Gamification: Changing People's Behavior with Fun

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Abstract

People generally want to have fun and enjoy their lives as much as possible, but many tasks and daily activities that people carry out are not exactly enjoyable. We believe that it is possible to make people have fun and change their behavior for the better through a process called "Gamification". Gamification is the act of changing human behavior by making activities more enjoyable by making them more game-like. This could be as simple as adding rewards for completing menial tasks like giving yourself a gold star for completing all your paperwork. Gamification can also be done through more complex, corporate sponsored projects. To us, Gamification should be implemented without having to offer material incentives to change a person's behavior. Over the past few months three attempts were made on the WPI campus to demonstrate this non-incentivized Gamification. The three experiments – "The Minefield", "Battery Recycling Bin", and "Trashketball" – brought about a variety of reactions from the students, faculty, and staff where apparent interest and amusement were observed.

Keywords: Gamification, Commercial, Non-Commercial, Behavior.

Gamification: Changing People's Behavior with Fun

Gamification is a relatively new concept. The word itself still doesn't appear in many print dictionaries. Supposedly, "the term 'gamification' was coined in 2002" and "first gained widespread usage in 2010" ("Gamification", n.d.). How Gamification is defined and understood today still varies from person to person. The one thing that stands constant between each definition of Gamification is that it revolves around making things fun and game-like in an effort to influence people's behavior. Whether it is for financial benefit, advertising, changing the way a person thinks, a person's stance on a hot button issue, or whatever else the purpose of the Gamification experiment may be, it can only be called Gamification if fun is the not-so-secret ingredient that makes it work. We intend to motivate people to behave in ways that are better for them and/or for the world by making those things fun without relying on material incentives. As long as we change the behavior of at least one person in the long run, we have accomplished our goal of changing people's behaviors for the better.

Understanding Gamification

There are several ways to approach Gamification, including approaches from a commercial standpoint and from a non-commercial one. Commercial Gamification usually takes the form of corporate sponsored projects developed for the purpose of promoting a product or service and boosting the reputation of a brand or company. One hypothetical example of commercial Gamification by a corporation, let's say McDonald's, could be challenging people to run through a series of golden arches in a mall within a set time limit for the reward of a discounted or free McDonald's meal. This could earn the company new customers by giving them the opportunity to try their product at the cost of a fun activity instead of money. Often characteristic of commercial Gamification is that material incentives are offered to encourage

participation and draw attention to their brand. Non-commercial Gamification lacks the ulterior goals of commercial Gamification and usually focuses on promoting positive behavior.

Failing Gamification

Gamification is a trending and appealing concept, but its application must be carried out with careful thought and planning. There are many disappointing games that few want to play and Gamification can fail just as easily. One of the worst mistakes with Gamification is "creating a game that no one wants to play" (Kleinberg, 2012, p. 4). No one will participate if the 'game' fails to even generate a person's interest. Few people have fun playing a game that is too difficult or, oddly enough, too easy and lacking challenge. Both games and Gamification are bound to fail when the participants can't figure out what they are supposed to do or how to play the game. Confused players and participants are also more likely to grow frustrated and leave (2012, p. 5). Whatever the issue, if bystanders aren't motivated to join in or the participants aren't having fun, the Gamification fails. Even worse, poorly done Gamification can not only fail to produce the desired effect, but can also produce the opposite effect and completely backfire. Poorly done commercial Gamification results in wasted funds and resources and can lower the reputation of the associated company.

Rewards

Many Gamifications implement a reward or prize system to draw in and motivate participants. There are ways to reward a Gamification participant, either with material or non-material rewards.

Non-material rewards. It can be argued that the fun one experiences from playing or participating is a reward. The reason people play card games, board games, and video games – where there are no physical or monetary prizes – is because they have entertainment value. The

satisfaction one feels when they've won, completed a difficult challenge, performed a good deed promoted by Gamification, and all the other good feelings motivates people to participate when there are no material incentives. Of course, this only works provided that the gamified activity is successfully made to be fun and enjoyable.

Material rewards and their pitfalls. The benefit of a material reward is that it draws in more attention and people more easily. However, it can be argued that people are only participating because they get something material out of it. It becomes difficult to tell whether a person is participating for the fun or for the reward. The purpose of Gamification is to influence people to behave in a certain way or to take a particular action. However, many Gamification projects are only short term set ups or one-offs. Can we guarantee that people will continue to behave or act in the desired fashion in the long run, after the Gamification ends?

