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# Integration of Gamification into the Classroom and the Reception by Students

Zoe Stokes
stokes.marshallu@gmail.com

# INTEGRATION OF GAMIFICATION INTO THE CLASSROOM AND THE RECEPTION BY STUDENTS

ZOE STOKES
MARSHALL UNIVERSITY
PHYSICS DEPARTMENT

## Contents

## 1. Abstract

The purpose of the research is to change the way the traditional classroom works and how students are taught. With the rise in popularity of video games many people have begun to integrate elements of games into everyday life. This is what is known as gamification. We wanted to do this with the classroom and see whether or not students were receptive to it. In order to do this we had to look at the elements of video games that we wanted to use and then try and successfully integrate them into the class. We also had to change several things that are used in a class like exams and grades. What we found was that students fully embraced this new style of teaching and actually thrived in it.

## 2. Introduction

Many gamers will atest to the fact that they have played a game far longer then they should have. Most of the games that do this use certain psychological tricks to keep them playing for hours. The idea of using these tricks in other areas of life is called gamification. The purpose of this research was to use gamification in a classroom setting. We did not just simply add these techniques to the pre-existing structure of lectures and tests but instead built the entire class from the ground up around gamification. To do this several things about the classroom had to be completely rebuilt. The inspiration for this research actually came from a series of videos on Youtube® written by James Portnow. These videos discussed what gamification is and the benefits of it and how to use it in education. This research takes the ideas presented there and takes it to the next level. The main point was not to prove whether or not this method of teaching is better or worse than any other, but rather to develop the techniques so they could be used and to see how receptive the students were to it.

## 3. What is Gamification

3.1. **Basics of Gamification.** The basic idea of gamification is to take elements of video games that drive people to play the game and use them in other areas of life to make it more engaging. Essentially, it is to take the principles of play from games and integrate them into everyday life [2]. This can manifest itself in several different ways. For example, you could add a leveling system to a repetitive or mundane task so the person can see their progression. Studies have been done to show that this use of a leveling system keeps people motivated and working [1]. This same effect can be achieved by using some kind of quest or achievement system. This way the person would be rewarded after doing a task.

This use of gamification can have many benefits for education. The most important benefit is that it gives students a sense of control over how their education happens [3]. Another large benefit is that is keeps the students motivated by giving them a goal to reach. This is most easily done with a leveling system. Gamification can also be used to provide the students with a better sense of growth as the class goes on. Students would be able to track with a numerical value how they are doing in a class[3]. This is already somewhat done by using grades to evaluate students but can be improved upon which will be discussed later.

3.2. **Why We Need It.** One question that might, and should, come up is why do we need gamifiaction? Right now the world is facing a very unique crisis. That is a crisis of engagement [2]. We as a people have spent millions of dollars over the last several decades to improve are entertainment and make it more and more engaging. Meanwhile, our places of work and education have stayed about the same over that time [2]. Over the years productivity has dropped in the work place and students are more distracted than ever at school. If refreshing your facebook page is more engaging than work or school, something is wrong [2]. This research hopes to change that for education and increase students engagement both inside and outside the classroom.

3.3. **Techniques We Used from Gamification.** There are several different ways that someone could add gamification into an everyday activity. These can be as simple as setting up an activity to "play" like a game or using psychological aspects of games. Here we will discuss the different techniques that we used in the classroom.

3.3.1. *Skinner Box.* The first of these techniques is what is known as the Skinner box technique. This is based off of the research done by B. F. Skinner, a psychologist during the 1930's. The basic idea of his research was that people can be conditioned into doing a certain act. This is known as operant conditioning [1]. The details of Skinner's research will not be discussed here but information on it can easily be found on the internet. The basic idea though is that if a person is rewarded after doing a task so many times then they can be conditioned to said task [1]. We used this in a few different ways in the classroom. The first way that we did this was to integrate a leveling system and use this instead of traditional grades (discussed in detail in section 4.2). In this case the task was to gain points in the class and the reward was a higher grade. We could have just stopped at that but we also added in a skill system (discussed in detail in section 4.4) so each student would get an additional reward upon gaining a new level. We also used the Skinner box technique in an achievement system that we developed (discussed in detail in section 4.3). Whereas the leveling system was used an each individual student, the achievements were used on the class as a whole. There tasks (see appendix A) were things that the class had to accomplish together and required them to do a task $X$ number of times. The reward was typically points that the each student would get.

