student progress. Teachers save time because the process becomes more efficient and grades become more standardized because the criteria for grading the project have been previously determined. More time is saved when teachers use the computer as a tool to collect data and present it to the students. Students are given immediate feedback on their work that can be accessed at any time. The student does not need to meet with the teacher to receive feedback; he or she can simply access the material online.

Using instructional rubrics can improve the quality of student work because students are presented with assessment criteria prior to starting the project and can focus their efforts on producing work based on the highest standards of quality. Using web-based rubrics allows the teacher to quickly and efficiently grade student work and provides assessment materials to students at any time. Time is saved and grading is more standardized.

All the participants in the research study reported that time was saved by using a rubric for grading. Grading was standardized because the teachers had predetermined criteria for grading the projects their students completed. The students were introduced to the criteria and used those statements to complete their projects. Quality of work was improved because the students knew what the teacher expected in final outcomes.

The efficiency and accessibility provided by using technology to house the rubrics was clearly noted in the data collected. Participants had the opportunity to use the rubric from any computer with Internet access. Participants were given the option of scoring
student work directly on their computer or printing out hard copies of the rubrics and inputting the scoring data later.

After the data was analyzed, conclusions were drawn about whether the web-based rubric was the right tool to use for standardizing grading practices and improving grading efficiency and validity among the teachers and instructors in the research group. The findings showed that this tool was helpful in standardizing grading practices and making the grading more efficient, but the data did not show whether teachers were willing to use the tool on a regular basis. Using this tool would save time but signal a change for some of the participants and change is difficult for some people.

After completing this research project the findings were reported to the college dean. It was determined that using this web-based rubric for grading projects is the appropriate direction in standardizing grading procedures, but more work needs to be done. Questions include how to get all the teachers to participate and once they have agreed to participate, how to make it so easy to use that all will use it regularly. The researcher is currently working on two rubrics to make available to the teachers and instructors in the research group. One rubric would evaluate a project at the mid-term point of the semester and one rubric would evaluate a project in the final days of the course. If all the teachers would agree to use the rubric for these two projects, the grading process would have some standardization among all participants.

While collecting the data, the research questions stayed the same. There were other questions that came up during the data collection that would offer the opportunity for more research in this area. While the teachers would all be classified as technology teachers, the desire to use technology to enhance their classroom procedure varied widely
among the members of the group. It would be interesting to identify the tipping point of
time saved due to efficiency and ease of use which would make even the most reluctant
teacher set aside the time to adopt the use of technology in the grading process.
Anecdotally, the participants appeared eager to try the online rubric and felt that they
would be interested in using the online rubric again for future assessment.

Recommendations

1. Revisions should be made in the wording and some of the criteria of the current
rubrics. The quality of a rubric improves when more people use it and when it is
evaluated and revised regularly. All the participants in the project would be asked
to suggest revisions and additions to the rubrics.

2. The original project included three standard rubrics identified as Evaluation #1,
Evaluation #2, and Final Evaluation. The participants could choose which criteria
to include in the grading at each point in the grading process. The rubrics also
included a “not applicable” choice if a specific concept had not been covered.
These rubrics were identical in format and a criterion; the only difference was the
name. A recommendation for future groups using a rubrics for a grading study
would be to create rubrics tailored to specific points in the curriculum in order to
evaluate student work throughout the course.

3. The online rubric use will be expanded to all the high school teachers involved in
the high school-college cooperative program at the local community college.
The pilot group, which participated in the research study, was very interested in
continuing to use the rubrics. Because the outcome of the project and acceptance
by the participants was positive, a conclusion was made that the use of the rubrics in this program was valuable enough to continue.
REFERENCES


APPENDIX A

A.1 Recruiting Letter
February 2007

Dear Career Edge Academy Teachers,

Having students create projects is a creative way to reinforce course concepts but the difficulty in grading the projects tends to make the grades subjective and the process time consuming. Project-based courses are among the most difficult to assess accurately. Teachers strive to find a grading tool that will give them flexibility in grading projects and accuracy in assessing student work. Using a standards-based rubric created for a specific course is one assessment alternative that research has shown can accommodate both the accuracy and efficiency teachers’ desire.