> To think that you can give people badges to reinforce behavior and that will translate into long-term learning and behavior change, or overall performance improvement? Really? It's not how humans learn, and it's certainly not how we change. …the reality is that badly designed gamification can actually cause learners to stop performing the desired behaviors once the rewards of the game are removed...the exact opposite of what we want to achieve. (Pagano, 2012)

Most people seldom go out of their way for something they don't usually do unless there is something to gain from it. People who are only motivated by rewards lack the ability to self-motivate in their absence. Even good Gamifications that produce immediate results fail in the long run to motivate people. The ideal and truly successful Gamification is one where at least a single person continues the encouraged behavior long after the Gamification is ended.

Gamification Examples

One big name chain of Gamification projects over the last few years was Volkswagen's "The Fun Theory". Though they didn't directly call what was done Gamification, they did indeed encourage it in several different ways. The Fun Theory was a competition that awarded money for creative and successful Gamification ideas. The following "The Fun Theory" submissions exemplify short-term Gamification without the use of material incentives. Many of these examples served as inspiration for the Gamification attempts performed at WPI discussed later.

Bottle bank arcade (2009). This is the first example researched for this project. The goal here was to get people to recycle bottles more actively by turning recycling them into a game where you recycle the bottle in a designated hole that is lit up by lights before the lights move to a different hole. The concept is simple and the results were very apparent as crowds gathered around people who were simply recycling their empty bottles. It helped spread message of going green and recycling and the game was without a prize so it didn't use incentive beyond just getting people to have fun.

Figure 1. Bottle bank arcade (2009)

Piano Stairs (2009). A more musical example of Gamification from The Fun Theory took place at Odenplan, Stockholm where overnight a group of people put mats, sensors, and speakers on the stairs next to the escalators to make it look like a piano. As people walked up and down the stairs, the speakers would play piano notes. The intrigue and interest this generated caused 66% more people to use the stairs that day as opposed to the escalators which are normally more convenient. A similar music centric Gamification attempt was a plan to get people to clean their shoes more when they entered buildings. The effort was creative because finding ways to gamify cleaning your shoes on a mat seems very challenging, but the effort proved to be successful in this particular case.

Figure 2. Piano stairs (2009)

Scratch mat (Möller & Westhof, 2009). The "Scratch Mat" was a regular floor mat with an image of a DJ's turntable on it that made disc scratching sounds when you stepped on it initially to grab your attention to it and then continued making more sounds as you cleaned your shoes on it. The idea was a simple and effective means to stop people from tracking mud and dirt through buildings.

The world's deepest bin (2009). This was essentially a bottomless trash can. People would throw trash into the can and it would emit the classic cartoon sound of falling for a very long time then crashing at the bottom. Curious people tried to look into the trash can to confirm

that there was a 'bottom'. Some even picked up litter to put it in the trash can in order to make it play the sound again.

Limits to Measuring Long Term Effects

Few of the Gamifications submitted to "The Fun Theory" website were aimed at producing long term change. The intended purpose of those attempts was simply to demonstrate the immediate effectiveness of each one. The Gamification carried out in this project is of a similar nature: short term. Although it was argued earlier that ideally Gamification success should be measured by whether or not behavior change is sustained long term, we did not evaluate the long term impact of our attempts for two reasons. The first is that we lacked the means and time to measure this impact. The second reason is because of our targeted population and location: college students on a college campus. The location makes it so that the students will make up most if not all of our possible participants. Every year, hundreds of students graduate, leave, and are replaced by incoming students. In four or fewer years, the students who participated in our Gamification experiments will no longer be on campus. Those involved in the Gamification creation and set up will not be around to maintain and keep it running. It was not in our capacity to measure long term effects of our short-term Gamification or to maintain a long term one. Success of the performed Gamification demonstrations was instead measured by whether or not people participated and whether or not the participants had fun.

Brainstorming and Planning

We couldn't decide on or plan anything of our own without first defining Gamification and researching other people's experiments with Gamification. We first figured out our personal definition (stated previously) and then did some research based on that.

