

# Colorado Technical University



**Technical Report  
Computer Science**

**Let's Play: Using Game Design in Our Online Course Rubrics**

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## **Let's Play: Using Game Design in Our Online Course Rubrics**

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### **Abstract**

Getting online and hybrid students to communicate and complete collaborative work can be challenging. This paper describes a case study of two computer science graduate courses, one that was delivered online and the other that was held in a hybrid format. Each class used game-base rubrics to measure two authentic assessment instruments, including a collaborative exam and a team project.

This paper continues the story that began in the first paper entitled, " Assessment by Playing: Using Game Design in Our Online Course Rubrics." The three papers discuss the design, delivery and assessment of an online and a hybrid course.

### **Keywords**

rubrics, games, interactivities, authentic assessment, activity-based learning, the Professional Learning Model (PLM), team projects, collaborative exams, measurable goals and student assessment

### **Activity-Based Learning**

Wouldn't it be great if students were excited to participate in online classes? You may already enjoy this phenomenon, but let's take it another step. Let's make our online and hybrid courses engaging so students will want to login and participate in team projects and activities.

Adding excitement to a course can be handled many ways. One option is to use interactive Flash animations that draw the student into the course context (Carbol, 2004). Others elect to use games and interactivities that provide authentic assessment opportunities in an engaging setting (Bergstrom, 2004; Bray, 2004; Corbett and Kearns, 2003).

At Colorado Technical University (CTU), we use activity-based and adult learning strategies, as recommended by the CTU Professional Learning Model (Leasure, 2004).

The PLM is the compilation of the best practices in adult and activity-based learning. This learner-centric model puts the action where it belongs, using a set of engaging student activities to help students apply the course concepts to solve real-world problems.

Depending on the course concepts and objectives, a variety of engaging projects and collaborative activities can be designed to intrigue and capture the imagination of your students.

### **Authentic Assessment**

Measuring the competencies and skills acquired by our students is an integral part of the PLM. Authentic assessment focuses on higher order thinking and using facts and concepts to solve real-world problems (On Purpose Associates, 2001).

### **Adjusting the Rubrics for Hybrid Course Delivery**

In the first paper, we discussed the formation of game-based rubrics to support the case study courses. To use them effectively, we needed to tailor the rubrics slightly to fit the hybrid course. The assignments and measurement methods used during a hybrid course require less online activity than an online course and some of the discussions and team meetings occurred in the classroom.

Hybrid courses meet once a week in the classroom, then students contribute to activities and discussions online. These online activities are naturally less time intensive than a class that meets only online.

### **Case Study Objectives**

The online and hybrid courses covered different software engineering subjects and shared common goals. These goals include a brief definition of them and suggest how we might measure them.

1. Increased participation -- students participating often and openly
2. Better participation -- beginning activities and discussions earlier in the course
3. Improved collaboration and communication -- posting productive contributions
4. Individual assessment of the team project activities -- shifting from a team grade
5. Successful projects -- building measurable competencies and skills

### **Why Were These Objectives of Interest?**

Let's look at the experiences that relate to each of our objectives.

1. Participation in online courses tends to be great the first week of class, especially during student introductions. Students share background information, identify their goals for the course, and begin to review, reflect, and discuss the course concepts. Discussions are often terse among students who are new to online classes. At least half of the class will only contribute the required number of replies.
2. For classes with team projects, the teams may be slow to form and even slower to select a project topic and begin work. A few students participate early in online discussions, but most of the class waits and listens until the deadline draws near.
3. Students will post polite replies that offer agreement and little or no new information. Each student's initial post in each discussion forum offers the most information. Some students fail to read the remaining posts and do not participate in the threaded discussion.
4. Students fear team projects, so why not shift the measurement of the team project into a set of discrete activities that each teammate performs.

### **Transforming Our Objectives into Measurable Goals**

Objectives are easier to measure and verify if we quantify them, define the conditions under which they will be measured, and transform them into goals. Numbers alone do not adequately express how we will measure, analyze, and assess each goal. In some cases, it may be easier to measure a condition that is undesirable than to measure success.

Here is an overview of the case study objectives transformed into goals.

#### **1. Increased participation**

Both courses had been taught in an online or hybrid format over the past year. The online course had used the same collaborative exam for the past two years while the other course used a take-home comprehensive essay exam that centered on problem-solving questions. Again, the online course used the same project that we used in the case study while the other course had required a research paper in the past.

We introduced new activities to the software process course based on feedback from students and on earlier course assessments.

The assessment of increased participation was measured against the quality of the content in each activity and online discussion post. An increase in the number of posts throughout the course did not necessarily suggest that participation had increased. The quality of each contribution was an equally important measurement attribute.

## **2. Better participation**

Traditionally, students start strong during their introductions, then taper off while they review the materials, reflect on their meaning, and ponder how to respond to the discussion questions and activities. In classes where students are familiar with the subject, the discussions begin strong, then taper off as they progress through the course to more difficult topics. If the course subjects are relatively unfamiliar to them, then there is a period of reflection with little discussion the first week of class.

To define and measure this goal, we were interested in the timeliness of collaborative activities. We wanted to encourage early participation and feedback. This means that we wanted to analyze the game-based rubrics and examine the effect they had on the early start and development of team activities. The volume of posts and topics that focused on the exam and the project content were of interest for this goal.