In an effort to make project grading more standardized and efficient I am creating rubrics for use in Desktop Publishing and Web Design classes. Kirkwood Community College works with a web-based rubric program called eLumen (http://elumen.kirkwood.edu/elumen/) in lab classes to standardize grading in medical program clinical situations. I am interested in using this software to create standards-based rubrics for grading projects in our area.

Rubrics get better the more they are used and refined and this is where I need your help. I am asking for volunteers to evaluate the rubrics. If you agree to participate you will be asked to complete three surveys: before, during, and after use. You will be given a user name and password to access all rubrics on the Kirkwood Community College-eLumen website. You can use the rubrics specifically created for Desktop Publishing and Web Design classes, you can use other rubrics found on the site, or you can create rubrics of your own. I ask that you use the rubrics I have created for one grading event some time between March 5-12, 2007. You will be assigned a participant number so your participation will be kept confidential and any data gathered from the research will be identified only by your confidential number.

The information gathered through this process will be used to refine the rubrics and make them more accurate and user-friendly. My research question asks whether using rubrics makes grading more accurate and efficient so I will also use your responses to answer my research question. A summary of my findings will be submitted as part of an action research project to my complete my master’s degree.

If you are willing to participate, please return the enclosed HUMAN PARTICIPANTS REVIEW INFORMED CONSENT form in the stamped, addressed envelope included with this mailing by March 5, 2007.

Sincerely,
Sandra O’Brien
Research Proposal Form

Note: Please complete this form and attach brief responses to the issues raised, keeping in mind that the primary concern is the potential risk—physical, emotional, or other—to the participants, as well as the protection of their rights. Provide copies of all questionnaires, consent forms, or other documents to be used in the inquiry. The Institutional Review Board (IRB) must have enough information about the transactions with the participants to evaluate the risks of participation. Assurance from you, no matter how strong, will not substitute for a description of the transactions.

Submit the proposal and supporting documents to the Institutional Review Board, c/o Office of Institutional Research, Room 123 Linn Hall.

Principal Researcher: Sandra O'Brien
Title: Using Online Rubrics to Make Project Grading More Standardized and Efficient.
Institutional/Department Affiliation:
  Kirkwood Community College/Business and Information Technology
  University of Northern Iowa/Educational Technology Master's Program
Address: Kirkwood Community College, 203 Nielsen Hall, Cedar Rapids, IA 52406
Phone: (319) 398-5416   Fax:                     Email: sandy.obrien@kirkwood.edu

Other researchers in project (provide same information as for principal researcher)
NA

Purpose of Project (check all that apply):
X  To fulfill requirements related to course or degree program at a college/university.
   □  Course project (Course name/Institution__________________________)
   □  Thesis/Dissertation (Attach summary of proposal made to institution)
X  Master's Degree Action Research Project
□  CASTLE Project
□  As a part of an externally funded project (Funding agency__________________________)
□  For my own scholarly interest
□  Other (Please describe)

Research Title: Using Online Rubrics to Make Project Grading More Standardized and Efficient

Data Collection Start/End Dates: February 27, 2007 through March 5, 2007
Project Description:

Using these guidelines, address the following in a narrative.

• Briefly describe the purpose of your study and, in non-technical terms, what will the participants be asked to do, what are the processes and procedures for data collection. Append relevant instruments (protocols, questionnaires, surveys, etc.).

• Describe the value-added knowledge of your project – i.e., describe how your project contributes to the teaching/learning environment at Kirkwood or to the college’s policies, procedures, or operations.

Which of the following activities describe your research (check any that apply):

- X Research conducted in established or commonly accepted educational setting, involving normal or special educational practices. (46.101b 1)
- □ Research involving educational tests, surveys, interviews, or observation of public behavior and either confidentiality will be maintained and/or any disclosure of the responses would not place the participants at risk. (46.101b 2)
- □ Research involving elected or appointed officials or candidates for office, even when confidentiality cannot be maintained or disclosure places the participant(s) at risk. (46.101b 3)
- □ Research involving the study of existing data either publicly available or recorded by the researcher(s) in a manner that maintains confidentiality. (46.101b 4)
- □ Institutional or organizational research designed to improve service or benefits when approved by the department’s head. (46.101b 5)
- □ Research involving taste and food quality evaluation of either wholesome foods without additives or food with ingredients at or below levels found to be safe by the Food and Drug Administration. (46.101b 6)

If at least one box was checked above, your research is considered to be “exempt” and you may sign this form and return to the Office of Institutional Research. If you did NOT check any of the above boxes, please address the following in narrative:

• Describe any potential risks or benefits (emotional, physical, social, or political) to your participants.
• Give the anticipated ages, sex, and number of participants, and explain how and where they will be recruited.