An important detail we realized a few weeks into our project was that we were limiting ourselves and dooming ourselves to fail before we started by basing our own ideas on gamifications sponsored by huge companies with larger budgets and much more time to design and implement than we have. We had to take time and reanalyze how we defined gamification and our criteria for how to "play the game". Playing the game is an important detail because there are many ways to play games, e.g. board games and video games; therefore we cannot limit ourselves by assuming that there is only one way to implement our gamification and analyze how people solve it.

Setting Rules and Limits

While coming up with the ideas for Gamification, we decided to create a list of things to do (DO) and things to not do (Don't) that we must abide by throughout the process. Some of them are simple and were already stated earlier in the paper, such as "to try to change the behavior of a person". Others were less simple such as ensuring that participation was optional.

One of the items of the top of the Do list is to record anything we gamify. This was going to be handled by setting up hidden cameras in the area around it to capture people's reactions, experiences, thoughts, and opinions on what we have done. They are also incredibly important for documentation and keeping records of how people responded to the Gamification. We also decided on doing this as opposed to keeping someone nearby with surveys and questions that may drive away participants.

There are some areas where our two lists overlap due to common themes between them. One overlap or near overlap is: "Do practice safety with any instance of Gamification" and "Don't do anything that involves live animals, things with a chance to harm people, or make areas unsafe". Safety is a common and important practice, and we do not believe people want to

play games casually at no chance for a reward that can hurt them. As interesting as live animals may be for drawing in crowds, we can't control them completely and they could attack people or cause allergic reactions. We also can't make an area unsafe to traverse, by doing something like blocking the entire sidewalk next to a busy street which would force people to either play the game or risk getting hit by a car.

The Don't list is a lot more important because what we can't do and could receive backlash for or inhibit our own Gamification over definitely takes precedent over things that are basically nice targets and reminders. "Don't make the area in which the Gamification is done inconvenient for non-participates to be in or obstruct an entire area". This is a major one. When we force people to participate, it no longer becomes a game and it instead becomes a hurdle that people must deal with. That breaks the point of getting people to opt into things and can cause complaints and frustration, so we made this a very important item on the list. And though we have stated this several times so far: "Don't force people to participate." One last Don't that was very important as well was "Don't encourage harmful or disgusting behaviors".

Planning Process

Most of our ideas for Gamification projects were conceived in group meetings while discussing other attempts and analyzing what could work best on a college campus. Whenever we came up with an idea, we analyzed whether or not it should be done according to the "Do and Don't" list. If it passed the initial rundown of the list, then we discussed how practical and effective the project would be. If we all found the project favorable and we were confident in its success, we then discussed the budget for that Gamification attempt. Expenses were paid for out-of-pocket; therefore, lower cost projects were preferred. If the idea would take too much time and money to put together, then it was discarded. In the end, we selected the ideas that

seemed simple, cheap, quick to assemble, and quick to execute. This was different from what was initially intended: one long major Gamification experiment. That plan ultimately became a risk because more resources and outside assistance became necessary than originally estimated.

Rejected Ideas

The first idea proposed came from Jayson, which he called the Security Hall. The concept was to use lasers to fill a hallway similar to highly secure areas in spy and crime movies. The lasers would not be connected to any form of security device or alarm so as not to disturb anyone. People could opt out of it by simply walking through the hallway, since the lasers are not obtrusive. However, we could not afford that many laser pointers, and this Gamification doesn't really do anything. It's more of a thing for fun one time and then it has no lasting impact on a person unless they were to for some reason start acting like they are dodging lasers as they walk through hallways in the future.

Following the trend of getting people to navigate areas in ways that are awkward, Nick proposed an idea similar to the childhood game "The Floor is Lava". We would simply take sidewalk chalk and draw patches of lava on the sidewalk and record people's responses to it. The idea would to get people to be more aware of the steps that they take and make them have a little more fun during their commutes through highly active areas of the campus. However this idea does little for long term behavioral changes besides perhaps getting people to look down more as they walk, which could raise problems in some cases.

