

Investigating the Impact of Gamification on Student Performance in a Secondary Science Classroom

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Background

I conducted my capstone project at Dallastown High School in Dallastown, Pennsylvania. Currently, around 10% of my level two (“average college preparatory” level) ninth grade general science students do not pass for the year. My district has eliminated level 1 general science classes for 9th graders in an effort to eliminate leveling within the student population. This move has generated classes with a much broader spectrum of ability, making it more difficult to cater to the needs of each individual student.

In an effort to reduce failing grades and increase student participation and motivation in the classroom, I decided to create a “video game” style unit. Within this Moodle based video game, students are able to move through the content at their own pace. Each student earns points by watching videos, participating in online forum discussions, completing laboratory activities, quizzes, and games.

Research Questions

What are the effects of blended model gamification on student performance on a traditional test and overall motivation in class?

How do parents and students view learning through video games as opposed to a more traditional model?

How does creation and implementation of a video game impact the teacher’s role and responsibilities?

How does student motivation change through a gamified unit?

Sample

This study was conducted within a ninth grade, college preparatory, general science course. I teach five sections of this course ($N = \sim 126$ depending on the time of year and number of withdrawals) all of which will be participating in this treatment. This particular course covers half a year of chemistry and half a year of physics. Dallastown High School has roughly 1800 students, 17% of whom are eligible for free or reduced lunch.

Student Performance

Students grades did not appear to have any significant differences. Compared to other years, students did not performed similarly. Test scores for the motion and forces units are shown below.

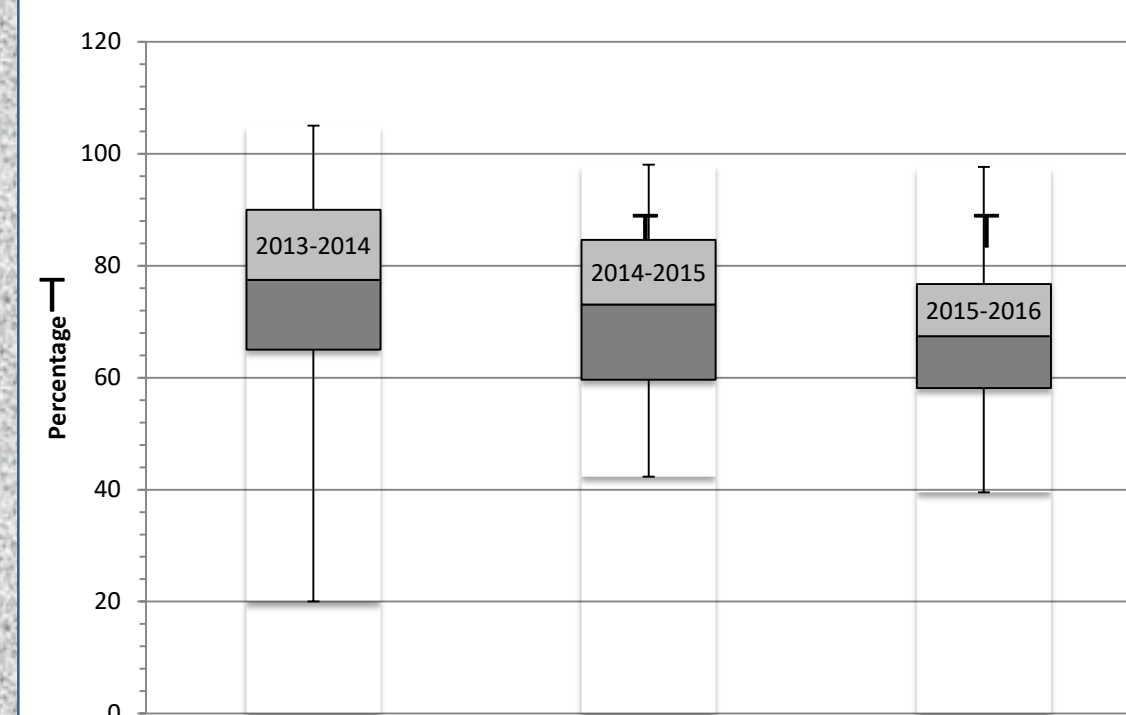


Figure 1. Box-and-Whisker Plot of Motion Unit Test Scores. The 2013-2014 year was not a treatment year ($N=97$). The 2014-2015 and 2015-2016 years were treatment years ($N=73$, $N=121$ respectively).