## **3. Improved collaboration and communication**

Once students began posting their project ideas, we were interested in how often they communicated project status and provided feedback to their teammates.

## **4. Individual assessment of the team project activities**

Addressing students fears and establishing an environment of trust is important. We could have met this objective in several different ways, and have in past offerings of these courses. During the case study, we elected to evaluate the use of individual student assessment of each team project activity.

Individual assessment reduces fear and uncertainty, and helps the instructor use the rubrics to provide timely feedback throughout the course.

Under this method of measurement, students could be successful based on their individual efforts, despite the potential lack of participation from teammates. Some activities did require collaboration, but each student's discussions and accomplishments were evaluated separately.

This method made it easy to track and update the Treasure Hunter Gold Coin Report.

## **5. Successful projects**

The quality of each project was measured, in addition to the process under which it was produced. In a graduate course, we are less interested in repeating the activities of an undergraduate course. We used the team project as a vehicle for discussing our decisions and for learning to provide guidance and leadership on professional projects. In particular, the students analyzed why we do, what we do, and when we should do certain activities differently. Each course used a critical analysis approach to learning, helping

students to develop skills and competencies that will fit a variety of different real world problems.

Each student was asked to:

- a. Assume a leadership role for a project section
- b. Share ideas on all sections
- c. Post project status reports
- d. Post draft sections
- e. Offer feedback on the draft sections from teammates
- f. Post their final drafts of the project sections for integration into a completed project

### **Make It Exciting!**

Games add a competitive edge to a class, motivating students to login and contribute to class activities to gain recognition and rewards. In this case study, the grading system was centered on a Treasure Hunter Game. After all, few students do not want to earn gold coins, amass great wealth and have fun doing it. Playing the game was a choice, and students could opt to not play and still be successful.

### **Playing The Treasure Hunter Game**

A simple Treasure Hunter Game was developed to enhance online collaboration and communication,. It was modeled after a set of rubrics used by Bonnie Bray in her University of Calgary seminar "Learning By Playing: " (Bray, 2004).

In the game, students earn gold coins instead of points for each activity. The range of possible points complemented the normal A, B, C grading system with the following exception. Bonus points for superior work that exceeded expectations were possible in most categories, providing students with greater opportunities to win gold coins.

Using gold instead of points may seem simple-minded and silly, but it was an effective way of motivating over 88% of the hybrid class.

It was tempting to add interactive crossword puzzles (Bergstrom, 2004), Flash interactivities (Carbol, 2004) or other playing by learning techniques (Corbett and Kearns, 2003), but it was better to build a good game scoring foundation prior to introducing new technologies. A crossword puzzle was developed for fun and enjoyment, but not used as a measurement instrument.

## **The Right to Privacy**

Students have a right to privacy as concerns their educational records and grades, as noted by the FERPA guidelines (FERPA, 2005). When it comes to providing feedback and grades, it is important to preserve the anonymity and privacy of each student. The problem: How do we publish the amount of gold coins earned and still protect these rights?

In each class, the students were asked if they wished to participate in the game. If they agreed and gave permissions in accordance with FERPA, they provided an alias under which their scores would be posted every few days. If a student felt uncomfortable with the game-based rubrics or with having their scores published, they had the opportunity to use the standard grading system. That infrastructure remained consistent under the foundation of the gold coin system.

## **Comparing Measurement Instruments and Activities**

The two classes in our case study covered different, yet related topics. The hybrid course focused on the systems engineering lifecycle, a cradle-to-grave perspective of how we develop and retire software systems. Emphasis was placed on how we improve the software process to measure and improve product quality.

The online course narrowed its attention on one phase of the systems engineering lifecycle. It addressed the elicitation, definition, and understanding of software requirements.

Naturally, the exams and projects for these courses differed in content and format, but the collaboration and reporting activities were similar for both courses. How we approach a collaborative exam and a team project is as important as what we do to complete them.

## **Playing the Game**

Most students enjoyed the Treasure Hunter game, so much so that course discussions and activity continued after the course concluded. The game helped to alleviate some concerns that students had about the software process project.

Since we were launching a new project for that hybrid course, there were no examples for students to review. They developed their approach to each activity even as they completed it.

Through mentoring and feedback, students learned a variety of possible approaches, then chose the options that worked best for their projects. The game measurements provided the right mix of feedback and competitiveness, keeping everyone working towards the goal.

There was some initial thought put into the concept of competitiveness. The goal was not to have students compete with one another, but to see how their peers were doing and strive to be responsive and maintain a steady pace through the course. It was emphasized that they were competing against a set of quality goals and not with each other. Still, a handful of students felt very competitive, completing many of the course activities earlier in the process to attain larger amounts of treasure.

The game mechanics required additional explanation, but the measurements were similar to traditional course activities and rubrics, so students grasped the concepts quickly. Conceptually, we were treasure hunters, accumulating wealth as we made discoveries, but in reality, we were scholars achieving course goals and competencies.

### **How Did We Do?**

Both courses completed their exams and projects successfully. The energy level in the course increased as we progressed through the term, starting early and building to a very satisfying conclusion. No matter how successful a course seems, there is always room for improvement.

The case study results are discussed in part three of this series of papers. It is called, "Playing to Enhance Learning: Using Game Design in Our Online Course Rubrics" (Calongne, 2005).

See you online!

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