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UNDERSTANDING GAMIFICATION

Bohyun Kim

Library Technology Reports
Expert Guides to Library Systems and Services

FEB/MAR 2015
Vol. 51 / No. 2
ISSN 0024-2586

Library Technology
REPORTS
Expert Guides to Library Systems and Services

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ALA TechSource
alatechsource.org

American Library Association

Library Technology
REPORTS

ALA TechSource purchases fund advocacy, awareness, and accreditation programs for library professionals worldwide.

Volume 51, Number 2

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ISBNs: (print) 978-0-8389-5953-4
(PDF) 978-0-8389-5954-1
(ePub) 978-0-8389-5955-8
(Kindle) 978-0-8389-5956-5

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Library Technology Reports (ISSN 0024-2586) is published eight times a year (January, March, April, June, July, September, October, and December) by American Library Association, 50 E. Huron St., Chicago, IL 60611. It is managed by ALA TechSource, a unit of the publishing department of ALA. Periodical postage paid at Chicago, Illinois, and at additional mailing offices. POSTMASTER: Send address changes to Library Technology Reports, 50 E. Huron St., Chicago, IL 60611.

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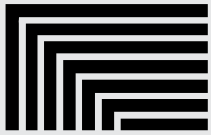

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Abstract

Gamification, which refers to applying gaming elements to a real-world activity, is not necessarily a new idea. But (1) the rapid adoption of the smartphone, (2) the tremendous growth of the mobile web, and (3) the increased use of social media have made it possible for gamification to be implemented in an unprecedentedly seamless, ubiquitous, and social manner, thereby transforming it into a portable activity interwoven with reality. This report explains the concept of gamification and how it differs from related concepts such as games, playful design, and toys; distinguishes game mechanics, dynamics, and aesthetics from one another; describes a number of gamification examples and projects in businesses, education from K-12 to higher education, and public and academic libraries; and discusses what they do, how they work, and how successful they are. This report also addresses a number of issues and variables that need to be taken into consideration when designing successful gamification for educational purposes, including the undermining effect of gamification's external rewards on intrinsic motivation.

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Chapter 1

The Popularity of Gamification in the Mobile and Social Era

Game vs. Gamification

Computer and video gaming is a huge and widely popular industry. The worldwide video game marketplace, which includes video game console hardware and software and online, mobile, and PC games, was forecast to reach $111 billion by 2015, driven by strong mobile gaming and video game console and software sales.[1] According to the *2013 State of Online Gaming Report* by Spil Games, the number of people who play games on computers, tablets, and smartphones "is expected to surpass 1.2 billion by the end of 2013,"[2] which is approximately 17 percent of the world's population. Over 700 million people play online games worldwide, which is more than 44 percent of 1.6 billion, the world's online population.[3] Also astonishing is the amount of time that people spend on playing games. According to game researcher Jane McGonigal, there are currently more than half a billion people worldwide playing computer and video games at least an hour a day, 183 million in the United States alone, and five million gamers in the United States are spending more than forty hours a week playing games, which is the equivalent of a full time job.[4]

Gamification has some similarity to games, but they are not exactly the same. The term *gamification* was coined by Nick Pelling in 2002.[5] But it wasn't until the second half of 2010 that the term came to see widespread adoption.[6] As the term suggests, gamification is not quite creating a game but transferring some of the positive characteristics of a game to something that is not a game, thus, gami-"fy"-ing. Those positive characteristics of a game are often loosely described as "fun," and they have the effect of engaging game players in the activity. The fun in gameplay is engineered by the four building blocks, or defining characteristics, of a game: goal, rules, feedback system, and voluntary participation.[7] In gamification, these building blocks more or less still appear but in a less pronounced manner.

Going places is mostly a mundane activity. We go to a supermarket for grocery shopping, drop by a pharmacy to pick up our medicine, visit a museum on a weekend, meet up with friends at a restaurant, and go to a dog park to walk our dogs. These are things we do in real life. Foursquare, a well-known gamification mobile app that launched in 2009, gamifies this common activity of visiting places. It invites people to check in at places, leave tips about them—such as "French toast is great at the so-and-so restaurant, but coffee is terrible"—and see which places their friends visited and what kind of tips they left. You get points and badges as you check in more. You can become the "mayor" of a certain place in Foursquare, and you may even get a tangible reward, such as a free cup of cappuccino, for the "mayor" status if you are lucky. (Foursquare removed the mayorships when it created another app call Swarm to handle check-ins in 2014 separately fro Foursquare.)