Related to the previous idea, Nick also proposed the idea of covering stairs in bubble wrap. Bubble wrap is a simple thing that many people just inherently love crushing, and putting it on stairs to cheer people up sounded like a simple and fun idea. We decided that if we can lay the bubble wrap down in strips so that only half of the stairs have the bubble wrap so people can

opt out of it, that it would be worth experimenting with just as a sample experiment to gauge just how much fun can change a person's behaviors. This aims less for long term change and more for testing the willingness of people to go out of the way to have fun, since we would be putting the bubble wrap in a less frequently used stairwell in a popular building on our campus. This differs from the previous two ideas in that it has a way to actively release stress for people due to the satisfaction of popping bubble wrap. None of the three ideas intend to change people's lives to a great degree, but this seemed like the best one for gauging interest and responses from students at WPI.

The next idea is rooted in the fact that some people take satisfaction from destroying papers with a paper shredder. This concept was simply to make a recycling bin that produces paper shredder sounds whenever something is put in it. It's simple to put together, and with a dark bin that someone can't look into, can cause some fun confusion and get some people to laugh. In the long run this may also condition people to recycle more because their brain may recall the satisfying feeling of shredding their bottles and call that back as they recycle their bottles.

One idea that we instantly scrapped over this was a Bubble Gum target board which would have people spit their gum at a paper target placed above a trash can which would have flashing lights if the bull's-eye is hit. The bull's-eyes would have been made of sheets of paper which could simply be detached and thrown away later. The goal of that Gamification would be to get people to spit out gum into trash cans, instead of all over the ground, sticking it under tables and chairs, and basically anywhere except for trash because that's where you are most likely to find gum. But nobody wants to watch people spit and especially not spit wads of gum, so the idea was scrapped very quickly as a result.

Approved Ideas

Battery Recycling Bin (Experiment 2). One of our ideas that we experimented with comes from a similar vein the Bottle Bank Arcade. This idea Gamification was creating a special recycling bin for batteries that would light up and make charging sounds as batteries are added to it. And the more batteries are inside, the brighter the glow will become from the lights, which will shift from red to green. We would be placing the bin in numerous locations around the WPI campus over the course of a week, and set up cameras to see how people respond to it. After each bin is removed, we would try to leave less "In your face" recycling bins for batteries in their place to see if it encouraged lasting behavioral changes in people who saw it and "played it".

The Minefield (Experiment 1). Our second plan was to make a minefield out of bubble wrap and see if people will try to avoid the "mines". This is after we thought of and rejected the idea of people having to step on the bubble wrap in specific ways. What we want from this gamification is to give a little fun and stress relief into people's lives because even if you "fail" and step on the bubble wrap mines you get the fun noise of popping bubble wrap. Of course we left in the variables of people walking past it or just walking over it and not caring what you step on. The realization that our gamification doesn't have to be about the environment really gave birth to the idea of using bubble wrap because games at their core are about having fun and since bubble wrap being popped is fun we could use that angle of games. At first we were thinking of stairs but since that could be dangerous we switched to the idea of a large flat surface and the minefield. Another precaution we took to not having to constantly replacing bubble wrap was only doing it for 15 or so minutes. We need to know if people are playing this is also where cameras come into play because we need to record peoples feet to see how they are navigating

the minefield. This also causes the dilemma of having a disclaimer which covers our bases in terms of legality of recording people without their permission, but it does leave the variable of people purposely hamming it up for the cameras which may or may not be beneficial to the experiment. While some people may have done dramatic things if they set off a "mine" the knowledge of being watched may influence people away from doing theatrics or towards them and not knowing who each person is and their personalities we don't know if they would do that normally or if it is solely for the camera. The difficulties of this experiment is mostly in the preparing it because we need to find a good hallway where even when we set it up people can opt to walk around it, we need one that is not carpeted so no sounds are too muffled, and most importantly we need to be able to quickly and efficiently set up and take apart our minefield and then make it so it is not obvious that we are watching the experiment. We did some tests and decided that two small squares of bubble wrap taped together so that the bubbles were touching made the best mine no matter what footwear people would be reasonably wearing in winter. All the proper permissions have been gained and all that remains is running the experiment. Snow days, bad slush/melting ice causing a slipping hazard, and some personal illness delayed the experiment being run initially, but all factors considered we still managed run three trials of this Gamification during the course of the winter.

Trashketball (Experiment 3). The last idea we had related to trash was to convert it to basketball. This idea involved making a chalk or tape line that read "Free Throw Line", then elevating a trash can and adding a backboard to it to encourage people to throw their trash out instead of littering. It would probably cause the most change outside as opposed to inside, since people are less likely to litter indoors. However, if people miss, they may or may not opt back into the game, and the latter results in the litter that would be trying to prevent.