3.3.2. *Sense of Growth.* Another technique that we used to add gamification into the classroom was to give the students a sense of growth. This is probably one of the strongest points in video games. Whether it is through some kind of numerical progression system or just through the player getting more skillful at the game, almost all games provide players with some kind of sense of growth. One way in which we did this was through the level system. A level system is a tool that

allows some one to track their progression. The higher the level a person is at the more experience they have with something. So someone that is at a higher level would be "better" than someone at a lower lever. A level system has a few benefits as opposed to traditional grading systems. One benefit is that the student has a numerical value in which to see that they are improving since their level is constantly going up. In a traditional grading system most students go in thinking that they have an A and that their grade can only go down [3]. Also, because of the nature of a level system (that everyone starts at zero and works their way up), this is more motivational to students. The traditional way of grading usually involves subtracting points for every mistake made. This can be very demotivational for students [3]. Since levels start everyone with zero points, the students would have to gain points for everything that they do right since there would not be points to take away in the beginning. This way of doing points would be much more motivational since the students are being rewarded.

3.3.3. *Agency.* The final technique that we used from gamification is giving people a sense of agency. What we mean by agency is that we give the students control over their education. Studies have been done to show that people that have agency tend to not give up when outside forces prevent them from reaching their goals [2]. The way that we gave students agency in this class was to make nothing mandatory. By doing this we let the students decide where all of their points would come from. This also meant that students could concentrate on the things that they either needed to learn or needed extra work with. Another example of how we did this was with the EXP days (replacement for exams (discussed in detail in section 4.6)). Besides the fact that this was not required either, the students were given a wide variety of questions so that they could choose which ones they wanted to do.

## 4. Ideas Used and Their Development

One of the things that we wanted to accomplish with this new teaching style was to change how students thought about the classroom. To do this we have to change things to fit with the gamification style. Essentially, we had to make things feel like they were part of a game.

4.1. **Acquisition of Points.** The first thing that had to change was how students acquired points. To do this we had to change how students would recieve points first. Instead of taking points away from students for every mistake they made, we gave them points for everything that they did right. The main difference here is that taking points away from students is demotivational where as giving them points is motivational [3]. This meant that all the students started with zero points and could only go up in points.

The students also needed to have agency over how they got points. This meant giving the students several different options on what they would do to get points. This also meant that making things mandatory was counter productive. This is because making things mandatory would actually take agency away from the students. Anytime you take agency away you want to try to add it back in in some way.

The inspiration for letting the students do whatever they wanted to get points actually came from the video game Devil May Cry®. In this game you gain points by killing enemies with whatever weapons you choose to use. However, this is a very combo (stringing attacks together) heavy game, so the better you were at the combat the more points you would receive. In this class we wanted to make it so that if the students did the minimal amount of work then they would still be fine in the class, but would be rewarded if they put more work into it. This meant letting the students not only work on extra problems but also giving them points for doing that work. If you think about it the students are still putting in a large amount of work to do the problems and are learning by doing this. So this should be reflected in their grade.

4.2. **Grades as Levels.** With the way that students received points changed, we also had to change the way that students looked at grades. We wanted the students to have a better sense of growth of what they were learning in the class. With this in mind we decided to utilize a leveling system. With a leveling system, when a student reached a certain number of points their level would increase. This would make the student feel like they are improving in the class [2]. With this, we had to then come up with how the levels would be distributed. We knew that for the passing grades, A, B, and C, would have to be based off of the traditional 10% grade scale. However, with the two other grades, the D and F's, we wanted the students to reach these much faster. Otherwise students would have spent longer trying to get to the first level, or an F, than they would the final level, or an A. This idea comes from classic RPG's (role playing games) that use a leveling system like the Final Fantasy® series. In these games, you reach the first levels very quickly and are required to get more experience points for each level. We couldn't really do that latter part but we did want the students to reach the first level quicker then they would have based off of the old grade scale. We wanted to do it this way so the students would not think of their level as a grade and more as a reflection of their growth.

The layout of the levels can be found in appendix A. We based the total number of points off of four 75-point tests, 14 homework assignments worth 15 points each, 13 wiki assignments worth 5 points each, and attendance worth 1 point each day for 25 days. This way if the students treated the class like a more traditionally structured class they would still be able to get an A. Students were also informed as to the number of points that they needed for each level. These points were a fixed amount and were not flexible at all.