Foursquare is somewhat like a game. Participation is completely voluntary. It has a minimal rule that in order to check in to a place, one must be in close proximity to that location (tracked by the smartphone's GPS). When you check in, you get immediate feedback from the app, such as "Welcome back," and sometimes even surprise badges (see figure 1.1). On the other hand, Foursquare is clearly not a full-fledged game. When I use Foursquare, I am not playing any character or visiting a fantasy world. There is no clear goal in this gamification other than perhaps socializing with others about common locations. There is no puzzle to solve or competition to win. The things I do in Foursquare are exactly the things I do in my

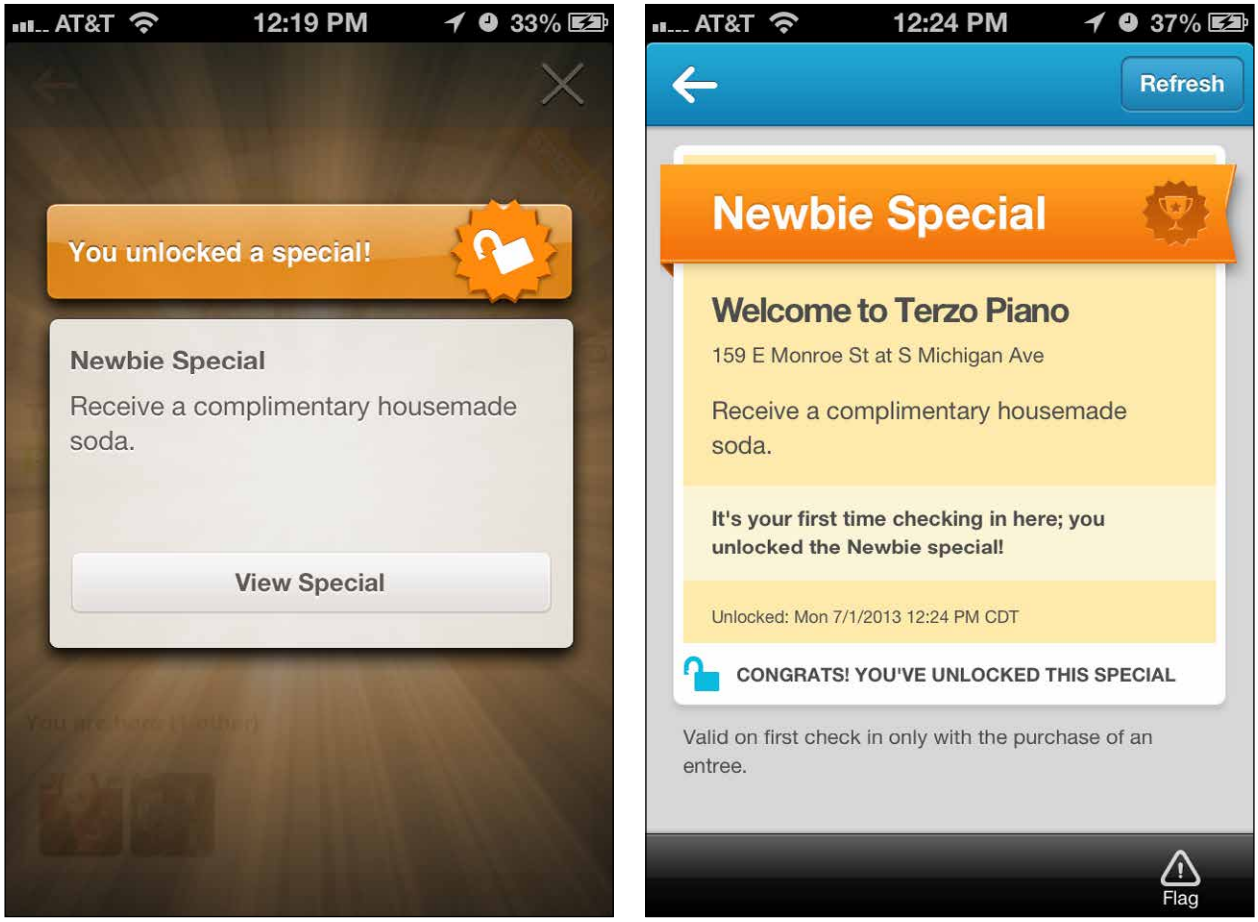

Figure 1.1
The "Newbie Special" badge that I unlocked in Foursquare. I received a complimentary housemade basil soda.

real life. But Foursquare still seems to succeed in making those mundane, everyday activities a little more fun and exciting by adding game-like elements such as points and badges. If you ever cared about being the "mayor" of your favorite coffee shop, for example, whether it was for the free cup of cappuccino or for the bragging rights to your friends, you are not alone. Foursquare reached 45 million registered users and surpassed 5 billion check-ins in December 2013.[8]

Just as Foursquare gamifies visiting places, Waze gamifies another everyday activity, driving. Waze is a GPS app with gamification built in. It not only gives you driving directions but also lets you see various tips left by other users, such as heavy traffic, foggy weather, an accident, and construction on the road (figure 1.2). Waze shows each user on the map with different visual mascots, along with their points and ranks. Waze users can chat or leave messages for one another. This encourages them to leave and share more driving tips with the community. It can be exciting and fun to be tipped ahead about problems on the road. It is rewarding to get a thank-you message from other Waze users about the tip that one left about the construction on the highway. Unlike a full-fledged game, however, Waze has a very limited number of actions one can take: getting directions, adding driving tips to the map, and communicating with other users. These are also all closely related to the real-life need and goal of getting to places as quickly as possible while avoiding bottleneck areas. A Waze user will be driving whether she plays Waze or not. But Waze adds a little bit of fun to driving and helps you pick a faster route to your destination.

Gamification has received a lot of attention recently in both business and education. *Fortune* magazine reported that companies were realizing that gamification, which uses the same mechanics that hook gamers, is an effective way to generate business.[9] In 2011, gamification was added to Gartner's hype cycle for emerging technologies.[10] Companies are leveraging gamification as a strategy to engage consumers and clients with interesting game-like mechanisms and incentives for the purpose of promotion, marketing, engagement, and customer loyalty. Over 350 companies have launched major gamification projects since 2010, and from 2012 to 2013 alone, consulting companies Deloitte,