Experiment 1: The Minefield

We started working on both the Minefield and the Battery Recycling Bin (see Experiment 2) at the same time, though the Minefield experiments were run sooner because the latter required more time to be made ready due to programming, technical errors, and more complex construction. Each land mine was made using two small square sheets of bubble wrap and taping them together with gaffer tape. The land mines, once complete, were then taped to the floors of the stairwell. Unlike the 'bubble wrap on the stairs' idea, the land mines were placed exclusively on the landings between flights of stairs. This reduced any risk of startling people and minimized the risk of people slipping on the mines, which thankfully never happened during the experiment.

Each set up of the Minefield was located in what WPI students called the "hidden stairwell" of Fuller Labs. This stairwell connects the Sub-Basement, Basement, and 1st-3rd floors of the building. The building's main stairwell, however, only connects Basement, 1st, and 2nd floors. The only other path to the Sub-Basement and 3rd floors is through the elevator, which is often takes longer. As a result, most students go through the stairwell to reach the Sub-Basement where two important computer labs are located.

We set up several 'warning' signs (using index cards) on the walls around the stairway and on the doors leading into the staircase to 'warn' people of the minefield. Jayson and Shea then hid in various areas of the stairwell to record what people said and the sounds of people 'detonating' land mines. Jayson recorded audio from the upper landings using a microphone and Shea recorded video from the Sub-Basement floor using a Flip camera. To protect people's privacy, faces and names were not recorded. Classes at WPI start at X:00 and end at X:50, so set

up was done from X:10-X:45 to surprise more people and to reduce traffic in the stairwell while setting up.

Figure 3. Sample land mine created using two small squares of bubble wrap and gaffer tape.

1st Run

For the first run of this experiment, we decided to focus primarily on the Sub-Basement. The main minefield was placed on the floor surrounding the door leading into the Sub-Basement; smaller minefields were placed on the landings above and by the doors around the door to the Basement level. The 1st run was carried out on February 18th, 2014 from 12:50 PM to 1:07 PM.

Results. During this trial, fourteen people passed through the Sub-Basement (recorded on video). About five to seven of those people seemed to be aware of the minefield, the rest presumably either not reacting to it or ignoring it. One person in a group of two people stepped on it, and then the two acknowledged the mines and started looking at where they were going, and one person noticed the signs after reaching the end of the minefield. Three land mines were stepped on, and there were six instances of people stepping on mines.

Responses. During the trial, three people talked to Jayson or Shea. The first time, someone stepped on a land mine then looked at Shea, who said "Watch the mines". The person apologized while laughing then continued walking away. One person opened the door and saw the minefield, then paused and looked towards Shea before asking "Can I pass?" Shea responded, "Yes you may. Just keep in mind where you are stepping. Don't worry, this is an IQP." One person stepped on a land mine near Jayson and asked, "Oh, is that a test?" to which he responded by saying, "It's an IQP." The person asked if they can pass and Jayson said yes; then the person continued walking through.

Two great responses to the trial were recorded just through audio; they revealed that some people genuinely enjoyed the experiment. The first case was a group of girls walking down the stairs together. They were laughing as they saw the mines and started off by dodging each one. Jayson rounded the corner after their backs were turned to see how they were reacting the farther down they went, and saw one step on a mine and jokingly yelled "I'm hit!" The second set of responses came from a group of three guys passed by Jayson towards the end of the run that were clearly amused by the experiment. A few of them made statements like "Look at this!", "That's awesome!", and "That's like… this is amazing!" The responses such as these were the ones that we truly looked forward to observing during this experiment.

2nd Run

The statistics and reactions from the first attempt of this experiment were very helpful and great to start with, but we decided to do an additional run under mostly identical conditions to obtain additional data. For this run, Jayson decided to place a few stray land mines on the higher floors of the stairwell to lure people who are interested in what was happening downstairs, testing to see if curious people will follow odd things down a 'rabbit hole' of sorts. However, we

were unable to gauge the effectiveness of this partially because we didn't interview the people who passed through and they weren't talking to themselves aloud. The second trial took place on February 25th, 2014 from 12:50 PM to 1:10 PM.