4.3. **Class Achievements.** Along with the changes that had to be made for this, there were also some new ideas that were made. The first of these was class achievements. Achievements are something that was first successfully used on the video game console Xbox 360®. These are goals that the game will set for you. These

are usually something that require effort to get. When you do meet the goal you are rewarded with points that are tied to a profile that you use. When this was implemented, people almost instantly loved them. You don't get anything for them really other than bragging rights. These became so popular though that people began to play certain games just so they could get the achievements and increase their "gamer score." We wanted to try and do this same thing. The biggest difference with our achievements is that ours were based on the class as a whole rather than the individual. This was done so as to create a sense of unity in the class and try to promote students helping each other [3]. The achievements and their rewards can be found in appendix A. The way that we came up with the achievements was we took things that they would be doing anyway, acquiring points, doing problems, etc, and made it so they would have to reach a certain number of these things. The rewards themselves were mostly things that students are always asking for anyway, extra credit, picking problems on exams, etc.

4.4. **Skill System.** Another new element that we added was skills that each student could acquire and use. These were tied to each level so that when the student would reach that level they would then be able to use that skill. The inspiration for how the skills were obtained was Mass Effect 3®. In this game, every time you get a level you can access a new ability that would either improve something or give you a new tool to use. However, after a certain point you are given a choice between two skills that do different things and can only pick one. We wanted to use this same idea. So, when a student would reach certain levels, they would be given the option to pick between two different skills that they could use. This actually was done to give the student agency. This way they could pick the skill that would be most useful to them and help them in the class. The skills were also used as an incentive for the students. This way students would not give up when they had reached the level that they wanted.

A list of the skills that the students could use is in appendix A. Many of the skills were picked from this that students wished that they could do in class. The hardest

part about the skills was balancing them. Some of the skills are very powerful and could potentially make the class to easy for students. So what we did was we tried to balance a skills power with the levels that they would be accessed at. So, the more powerful the skill the higher the level you needed to be at to use it. This way the skills were always used to assist the students and not as a crutch.

4.5. **Wiki Assignments.** Another new element that we added was what we called wiki assignments. For these assignments students would be given two seemly unrelated topics, one outside of what they were studying and one from what they were studying. They would then have to go to the wikipedia$^\circledR$ page for one of these topics, and through just clicking on links in the article, get to the other topic. We choose to use wikipedia$^\circledR$ since the entire site is interconnected and easy to use. Also, it did not matter if the information was 100% correct as we just wanted to so a connection to two subjects. These were inspired by what are called ARGs, or augmented reality games or alternate reality games. These are usually a type of puzzle or mystery game were the player either has to go outside the game to find something or use knowledge from outside the game to solve a puzzle/roadblock. These type of games can be used to show people how two different subjects actually relate. We wanted to do the same thing with these wiki assignments. So by giving the students a topic outside the class and a topic from within the class, we could show how these two topics are related. You could even let the students try and pick a topic unrelated to the class depending on what you are teaching. One example of a wiki assignment that we used was having the students go from the page on art to the page on magnetism.

4.6. **EXP Days.** The largest thing that we changed was the way that we did tests. Initially, we were just going to do a traditional test where students are given a certain amount of time to do problems and are graded on all the problems on the test. However, the more changes we made and the more freedom that we gave to students, the more tests seemed far too constricting and stressful. The down side to doing traditional exams is that they are required, stressful, and most importantly

take agency away from the students. These are all thing that we had changed in other areas of the class. So it only seemed natural to change the way that exams are done as well.

The initial idea on how to change exams was to let the students choose from multiple exams that were done in different styles. Some of the styles that we considered were practical exams, oral exams, written conceptual and mathematical exams. Doing exams this way, the teacher would still be able to see where the students are in the class and what they needed help on based on how they did and which exam that they took. This would also allow students to showcase what they had learned in the way that would best suit them. The biggest benefit to doing this though, is that it gives the student agency. As discussed before, this is a good thing. The main problem, and why we didn't use this, is it requires a lot of resources. Clearly the different exams would have to be done at the same time, but because of the nature of some of the exams, you would not be able to do them all in the same room. Grading the exams would also become more difficult and would require help. If you have the resources to do this though, it should be a viable alternative to traditional exams.

The main ideas that we wanted to use though, adding agency and letting students showcase what they learned, are still what we based things on. What we ended up doing was just adjusting traditional exams. The first thing that we changed was these new exams would not be required to take. This is the first way that we added agency. The next thing that we did was to increase the number of problems on the exam. However, the students were not made to do all of the problems. Instead the students got to choose what problems they would do and even how many they would do. This is the main way that we added agency to the exams. Because all of these things are now optional, we decided to make the problems themselves more challenging. This way the teacher would still get an idea of how each student was doing in the class. The final, and possibly most important, thing that we did was to change the name. We no longer referred to these as exams but instead as

EXP(experience) days. We wanted students to think of these as just another way to gain points in the class. We also wanted them to see it as a challenge, thus another reason we made the problems harder. If the student was able to do all of the problems and do them correctly, then they would not have to worry about their level. We also did not want students to worry and stress over the EXP days. This way they could just concentrate on doing the problems to the best of their ability.