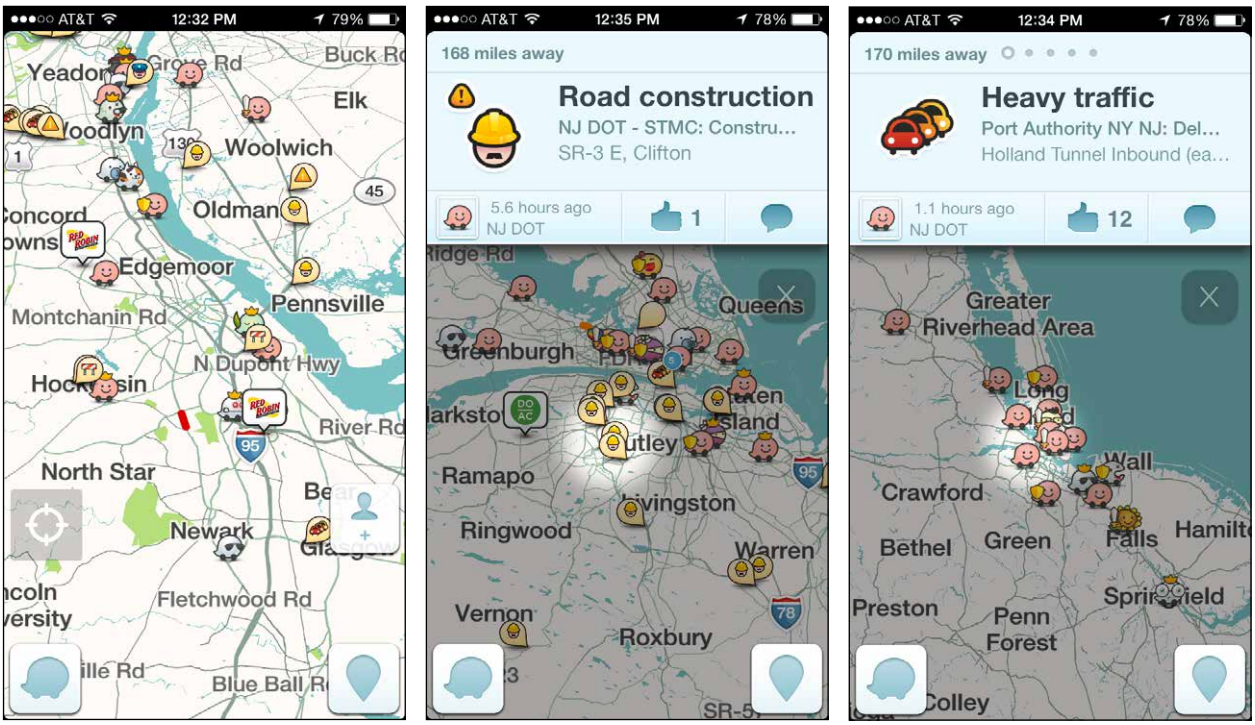

Figure 1.2
Waze screens on the smartphone showing other users' locations and the current road conditions, such as heavy traffic and road construction.

Accenture, NTTData, and Capgemini began practices targeting gamification of Fortune 500 companies.[11] Jimmy Choo, a luxury brand in women's shoes, ran a gamified one-day promotion in 2010, which resulted in approximately 20,000 participants and hundreds of thousands more women who followed the game remotely. It used the streets of London as its game board and social networks as its platform in a game called CatchAChoo.[12] In order to win the prize of six pairs of trainers, participants were asked to discover certain hidden locations in London announced by the company via Facebook, Twitter, and Foursquare. This event cost well under $100,000 but turned out to be the single biggest promotional event for the company in its history.[13]

Gamification is increasingly being adopted in education as well. Quest2Learn, a charter school in New York City, is attempting to gamify an entire school system. Quest2Learn has made the entire learning process into a game, with elements such as boss levels, quests, missions, avatars, and incentives.[14] In Quest2Learn, classes such as math, science, languages, and social studies take place in virtual game worlds, which have bad guys and monsters to defeat.[15] According to the information in its Curriculum web page, Quest2Learn uses games as rule-based learning systems, creating worlds where players take on the identities and behaviors of appropriate characters such as explorers, mathematicians, historians, writers, and evolutionary biologists; use strategic thinking to make choices; solve complex problems; seek content knowledge; receive constant feedback; and consider the point of view of others.[16]

The potential of gamification has begun to receive attention in higher education, too. The *NMC Horizon Report: 2012 Higher Education Edition* reported that game-based learning would be increasingly widespread in higher education over the next few years.[17] The *NMC Horizon Report: 2013 Higher Education Edition* repeated this prediction but added the term *gamification* for the first time, thereby placing both gamification and game-based learning on the two to three years of time-to-adoption horizon.[18] In 2014, the *NMC Horizon Report* continued to place games and gamification on the two to three years of time-to-adoption horizon.[19]

Gamification in the Mobile and Social Era

Some may argue that the concept of gamification is as old as the idea of the Olympic Games, in which the status of an Olympic Games winner was symbolized by an olive-leaf crown and three-time winners were given the reward of getting their own bronze or marble statues made to be displayed at Olympia.[20] But such a claim ignores a significant backdrop of gamification, which consists of three elements: (1) the rapid adoption of the smartphone, (2) the tremendous growth of the mobile web, and (3) the increased use of social media.