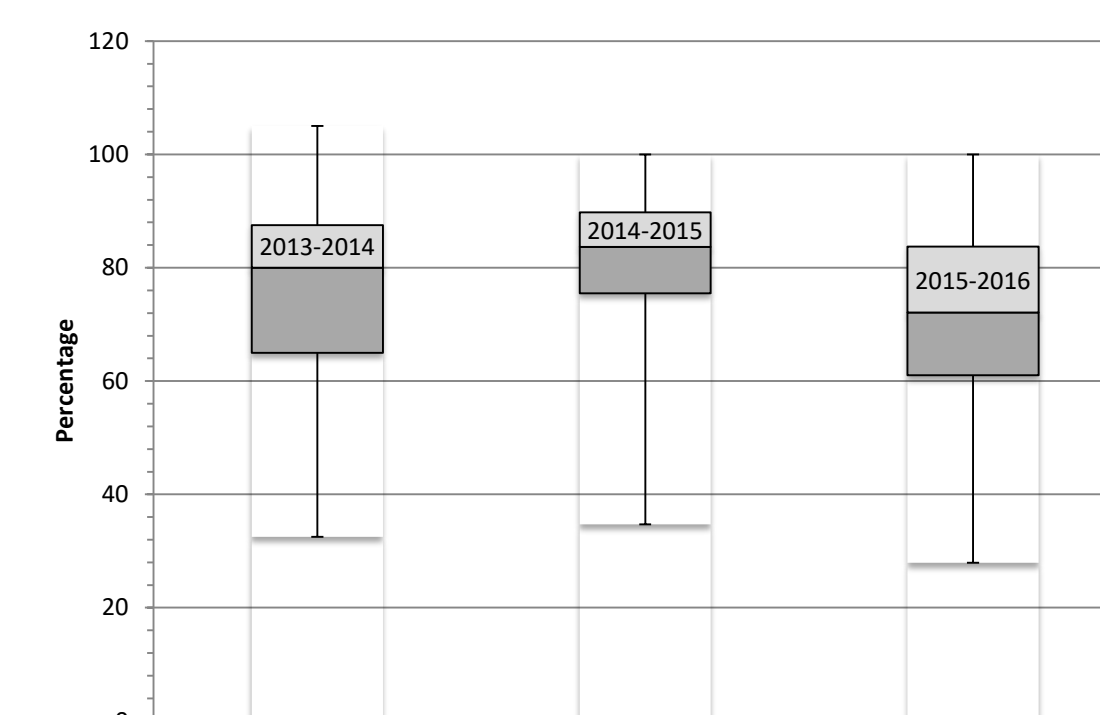
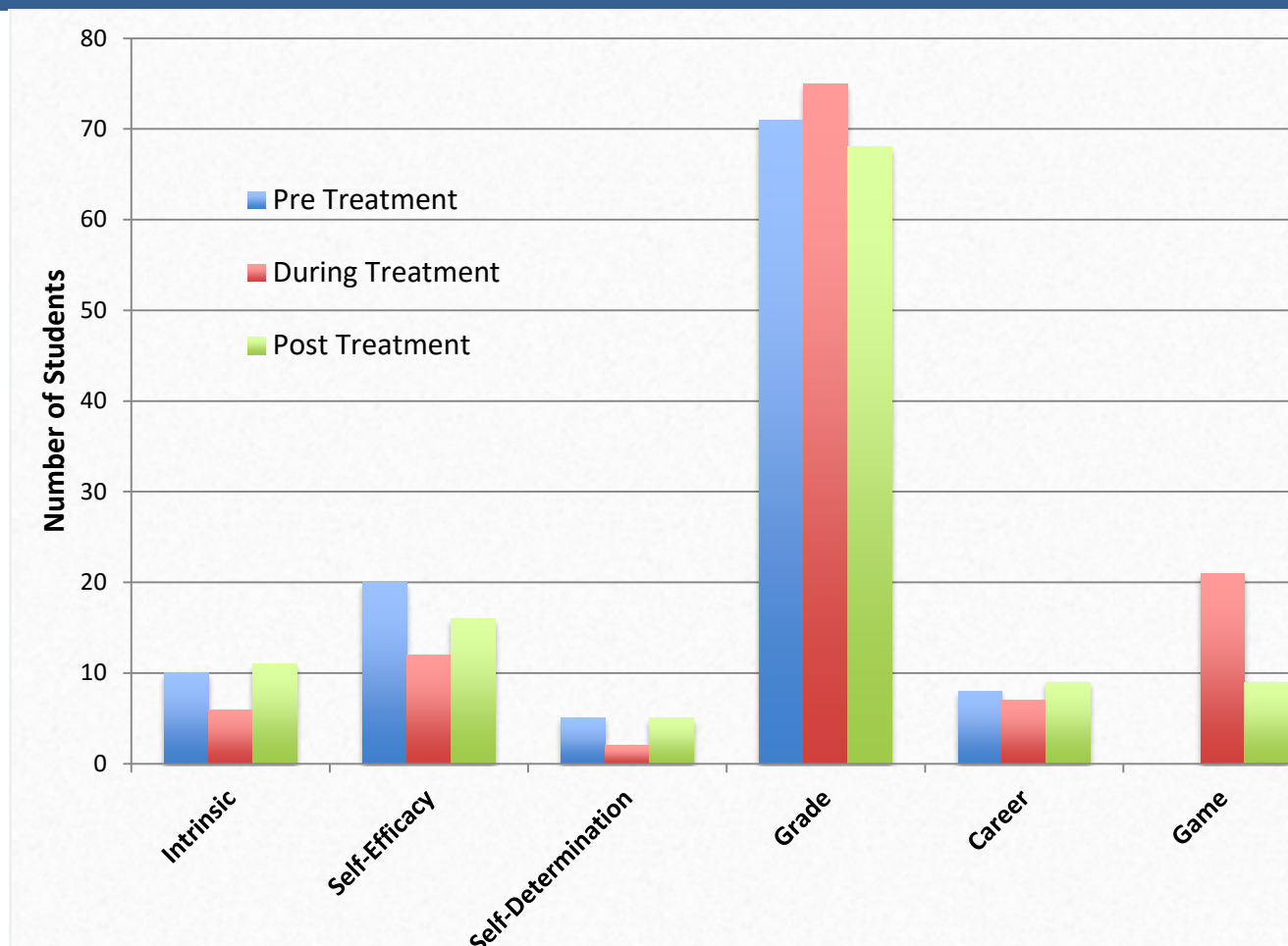