Results. Eight people were caught on camera during this trial. One person wasn't aware of the minefield at a glance but seemed to barely dodge them, one person passed through both ways, one person stepped on a mine after he passed the camera, and one person accidentally stepped on a mine on camera. There were about six instances of land mines being set off during this trial.

Responses. As with the first run, we had a few people talk to Shea who saw him. In the first case, someone asked him "Caught someone yet?" to which Shea said no. Then while passing through, he accidentally stepped on a mine while walking towards the door and said, "Oh s**t! I'd be dead there". One person opened the door slightly then looked at Shea and asked "Why?" to which Shea replied "IQP". The person replied, "fair enough," then simply left. The third person who engaged Shea asked for more detailed information about the IQP, resulting in a lengthier discussion.

3rd Run

For the last attempt, Jayson proposed another idea to get more information and changed how warning signs were handled. Minefields were placed on every single landing in this attempt, and two batches of signs were made. One group of signs parodied Monty Python's "Ministry of Silly Walks" and encouraged dodging the mines in outrageous ways. The other signs gave contradictory advice such as "Hate being tall? Just step on a land mine!", "Ever want to experience flight? Just step on a land mine!", "Chicks dig men with exploded ankles! Jump on a land mine today!", and other pieces of normally terrible advice intended to conflict people

passing through and possibly encourage them to step on the land mines on purpose. In addition, we had an additional person help set up and record audio for this run to ensure that we were ready on time and to collect more data.

Figure 4. One of the landings in the stairwell covered with land mines.

The third and final mine trial was run on March 20th, 2014 from 11:50 AM to 12:10 PM. In this run, Nick was able to stay for recording, and our guest, Max Smith, assisted in audio recording using his phone. Nick was stationed with a microphone at the 3rd floor of the stairwell; Max, between the 1st and 2nd floors. Jayson remained stationed on the basement floor; Shea, under the stairs in the Sub-Basement. Shea, however, decided to just lean his camera against a wall this time and hid even further into the shadows to avoid detection from people passing through.

Results. Five people passed by the Sub-Basement camera. The first person did not step on any mines, and we are unsure of whether or not he noticed or cared. The second person moved slowly through the minefield, carefully trying to dodge each one. Two people entered

together without hitting any mines, but the way the second person twisted his feet as he walked suggested he was trying to avoid the mines. We believe that they may have been the pair who read a sign aloud and possibly tripped a mine or two away from the camera on the higher floors. The fifth person exited the Sub-Basement and stepped on a mine and did not acknowledge or pay attention to it.

Responses. During set up, a woman started picking up the landmines until we told her to stop and explained our IQP to her. She apologized and told us she thought the land mines were trash at first. This was understandable because the mines were little more than sheets of bubble wrap and tape, but at the same time, she should have suspected something from the way they were placed on each floor, in very similar positions, and taped to the floor. She also claimed that she did not see the signs that we hung up on the walls.

The two people who read the signs aloud had the following conversation: "Says don't step on the mines" "What?" "Just step on the landmines." "Guess it's a joke or something". While we have clear information on those five people, we do not have a complete tally of the total number of people who passed through the area during this trial.

One group of people deliberately stepped on a group of about six landmines according to Max. Two people engaged Max in conversation during the trial. The first person asked "Are you watching people just step on this?" and he responded "Yes actually". That person then continued upstairs and asked him what the purpose of the study was. There were some technical difficulties with Nick's microphone however so we don't have a record of the rest of the conversation. The second person who talked to Max was another person who wanted to know what was going on and got the message after being told it was an IQP. Thankfully most students and faculty at WPI know that some projects ran by students can be silly and odd. Max noted that

he kept hearing people pick up the land mines instead of stepping on them. Nick stated that a woman asked to borrow some spare bubble wrap and admitted to enjoying popping bubble wrap.

Discussion

Between the three trials, we had upwards of twenty-five people pass through the mine fields, over a dozen instances of landmines being set off, about ten instances of people asking us questions about what was happening or talking to each other about the landmines, several people took or asked to have some landmines/bubble wrap, and nobody was hurt or disturbed by the experiment.