As of January 2014, 83 percent of American adults in the age group 18–29 and 74 percent in the age group 30–49 own a smartphone.[21] Smartphones make it possible for people to access and use the Internet on the go. Suddenly, all the information stored at the world's largest library—that is, the Internet—was made available on the small screen of a smartphone, which can be carried everywhere we go. Furthermore, the GPS chip in the smartphone has made it possible for people to track their own locations as well as find out the locations of other people who share their information. The rapid adoption of the smartphone inevitably led to the tremendous growth of mobile data traffic, which again resulted in the rise of the mobile web—the part of the World Wide Web that is accessed by mobile devices—as the competitor of the traditional desktop web.[22] Over the five-year period from 2007 to 2011, wireless data traffic on AT&T, the second largest wireless carrier in the United States, has grown 20,000 percent, at least doubling itself every year since 2007.[23] Mobile data traffic is expected to grow by 61 percent annually into 2018, with the extra traffic from just one year, 2017, to be triple the size of the entire mobile Internet in 2013.[24] The most common use of the smartphone by far is in accessing social networks such as Facebook and Twitter. In 2013, smartphone users spent nine hours and six minutes a month on social networks, compared to one hour and fifteen minutes a month streaming video on the device and around one hour and eleven minutes engaged in sports-related news and videos.[25]

The combination of these three elements—the smartphone, the mobile web, and social media—made possible the popularity of gamification apps such as Foursquare and Waze. Without the smartphone and a fast enough mobile web, people would have been unable to use these gamification apps in any meaningful way. The GPS feature of a smartphone allowed people to easily share their locations. And the mobile web made the real-time information sharing on such gamification apps a reality. People who were used to the social media not only quickly adopted these gamification apps as another means to keep track of and share their own and their friends' everyday activities but also started sharing and displaying the points and the badges that they earned on social media, thereby increasing the popularity of gamification itself.

What is new about gamification is not necessarily the idea of applying gaming elements to a real-world activity, but how seamlessly, ubiquitously, and socially those gaming elements are now applied. We now carry our address book, e-mails, notes, calendar, map, social media accounts, and even spending history and patterns (if you use one of those personal finance apps) in one small smartphone. Being placed in the same device where all this information resides and which we carry everywhere we go, games can easily slip into our real-world activities. This is a real difference between today's gamification mobile apps and all the past attempts at utilizing games and game elements for a real-world purpose. Commercial video games have been popular for years, and many of them had impressive graphics and sophisticated narratives. But the smartphone, the mobile web, and the social networks completely changed where and how games are played and game dynamics can be applied. With those three elements in place, games were transformed into portable activities interwoven with reality. If we could not carry a smartphone when we go out for a run, for example, how could we make use of Nike+, an app that gamifies running? It is this new mobile and social era that enabled games to become pervasive in everyday activities beyond an imaginary game world confined to a computer or a video game console. While there have been "serious games," which tried to utilize game elements and dynamics for education beyond mere entertainment, those serious games never achieved the same level of popularity that gamification did.

Nike+
www.nike.com/us/en_us/c/running/nikeplus/gps-app

The significance of the smartphone, the mobile web, and social media in the wide adoption and popularity of gamification does not mean that gamification must take the form of a mobile app. As we will see in the next chapter, everyday activities such as recycling or observing the speed limit while driving can be gamified without the use of a smartphone or the Internet. What makes something a game is never purely technology. However, understanding the significance of these three elements in the recent trend of gamification provides a vantage point from which we can determine where the strength of gamification lies. A simple way to understand the difference between gamification and games is that while games tend to create an imaginary world that is separate from reality, gamification creates a game layer on top of the real world.[26] We do not enter a fictitious game world when we play Foursquare, Waze, or Nike+. Instead, those gamification apps create a game layer on top of real-life activities using game elements such as points, badges, and leaderboards.

Gamification rewards our behavior on the web, often on the mobile web, with social connections and statuses. It even occasionally offers discounts or freebies that can be used in the real world. As we spend more and more time online, the boundary between our online and real life will only become increasingly blurry, and more things will start crossing over between these two domains. Gamification is an early

harbinger of this broader trend. In the next chapter, we will take a look at a number of examples of gamification and see how we can define the concept of gamification more clearly and differentiate it from other related concepts.