Figure 2. Box-and-Whisker Plot of Forces Unit Test Scores. The 2013-2014 and 2014-2015 years were not treatment years ($N=97$, $N=75$ respectively). The 2015-2016 years was a treatment year ($N=122$).

Student Motivation

Student motivation factors were measured before, during, and after implementation. Shown in this figure are the number of students who responded each motivational factor as being the most influential. Though there was a temporary spike in motivation due to the video game, interest seemed to wane with time. It is also interesting that students consistently regarded grades as the highest motivating factor.



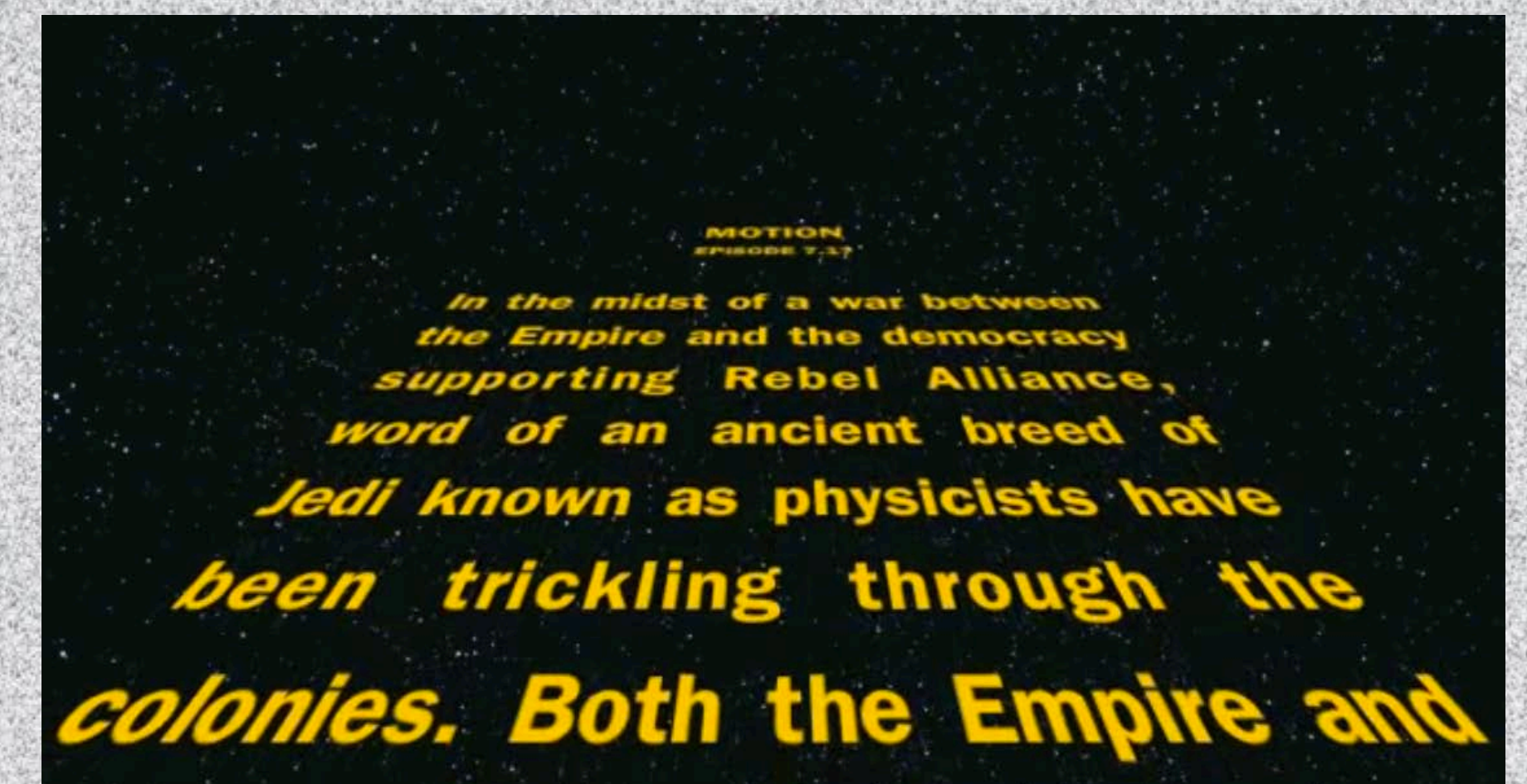
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Dallastown High School
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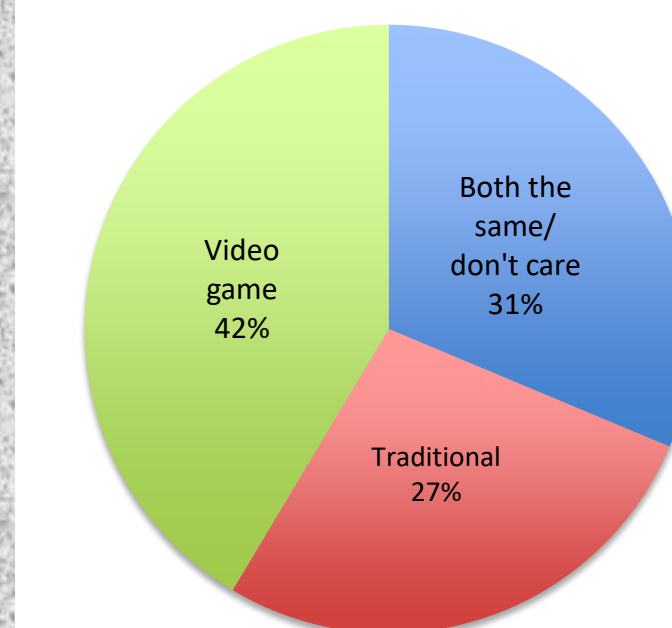
Ritchie Boyd
Walt Woolbaugh

Treatment

A blended style video game was designed and implemented through Moodle. The video game covered the two units on Motion and Forces.



Student and Parent Perceptions



Students and parents responded to surveys to indicate what they thought about the gamification unit. When asked, 42% of students indicated that they preferred the video game style unit to a more traditional model. Parent responses were mixed. Some parents responded wondering why students were watching videos instead of being taught directly. It also became clear that many of the students did not tell them about the video game unit.

Conclusions

Though many students seemed to prefer the video game, student performance and motivation did not seem to be measurably impacted by its implementation. However, the video game also did not appear to have a negative affect on the students. Student interviews revealed that many students felt as though they did not have sufficient time to complete the activities in the game, yet many of them did not complete any from home. Despite the lack of evidence for improving grades, the students did gain experience and confidence in working independently to solve problems.