A few ideas incorporated in this experiment worked well, while others did not hold up as well. On the positive side of the spectrum, the mines were completely safe, and the placements worked well in that they roped in people who didn't pay much attention into the signs and still produce clear reactions. One such case was when one student, who was carrying a few books and not looking down, coming to a complete stop after "detonating" one of the land mines. The larger signs used in the 3rd run were expected to attract more attention and better inform readers, but it was still impossible to determine whether or not each person noticed or read them unless they spoke of it out loud. The bubble wrap pops were also not as loud as desired. Larger bubbles would have produced more noise but at the cost of a greater slipping/tripping hazard. Therefore, we opted to continue using the current bubble wrap. One participant remarked that it was difficult to identify the bubble wrap squares as mines and that the setup may be misinterpreted as an unusual art installation, as the building already had quite a few of. This revealed some flaws in the experiment. The signs may not have stood out enough; many people failed to notice them. Many people were unsure of what to do with the mines or what was expected of them. It wasn't made clear to them whether it was a simple prank or a game to play

along in. It resembled the "obscure gameplay" mistake in Gamification that Adam Kleinberg (2012, p. 5) warned against.

Overall, we saw that plenty of people at WPI were willing to interact with and participate in the Gamification experiment. Although many people rushed through either unaware of the setup or more focused on reaching their destination, plenty of others were willing to take the time to have fun and take advantage of the opportunity presented to them. This experiment gave us faith that future Gamification attempts at WPI could continue to generate positive responses

Changes for Next Time

If we were to run the experiment again though, there are a few things that we would do differently. Larger bubbles could generate more noise and stood out more than the small bubble wrap we used. We could use larger signs that stand out more and used more of them. We could try using hidden cameras and microphones and just leave the area, since some people get shy and nervous about their actions when there are other people around, and our hiding places weren't perfect. We could try making a bigger entrance to the "Rabbit hole" by thinking of ways to let people know that there is a mine field in the area and try to make them go out of their way to see what it is.

If we were to attempt this experiment with a larger budget, some more options would be presented to us. We could use mats/pads that look like landmines and set up weight sensors to them and have them play explosion sounds through a speaker when stepped on. We could set up decorations like barbed wire and sandbags to make it look like a battlefield of sorts, maybe put spotlights on the mine to get people to look at where they are going and guide their attention. If this were a commercial Gamification project, that is probably what it would look like.

Experiment 2: Battery Recycling Bin

The goal of this experiment is to influence students to continue actively disposing of batteries in the proper bins even after our gamified 'Battery Recycling Bin' is removed. In order to determine whether or not this goal was achieved, we planned to collect and compare the weekly data on usage of battery recycling bins for several weeks leading up to the deployment of the 'gamified' bin, for every week during deployment, and for several weeks after our bin is recall. Due to the nature of the experiment and our personal guidelines, we would only declare the experiment successful if the average usage in one or more of these bins after recall remained higher than that prior to deployment. To 'gamify' the bins, we planned to change the color or appearance of the bins so that they stood out more than the current grey ones, add a sensor to them one at a time (the sensor would move to the various bins so we could collect data from all of them) that causes a little bar on the side to light up, potentially add a high score that totals the highest number of batteries in the Gamified bin in a given week, and educate people with these bins so that they know the locations of the others by having signs next to them that tell them where they could be found. The bin would have been placed in the building on WPI contains the two Game Development labs, in a location where a large number of lectures are held, and in the Academic Technology Center, or ATC. For our battery recycling bin we used an Arduino, programmed and wired by Devon Locke (RBE class of 2016), that uses an infrared sensor to count batteries that pass through it. These batteries, if done in succession without any long pauses, will cause an LCD screen, also attached to the Arduino, to display a number which equates to player's 'score'. To make the bin itself, we used a small trashcan which we then painted and added our own hand-made lid that contained the electronics. The bin would be decorated to resemble a battery. However, some major issues arose during the process of gamifying the battery recycling bins.

Figure 5. Incomplete battery recycling bin

Setbacks and Failure

Due to technical difficulties, the plan of having a small light bar fill up in response to the weight of batteries placed in the bin had to be cancelled. It was discovered that the more weight sensors than we had ordered were required for proper functioning and data collection. Another plan display the 'high score' was cancelled due to the limits of the screen purchased. From this we realized that we should have received expert consultation for the setup of the Arduino and electronic components. Our expert to be consulted was Kevin Burns (RBE class of 2014).