Doing exam in this way

4.7. **Language of the Class.** The final, but maybe the most important, thing that we did was to change the way that we talked about the class to students. The language that the teacher uses is actually extremely important. One reason, is that with this new and different way of teaching, we want the students to realize that this class is in fact different and should be treated differently. The easiest way to do this is through language. As a comparison, in Disney World the rides are all themed appropriately as to not take you out of experiencing the ride [2]. We need to do the same thing but just with language in this case. We don't want the students to think they are doing homework or taking an exam, but rather working to gain levels and seeing if they can conquer a challenge.

So how do we do this? Well, the first thing that we have to do is avoid using certain words. One of these words in our case was the word test/exam. Students usually tend to panic when they hear this word and begin to worry about it. So by changing this to something more positive, or completely new in our case, you can help take away that stress and anxiety the students would feel. Another word that we had to avoid was percentage. This can imply that the students have only learned so much of what they should have or even that they lack important knowledge. This can be seen as being demotivational to the student. So instead what we used were the words experience or levels. This way no matter how the student progresses, they feel that they are learning and getting better. Another word that we actually eliminated completely was the word required/mandatory. This word, really the idea behind the word, was completely counter productive to what we wanted to do.

We wanted to give the students the freedom to approach this class however they wanted to. They had complete control over where their points would come from. By making anything absolutely required, we would have taken agency away from the students. We did however, make suggestions of what might be a good way to get points and approach the class.

## 5. Problems that Occurred

There were several problems that occurred during the class. Here we discuss these problems and some solutions to them. Keep in mind though, that these are not the only solutions and that other problems may arise from them. More testing is needed to develop working solutions. Also keep in mind that the specifics for these solutions would depend on the class and the person teaching it and what they would want to do.

5.1. **Attendance.** The first problem that we encountered was attendance for the class. While this was not the largest problem it still needs to be addressed. Several students even felt that it was a problem. The basic problem that occurred with attendance was people not showing the longer the class went on. There were also a couple of students who missed on a regular basis. The easiest solution to this is to require a certain attendance in order to level up. For example, students would have to maintain an attendance of 70% in order to move on to the next level. If this were to be done though, a simple code would have to be written in order to keep track of the additional requirements for the level system. The students would also have to have constant access to this information so they can track what they need to do to level up.

5.2. **Attendance on EXP Days.** In addition to regular class attendance being a problem, there was also a problem with the attendance on the EXP days. As the semester went on, fewer and fewer people were doing the EXP days. However, since the EXP days were optional, this may not be considered a problem to some. It is something that still needs addressing. The simplest solution to this is to make the EXP days mandatory. This, however, presents another problem in that it takes agency away from the students. In order to fix this though you can just add agency into the EXP days another way. One way in which to do this is to let the students work in groups. You would have to limit the size of the groups but let them choose who would be in the groups. This solution would also give the students a realistic

view of how problems would be done outside of the school setting. Another way in which you could add agency back in would be to allow the students to choose from selected resources to use on the problems. The resources would be things like the text book, notes, internet, etc. You could really make the resources anything that would assist in doing the problems for the EXP day. Either of these solutions should allow the student to feel like they have more control over the outcome of the EXP day.

5.3. **Large Number of Homework Problems Done by Students.** The largest and most significant problem during this class was the number of problems that the students did. During the entire semester, the students were assigned 2200 to do. The class as a whole about tripled this amount doing 6232 problems. This was not expected. The best way to fix this problem would be to make use of on-line homework problems. You would still assign certain problems for them to look at and work on and turn in to be graded by the teacher, but if the students wanted to do extra problems they would have to do them on-line. These on-line problems would need to be chosen by the teacher of course. But doing it this way, the students would still be able to do extra problems and would give them instant feedback on how they did. You would also have to make sure that these on-line problems could only add to their point total and never take away from it. You would also have to make sure that the student would always receive some points just for doing the problem whether they got it right or not or had to use hints to get the answer. If the student works on a problem but does not receive points for their work they are less likely to do these problems.