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Chapter 2

Gamification

Examples, Definitions, and Related Concepts

Gamification and games share many characteristics. Just like games, gamification provides us with a fun activity to do, has rules to follow, and can require various levels of technology, from none to simple or advanced. It can also be seen as a trivial pursuit; it may serve many different purposes for different individuals in different contexts, from destressing to excitement;[1] and it can be addictive sometimes, just like games. However, there are some important differences between games and gamification. We will review a number of examples of gamification in this chapter and see if we can identify those elements that differentiate gamification from games.

Making Recycling Fun with the Bottle Bank Arcade Machine

The Bottle Bank Arcade machine is a green recycling box that collects used glass bottles. It has six holes for bottles, and each hole has a blinking light flickering in bright colors on top. It is fitted with a display panel, which records the scores. The Bottle Bank Arcade machine invites people to not only simply deposit bottles but also to play an old-fashioned arcade game with those bottles. Once people press the Start button, one out of six lights lights up, thereby indicating where one should insert a bottle. If you put in a bottle in time, you score points. The video on the Fun Theory website shows people stopping, intrigued by sound and lights; depositing glass bottles with smiles on their faces; and even a kid jumping up and down in excitement. The Bottle Bank Arcade machine was designed to encourage more people to recycle bottles by making it fun. According to the result mentioned in the video, it certainly seems to achieve its goal. Almost a hundred people used it in just one evening while the nearby conventional recycle bottle bank was used only twice.[2] The Bottle Bank Arcade machine received the Fun Theory Award, which is an initiative by Volkswagen. According to the award website, "the fun theory" means that fun is the easiest way to change people's behavior for the better, and the award is given to an idea or an invention that helps prove the fun theory.[3] This is an interesting way to state the concept of gamification.

The Fun Theory
www.thefuntheory.com

The Speed Camera Lottery, the World's Deepest Bin, the Play Belt, and the Piano Stairs

Other winners of the Fun Theory Award include the Speed Camera Lottery, the World's Deepest Bin, the Play Belt, and the Piano Stairs. The Speed Camera Lottery machine photographs those who are driving both within and above the speed limit. Law-abiding citizens are automatically entered into a lottery, while those who break the law are issued citations. The best part is that the cash reward for the lottery winners is funded by the fines paid by those who broke the law. The video on the Fun Theory website reports that during the three-day trial period, 24,857 cars passed the Speed Camera Lottery machine. The average driving speed went down from 32 kilometers per hour

Figure. 2.1
The screen images of a gamified to-do app, EpicWin. My tasks are listed as quests with certain points, which takes me farther along in my avatar's travel and lets me find and collect items.

to 25 kilometers per hour, a 22 percent reduction.[4] The World's Deepest Bin was designed to produce sound whenever someone dropped garbage into it, as if something very heavy had been thrown into a tremendously deep valley, thereby encouraging people to use a garbage bin instead of littering.[5] The Play Belt is a safety belt that turns on the in-car entertainment system mounted on the back of the front seats when the belt is in use. The belt is a way to reward the use of a safety belt by making the in-car entertainment system available.[6] The Piano Stairs are stairs made to look like a piano keyboard and engineered to make the sound of each piano key when people step on different steps.[7]

As you can imagine, the video of the World's Deepest Bin in use shows people trying to peer inside the bin itself with a curious look on their faces. It succeeded in collecting almost double the amount of garbage compared to an ordinary waste bin. The Piano Stairs, installed right next to an escalator, effectively changed people's behavior, increasing the use of the staircase by 66 percent. Both videos can be viewed at the Fun Theory website.

Get Things Done with EpicWin and Chore Wars

The Bottle Bank Arcade machine, the Speed Camera Lottery, the World's Deepest Bin, the Play Belt, and the Piano Stairs demonstrate that by adding a bit of fun to everyday activity, people can be persuaded to act in a more socially responsible, safer, and healthier way. If fun can change people's behavior, could it help people get everyday tasks done on time that are often put off until the last moment?

EpicWin is a gamified to-do list app dressed up with a RPG (role-playing game) setting. It allows one to create to-do list items and assign points that will be earned when the task is completed (figure 2.1). Those points can fall under any of the five categories: strength, stamina, intellect, social, and spirit. EpicWin invites people to see themselves as a character on a quest for various treasures and encourages them to complete their everyday tasks. With its nice visual design and fun sound, EpicWin throws a layer of lightweight fantasy over a to-do list that is often boring and dull to look at.