The Arduino needed for the battery bin caused many delays and ultimately ended up breaking right before the planned 1st run. Wiring everything together was something we had particular difficulty handling. "We can get this to work if we find the right people to help us," was what we thought, but even the help we received wasn't enough to get it to work. This plan was at heart a really good stretch for what we could accomplish, but our lack of experience and skill with Arduino and coding resulted in several setbacks that ultimately ended the entire plan.

Experiment 3: Trashketball

In response to the failure of the planned Battery Recycling Bin, the backup experiment, Trashketball, was implemented. For Trashketball we took sculpting wire, a cardboard box, and a very large trash bag and made a basketball hoop with a backboard. The idea was that by making it more enjoyable to throw out trash, people would be less likely to litter. This is probably about as low budget as we could make a project. It was taped to the side of a building with a free throw line on the ground in front of it. The name of the game was also written on the backboard to help inform people about the setup.

Figure 6. Trashketball

We ran the experiment on April 15th, 2014 from about 1:00 PM to 2:00 PM outside of Atwater Kent Laboratories. We attached the backboard and bag to the side of the building with a lot of duct tape and gaffer tape to minimize the risk of it falling down or being blown away by the slightly strong winds present during the testing period, and placed a free throw line made of duct tape on the ground a few feet away. Jayson and Nick sat nearby with audio and video recorders, observed the people who passed by, and talked with those curious about Trashketball.

Results

Trashketball attracted the attention of approximately 56 people. The approximation is due to a large tour group of 30+ people that passed by at one point. The density of the group, obstructions in the line of sight, and distance prevented us from accurately counting the number of people who noticed it. We did observe at least 4 or 5 people from the group turn their attention towards Trashketball. 3 of the 56 people stopped to speak with Jayson and Nick concerning the setup. Not one person threw any trash into the bag or even dropped any in.

Discussion

There are several things that could have gone wrong with Trashketball that fortunately didn't. The bag could have been torn or broken; the backboard could have been ruined by messy objects being thrown at them; the frame could have been warped from the force of objects tugging the bag down; and the entire rig could have fallen apart or off the wall.

One of the biggest fears that we had going into Trashketball that became a reality is that nobody played it. However, this was not because they didn't want to participate. In truth, none of those people had trash on them to dispose of. Of the three people that talked to Jayson and Nick, two of them stated that they would have used Trashketball if they had trash on them. One of them jokingly threw his keys into it (which were promptly returned to him). Jayson threw some clumps of woodchips into the bag after a few minutes to demonstrate that it is indeed a functioning trash bag, hoping to encourage others to use it. However, still no one appeared to have trash to dispose of.

Another problem we noticed was the location that we chose to setup Trashketball. While the Atwater Kent building is a popular location on campus, people exiting the building couldn't really see Trashketball or the 'free throw line' (which did attract some attention) unless they

turned sharply and looked at the wall or at the ground. One of the people who talked to us told us that she didn't notice it until after she looked across from us, as she was exiting the building. We could have prevented or tried to mitigate this issue by placing some signs in view for those exiting.

Ultimately, many of Trashketball's shortcomings could have been avoided had we more time. Originally intended as a backup plan should either The Minefield or Battery Recycling Bin fail to be implemented, this Gamification had little prior planning behind it. By the time its implementation became necessary, there was little time remaining to make more detailed plans or obtain additional supplies. Otherwise, we could have constructed a more eye-catching version of Trashketball by adding lights, drawn chalk lines resembling those of a basketball court, created cardboard cutouts of imaginary fans in a stadium with motivating signs, or anything else barring the use of electronic sensors.

Conclusions

We managed to successfully entertain and amuse several people, just by changing ordinary things in their lives, including the paths that they walk on and how that can throw away their trash. We're quite sure that fun can be used to change people's behavior for the better after running these experiments, even if we didn't get the best of results from each one. We successfully gamified walking through areas and throwing away garbage, and people genuinely enjoyed it and some even talked to us about why we were doing it and ways we could make things even better. Our Gamifications weren't as big as commercial ones and didn't incentivize anyone, but we still did a good job of impacting people. Though only two of the three experiments worked out, "The Minefield" and "Trashketball" – were fun and made people happy, and "Battery Recycling Bin" was worth trying to pull off. All things considered, we

believe that we were successful with this project and believe that future attempts at Gamification at WPI could be very successful if future students follow what we did.

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