Doing on-line homework problems also helps to solve a related problem. Many of the students did an excessive amount of problems in the beginning of the class. However, by using on-line homework problems you will limit the number of problems that the students can do per chapter. This still gives them the option to do the extra problems but also helps encourage the students to seek points in other places. This in turn would most likely help the other problems like the EXP days.

5.4. **Grade Distribution.** The final problem that we found was the actual distribution of grades at the end of the semester. Looking at figure 1, you can see that most of the students received A's and that no one failed the class. While this in itself is not an entirely bad thing it still needs addressing. This skewing was mostly caused by the fact that the extra problems and points that the students could get were not included into the leveling system and the amount of agency that they were given. We may have in fact given the students to much agency. Many of the students in this class actually got well above the point cap of 600 points. The largest grade was actually around 850 points. This was well above the requirements for an A. In order to fix this for future classes we just need to include the fact that students will do extra work. The easiest way to do this is to take the number of points it would take to make an A and instead make that worth a C. This will mean that in order to get a higher grade than that, the student will have to do extra work and put time into the class to get an A.

In order to give you an idea of how this will change things we took the grades we got and changed the requirements to get to each level. The level distribution was figured out using the same pattern as in section 4.2. When the maximum number of points is at 800, see figure 2, we see that many of the students still pass the course. Of course the number of A's has drastically decreased. We also see that there are a few students that in fact failed. We also see that this starts to look more like a normal distribution. It should be noted though that there was not a large enough sample size to achieve an actual normal distribution. However, when we increase the maximum number of points to 850, see figure 3, we can see that we get even closer to a normal distribution. The highest grade here was that of a C followed by D. Most likely if we were to adjust it more we would be able to achieve something closer to a normal distribution. For the class taught, the best distribution that reflects class performance was that of figure 2.

It should be noted though, that if we were to reteach the class we may not see these changes in grade distribution. We may find that the students will continue to

do work to get the grade that they desire. However, by implementing the changes
mentioned in the previous sections, the grade distribution will most likely change
as students will be limited in how many points they can get from one place.
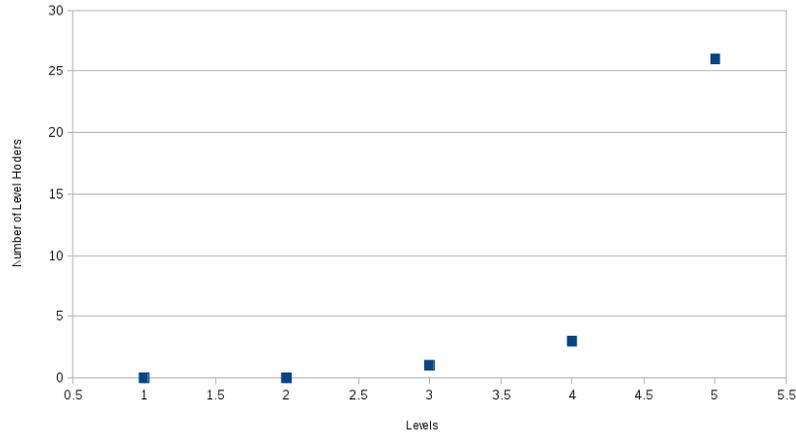