• Describe the procedures for obtaining informed consent as provided for the Code of Federal Regulations, section 46.116. Append any forms used.

• If minors are involved, describe the procedures for obtaining consent to participate from the minors capable of giving consent, as well as the procedures to obtain parental or guardian consent.

• If risk is involved, explain how the knowledge to be gained and/or the benefits to the research participants from the proposed research justify any risks the participants might incur.

• Explain what, if any, support services will be provided in the event of harm to a participant.

Signatures

Certification
I certify that I have read and understand the policies and procedures for research projects that involve human participants and that I intend to comply with the Kirkwood Community College procedures for research involving human participants. Significant changes in the research protocol for an approved study must be submitted to the IRB and approved prior to those changes being put into practice.

Researcher(s):

Signature: [Signature] Date 01/24/07

Signature: __________________________ Date __________________________

Signature: __________________________ Date __________________________

Certification
I certify that the above researchers have submitted the appropriate documentation to the Institutional Review Board and have been approved to conduct research according to the research protocol indicated by the researchers and in compliance with the Kirkwood Community College procedures for research involving human participants.

IRB Designee:

Signature: [Signature] Date 1-30-07
### APPENDIX B

#### B.1 Pre-Study Survey

Please answer these questions prior to starting any work on the study.

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you agree with the statement, “Grading in a project-based course is difficult because of the subjectivity of grading projects?”</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>When you grade projects, approximately how many minutes do you spend per project on grading?</td>
<td>More than 10</td>
</tr>
<tr>
<td>3</td>
<td>Have you ever used a rubric for grading? If yes, what did you grade?</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>How would you rate your computer expertise?</td>
<td>Expert Knowledge</td>
</tr>
<tr>
<td>5</td>
<td>How interested are you in using technology to assist you in grading projects?</td>
<td>Very Interested</td>
</tr>
</tbody>
</table>
B.2 Survey Instructions

Please look over the following surveys and checklist. You will be receiving an email explaining the login information and directions for using the eLumen website in order to complete the checklist and survey two. Please sign the consent form and send it back to me in one of the enclosed envelopes through Grant Wood AEA mail. You will be asked to complete survey one before you try out eLumen and the checklist and survey two during and after trying eLumen. When you have completed all the forms please send them back in the second envelope. Thank you for helping in this process.

Sandra O'Brien
Assistant Professor
Kirkwood Community College
**B.3 Study Survey 1**

Please answer the following questions prior to trying the web-based rubric for one grading event.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>More than 10</th>
<th>5-10</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When you grade projects, approximately how many minutes do you spent per project on grading?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. How confident are you that your grading method assessed the concepts you taught in the lesson?</td>
<td>Very Confident</td>
<td>Confident, but some minor changes need to be made</td>
<td>Not Confident, major changes need to be made</td>
<td></td>
</tr>
<tr>
<td>3. How confident are you that the same grading standards were applied to each project that you graded?</td>
<td>Very Confident, I feel very comfortable defending the grading criteria I used on all the project</td>
<td>Confident, although there may be some variations in the grading criteria</td>
<td>Not Confident</td>
<td></td>
</tr>
<tr>
<td>3. Have you ever used a rubric for grading? If yes, what did you grade?</td>
<td>Yes</td>
<td>No</td>
<td>Unsure</td>
<td></td>
</tr>
<tr>
<td>4. How would you rate your computer expertise?</td>
<td>Expert Knowledge</td>
<td>Working Knowledge</td>
<td>Novice</td>
<td></td>
</tr>
<tr>
<td>5. How interested are you in using technology to assist you in grading?</td>
<td>Very Interested</td>
<td>Somewhat Interested</td>
<td>Not Interested</td>
<td></td>
</tr>
</tbody>
</table>
Please complete this checklist during one grading event using the web-based rubric.