FIGURE 1. Regular Grade Distribution
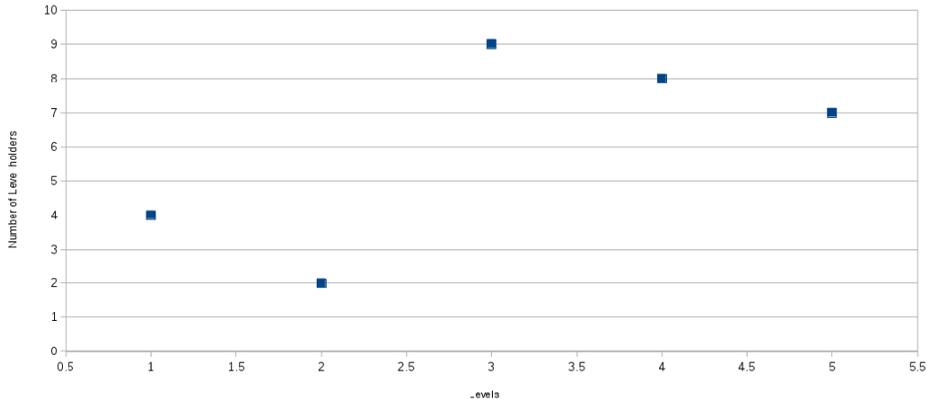


FIGURE 2. Grade Distribution with a Max of 800
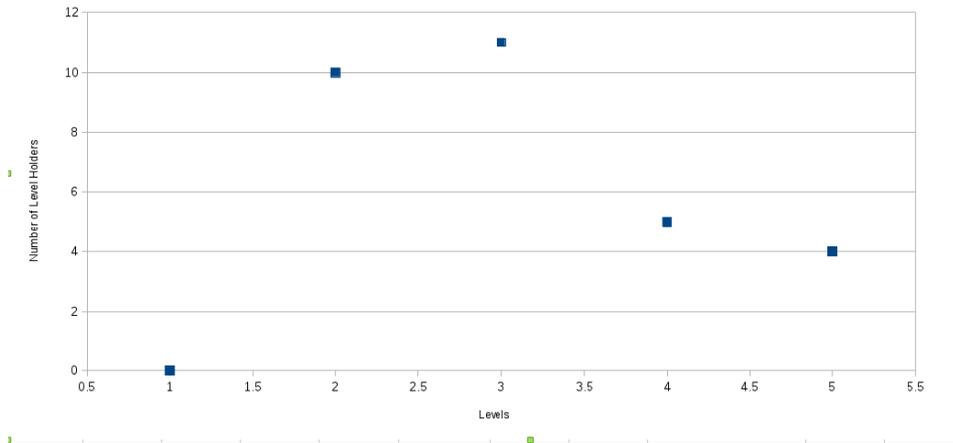
FIGURE 3. Grade Distribution with a Max of 850

## 6. BENEFITS AND RECEPTION OF GAMIFICATION BY STUDENTS

A survey was given to the class at the end of the semester that was used to gather information about how the students felt about the class. We will discuss many of the results here but for the complete results see appendix B.

6.1. **Students Overall Reception of Class.** The first thing that we would like to talk about is how the students received the class overall. The survey questions we will be referring to are $8, 9, 10, 13, 14, 16$. First, we can see from the survey that there were many things that the students liked about this class. Many of the students said that using this method made the class much less stressful. This is most likely due to the fact that the students were free to choose how they did things. This also allowed the students to customize the class to their needs. Students also said that they enjoyed the fact that there was no punishment for doing things wrong and that the effort that they put into the class was reflected in their grade. Another thing that should be noted is that many students said that this method of teaching allowed them to evaluate themselves much better.

However, with the good there is also the bad. There were some things that the students did not like about this method of teaching. The biggest complaint was probably that many students began to feel less motivated to do work once they had gotten to the final level. A solution for this can be found in section 5.3. Another complaint that students had was that the class was overwhelming at first. This can most likely be contributed to the new style of teaching on top of the subject matter. The final complaint was that some of the students did not like the attendance policy. This is most likely due to the fact that there was not much of an incentive to come to class. There were also a few students that only showed up on certain days. A solution was also discussed in section 5.1 and 5.2.

The students also made a few suggestion that could improve the class. Many of these ideas were used and discussed in section 5. One such suggestion was to limit the number of questions that a student could do in each chapter. Again, this could easily be solved with on-line homework. The other suggestion was that the attendance policy for the class and the EXP days should be changed.

Overall the students seemed to like the class as a whole. Every student that was surveyed said that they felt like they learned in the class. Also, every student said that they would in fact participate in another class taught like this again. It should also be noted that only one student said that they tried to cheat in the class, but it should also be noted that this student said this was in regard to using the internet. Another interesting fact is that all students said that they were never discouraged in the class. We believe that these statements show that there is potential in this teaching method and it may even be very effective. However, that was not part of this study and needs to be looked at separately.

6.2. **Students Reception of EXP Days.** Another aspect that we want to talk about is the students opinions on the EXP days. Many of the students liked the EXP days more then traditional exams. They felt that, because they were optional (both the actual day and with the questions they did), they were much less stressful and caused many of the students less anxiety. The students also felt like the EXP

days were much more rewarding. This was since the EXP days allowed the students to showcase what they had learned. The final thing that students had to say about the EXP days was that they could use them to evaluate themselves more accurately. This is the most interesting thing that we found since this is the basic purpose of traditional exams. The final thing that we should mention here is that because the EXP days were less stressful to students, it seemed that they did better on the questions that were asked. This needs to be looked at farther though since this was not included in this study.

6.3. **Participation by the Students and Benefits.** The final thing that we think is important to discuss is participation in the class. We can see from the survey data that all of the students did both the assigned homework problems and the extra problems they could do. This is consistent with what we saw with the grades. Many of the students got their points from doing extra homework problems. We can also see that there are actually more people that participated in the EXP days than did not. This is actually surprising to see since attendance for that seemed like a problem in the class. It should still be noted that attendance for these did decline as the semester went on. Most of the students also did the wiki assignments for the class. This is encouraging since these assignments were designed to show students outside connections to the material being taught.

One thing was a bit split on participation. That was the achievements. It was almost half and half. Many students found these as a goal to try to obtain but many also just saw them as something that would happen eventually. This could possibly be fixed by simply increasing the goals that they would have to get to.

Overall, most of the students participated in everything that was done in this class. We believe that the different amounts of participation was caused by the freedom that students were given in the class. This is probably the strongest benefit that this method offers. Since students are free to choose what they work on, teachers would not have to create a class to teach to a specific thing like a standardize exam.

Another benefit to this teaching method is the fact that students felt the class was stress free. Many students said that it was easier for them to learn since they were not worried about where their points would come from. This is also beneficial since people tend to do better work when they are not stressed.

6.4. **Other Observations Made.** There were also other things that we noticed during the class that need to be mentioned. The first is that students were constantly asking if they had leveled up yet. Not only that, but they seemed excited when they did. Much more excited than we would have expected them to be. Also, several students constantly asked about the skills and seemed to be excited about being able to use them. It seems that some of the students did actually try to increase their level just so that they could use a new skill.

One of the more interseting things that we noticed was the fact that students seemed much more excited about the class. It never seemed like the students didn't want to be there. This was most likely cause be the stress free environment that this new method created.

The most surprising thing that we found was that the students were willing to do much more work then was required of them. There were several people in the class whose point total well exceeded that was set for students to reach. We believe that this shows if you set a goal for a person and give them the freedom to achieve said goal, then they will exceed your expectation. While this may not have been part of the study, we feel that this study gave us a good indication of what we should expect if we looked at the effectiveness of gamification.

## Appendix A. The Syllabus

This is the complete syllabus for the class minus the class meeting time and the teachers contact information.

General Physics

PHY 203

**Objectives:** Each student is expected to learn concepts and problem solving techniques in the areas of electricity and magnetism, optics, and modern physics. Applications of the course material will be discussed that relate other sciences and everyday living to physical principles. Current technological issues are referred to along with the relevance of physical principles that can be used to understand the issues. Examples for this course include fiber optic technology, stray electromagnetic fields and human health, lasers and applications, semiconductors and modern electronics, nuclear energy, and biological effects of radiation. Topics are selected based on available time and student interest.

This is an algebra and trigonometry based course in which students are expected to think in logical and quantitative ways. Exams will consist of relevant conceptual questions and problem solving questions.

Students are expected to ask questions during class or after class on concepts and techniques that bother them. Students are strongly encouraged to work on problem assignments together.

Student attention during the class period should be directed to the physics being discussed in class. Please be punctual.

**Academic Dishonesty:** Academic Dishonesty is something that will not be tolerated as these actions are fundamentally opposed to assuring the integrity of the curriculum through the maintenance of rigorous standards and high expectations for student learning and performance as described in Marshall University's Statement of Philosophy. Cheating and other forms of academic dishonesty will bring serious sanctions, including possible expulsion, as described in pages 106-109 of the 2007-08

Undergraduate Catalog. Cheating on an exam will result at minimum in failing the entire course.

**Policy for Students with Disabilities:** It is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117, phone 304-696-2271 to provide documentation of their disability. The DSS will then contact me. For more information, please visit `marshall.edu/disabled` or contact Disabled Student Services Office at Prichard Hall 11, phone $304-696-2271$.

**Grading:** There will not be traditional grades in this class. You will instead gain levels as you progress through the class. The levels will be at the following point values.

- Level 1- 100 points
- Level 2- 210 points
- Level 3- 320 points
- Level 4- 430 points
- Level 5- 540 points

The points for the class can be earned by the following ways;

**Homework:** There will be five problems assigned as homework for each chapter. The problem sets will be worth +15 points each. Additional problems can be done for an additional +2 points each. For these problems you can select any of the problems from the end of each chapter. The extra problems need to be turned in whenever you turn in an assignment.

**Wiki Assignment:** For each chapter after the first you will be given one wiki assignment. These will be given when we start each chapter. For these assignment you will be given two subjects, one connected to the current chapter and one from outside physics, and you will be asked to go to wikipedia and try to connect each subject through a series of links. Each link will need to have a very small explanation of the connection. Each assignment will be worth +5 points each.