### Rubric Ease of Use

<table>
<thead>
<tr>
<th>Rubric Ease of Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key:</strong> 4 = strongly agree; 3 = agree; 2 = disagree; 1 = strongly disagree.</td>
<td></td>
</tr>
<tr>
<td><strong>Write the number of the rating that best identifies your experience using the web-based rubric.</strong></td>
<td></td>
</tr>
<tr>
<td>The web-based rubric was easy to locate and access.</td>
<td></td>
</tr>
<tr>
<td>Directions for using the rubric were easy to follow.</td>
<td></td>
</tr>
<tr>
<td>Scoring procedures were easy to understand and follow.</td>
<td></td>
</tr>
<tr>
<td>It was possible to save work in progress and easy to access incomplete files.</td>
<td></td>
</tr>
<tr>
<td>Once complete, project grades were easy to access.</td>
<td></td>
</tr>
</tbody>
</table>

### Rubric Efficiency

<table>
<thead>
<tr>
<th>Rubric Efficiency</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key:</strong> 4 = strongly agree; 3 = agree; 2 = disagree; 1 = strongly disagree.</td>
<td></td>
</tr>
<tr>
<td><strong>Write the number of the rating that best identifies your experience using the web-based rubric.</strong></td>
<td></td>
</tr>
<tr>
<td>Having standard criteria for grading projects made the scoring of projects faster.</td>
<td></td>
</tr>
<tr>
<td>Having standard criteria for grading projects made the scoring of projects easier.</td>
<td></td>
</tr>
<tr>
<td>Using an online rubric made the process more organized and efficient.</td>
<td></td>
</tr>
<tr>
<td>Making the process paperless is an advantage</td>
<td></td>
</tr>
</tbody>
</table>

### Validity

<table>
<thead>
<tr>
<th>Validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key:</strong> 4 = strongly agree; 3 = agree; 2 = disagree; 1 = strongly disagree.</td>
<td></td>
</tr>
<tr>
<td><strong>Write the number of the rating that best identifies your experience using the web-based rubric.</strong></td>
<td></td>
</tr>
<tr>
<td>Using a rubric made the grading process more accurate and standard from project to project.</td>
<td></td>
</tr>
<tr>
<td>Justifying project grades is easier when a rubric is used for scoring.</td>
<td></td>
</tr>
<tr>
<td>The rubric accurately assessed the concepts presented for this lesson.</td>
<td></td>
</tr>
</tbody>
</table>
### B.5 Post-Use Survey

Please answer the following questions after trying the web-based rubric for one grading event.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>More than 10</th>
<th>5-10</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>When you graded projects using the web-based rubric, approximately how many minutes did you spend per project on grading?</td>
<td>Very easy to use; No difficulties</td>
<td>Easy to use; Had some difficulties</td>
<td>Difficult to use; Had many difficulties</td>
</tr>
<tr>
<td>2.</td>
<td>As you were grading the projects, how would you rate using the web-based rubric?</td>
<td>Confident, but some minor changes need to be made</td>
<td>Confident, but some minor changes need to be made</td>
<td>Confident, but some minor changes need to be made</td>
</tr>
<tr>
<td>3.</td>
<td>How confident are you that the rubric assessed the concepts you taught in the lesson?</td>
<td>Confident, but some minor changes need to be made</td>
<td>Confident, but some minor changes need to be made</td>
<td>Confident, but some minor changes need to be made</td>
</tr>
<tr>
<td>4.</td>
<td>How would you characterize the time you spent grading using the web-based rubric?</td>
<td>Using the web-based rubric saved time grading projects in my class.</td>
<td>Using the web-based rubric saved some time but</td>
<td>Using the web-based rubric saved some time but</td>
</tr>
<tr>
<td>5.</td>
<td>How interested are you in using this web-based rubric for projects in the future?</td>
<td>Very Interested</td>
<td>Somewhat Interested</td>
<td>Not Interested</td>
</tr>
<tr>
<td>6.</td>
<td>What advantages do you see in using the web-based rubric for grading projects?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>What disadvantages do you see in using the web-based rubric for grading projects?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>What changes would you suggest to improve the rubric?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>