**EXP Days:** There will be four days during the semester where you will be given several problems to do during class. This is a great time to gain lots of EXP

points. Each question will be worth +15 points. You will be given 10 problems to work on and you will be allowed to pick and choose from them.

**Attendance:** Students are expected to attend all classes. Homework assignments will be given out in class. Demonstrations illustrating the physical principles that are being discussed will be performed during class. A seating chart will be passed around the second day of class. Students will receive +1 point per class attended.

**Skills:** With each level that you earn you will gain certain skills that can be used during class and assignments. These skills are the following;

(1) Level 1

- Receive points even when you miss class (5 uses)
- Extra time for the homework assignments

(2) Level 2

- Skip one problem on each homework set.

(3) Level 3

- Make an assignment worth +5 points(5 uses)
- Extra time for the EXP day problems

(4) Level 4

- Get points for one EXP day problem without having to do it

(5) Level 5

- Drop one assignment grade and receive the full points
- Skip an assignment and still receive full points

**Achievements:** There are several achievements that the class can earn together. Each achievement will net the class as a whole a bonus of some kind. These achievements include;

(1) Everyone getting a 14 or higher on one of the homework assignments.

- The class gets to pick a homework problem on the next assignment.

(2) The class earns, as a whole, 14911 points.

- Everyone gains an additional +10 points.

(3) Everyone got at least +65 points on one of the EXP days.

- Class gets to pick a question that will show up on the next EXP day.

(4) The class, as a whole, does 2,200 problems.

- Everyone receives +10 points.

(5) Everyone is at level 4 the week of the last EXP day.

- Everyone automatically gets +10 points on the last EXP day.

These achievements are meant to try and get everyone to work together. In order to get these achievements you will have to work as a group.

## Appendix B. Survey Results

This survey had 18 people (68% of the class) that participated. Students were asked to participate but were not forced to and were told that it would be completely anonymous and have no bearing on their grade.

(1) Did you do the assigned homework problems?

- 100% said yes

(2) Did you do extra problems?

- 100% said yes

(3) Did you attend the EXP days?

- 83.33% said yes; 16.67% said no

(4) Did you do the wiki assignments?

- 72.22% said yes; 27.78% said no

(5) Did you use the skills that you acquired?

- 94.11% said yes; 5.88% said no

(6) What motivated you to gain points in this class?

- Their grade

- Fact that they could not lose points

- To gain the skills for each level

- To gain the achievements

(7) Did you actively try to get the achievements with your classmates?

- 41.17% said yes; 58.82% said no

(8) What did you like most about the new system used in this class?

- They could earn points in different ways

- That they could do extra problems and receive credit

- That they could customize the class to their needs

- It was less stressful

- That they could work at their own pace

- That they were not punished for getting something wrong

- It made class more fun

- That their grade reflected the effort that they put in

- That it allowed them to evaluate themselves

- Things were not mandatory

(9) What did you not like about this new system?

- Their enthusiasm trailed off at the end of the semester

- The attendance policy was too loose

- The new system was overwhelming at first

(10) Would you like to take another class that uses the same system/structure?

- 100% said yes

(11) What would you like to see more of or improved upon in this class structure?

- Limits on the number of questions you can do per chapter

- Making the EXP days mandatory

- A better attendance policy

(12) How did the EXP days compare to traditional exams in other classes?

- Less stressful

- Caused less anxiety

- You had options on which questions you did

- That they were not mandatory

- That they felt rewarding

(13) How did this class compare to other similar classes?

- They felt they learned more in this class

- It was less stressful

- It was more fun

- That they felt more motivated

(14) Do you feel like you learned in this class?

- 100% said yes

(15) Being honest, did you try to cheat the system?

- 5.55% said yes; 94.44% said no

(16) Did you ever feel discouraged in this class? If so when and why.

- 100% said no

## References

[1] Portnow, James; Floyd, Daniel; Theus, Allison. *Extra Credits: Skinner Box*. March 13, 2012 `https://www.youtube.com/user/ExtraCreditz`.

[2] Portnow, James; Floyd, Daniel; Theus, Allison. *Extra Credits: Gamification* . May 10, 2012 `https://www.youtube.com/user/ExtraCreditz`.

[3] Portnow, James; Floyd, Daniel; Theus, Allison. *Extra Credits: Gamifying Education*. May 13, 2012 `https://www.youtube.com/user/ExtraCreditz`.

List of games referenced

(1) Capcom, *Devil May Cry*. Capcom, 2001.

(2) Square Enix, *Final Fantasy*. Square Enix, 1987.

(3) Bioware, *Mass Effect 3*. Electronic Arts, 2012.