EpicWin
www.rexbox.co.uk/epicwin

Chore Wars is a computer game that allows players to claim experience points for doing household chores. As members of a household or a workplace, people can earn experience points by performing individual tasks and chores, which are called "quests," and level up. Experience points can be used to develop one's character or exchanged for gold, treasure, or equipment, which can be further redeemed for a real-world reward, depending on the decision of a group.

Chore Wars
www.chorewars.com

Staying in Budget and Saving Money with Gamified Banking

If gamification can get people to tackle their chores and tasks, could it also similarly influence their spending and saving behavior? Simple applies a gamification strategy to help people understand their personal finances better and manage them more wisely. Users can download its mobile app for the iOS and the Android platform. Instead of showing the amount of money available in your account, the Simple bank app shows the effective balance in your bank, taking into account and deducting recurring bills such as rent or mortgage, utilities, and so on. It also makes you plan your purchases ahead and set them up as goals with saving plans. If you want to buy a fancy espresso machine, the Simple bank app lets you set into a game a specific goal that has an emotional meaning to you—delicious espresso every morning—with a certain due date for saving the five hundred dollars for that purchase. According to the experience of a user of this app, running all savings via goals can change one's whole attitude toward saving and make one view savings as an anticipatory pleasure rather than denying oneself.[8] While Simple is a very lightweight game, with a simple setup for goals and rules and no other game elements, such as points or levels, it certainly seems to have the potential for solving the overspending problem that many of us experience.

Simple
https://www.simple.com

Promoting Fuel Efficiency and Energy Savings through Gamification

An automobile company, Nissan, gamifies driving with its Carwings program. Carwings is a mobile app for smartphones designed for the owners of the Nissan Leaf. It allows owners to compare their driving performance to other local drivers, see their status in a regional rankings dashboard, and earn bronze, silver, and gold medals and a fancy platinum award, thereby encouraging them to drive in a more fuel-efficient manner.[9]

Carwings
www.nissanusa.com/innovations/carwings.article.html

In 2012, San Diego Gas and Electric (SDG&E) gamified energy-saving activities. For three months, approximately two hundred people played a social gaming app, which provided them with real-time information about their energy savings integrated with a control device at home. Those who participated in this energy-saving contest competed with one another and earned points and badges by increasing their energy savings.[10] The result was quite successful. The winner of the SDG&E's Biggest Energy Saver Contest achieved as much as 46.5 percent energy savings, equal to 1,356 kilowatt hours for her family of three, and those who used the same energy-saving gamification app achieved 20 percent savings on average, compared to 9 percent by those who used only the device without the gamification app.[11]

Making Exercise Fun and Social

Gamification proves to be quite popular in the area of fitness as well. Zombies, Run is a mobile running app, which sets you up as a hero in the middle of a zombie apocalypse. It asks you to run at a certain speed and with certain intensity in order to survive zombie attacks, avoid zombie hordes, and collect supplies along the route. While you are running, the app tells you more and more details of the story about the zombie apocalypse, which becomes the backdrop of your running exercise. When the Zombie Chase mode is turned on, users are basically asked to perform interval training. When you finish the run and are back home, you can release the supplies you collected to particular bases, so that those bases can grow and expand to fight more zombies. This also lets you gain access to other running missions and adventures in the app. Users can also view the report of their running speeds and distance and share it with friends on social media. Zombies, Run has currently over eight hundred thousand users according to its website.[12]

Zombies, Run
https://www.zombiesrungame.com

Nike+ is another gamification running app. Launched in 2007, it has approximately eighteen million users worldwide.[13] Nike+ allows people to track, share, challenge, and interact with friends and other runners across the world, thereby making running, usually a solitary activity, into one that is socially exciting and even collaborative. One can set up goals and challenges for oneself or a group, earn trophies and badges by achieving those goals or meeting the challenges, and move up to higher levels. For example, one receives the Jack O Lantern Badge by running on Halloween and earns the Platinum High Mile Trophy by running over a hundred miles in a month.

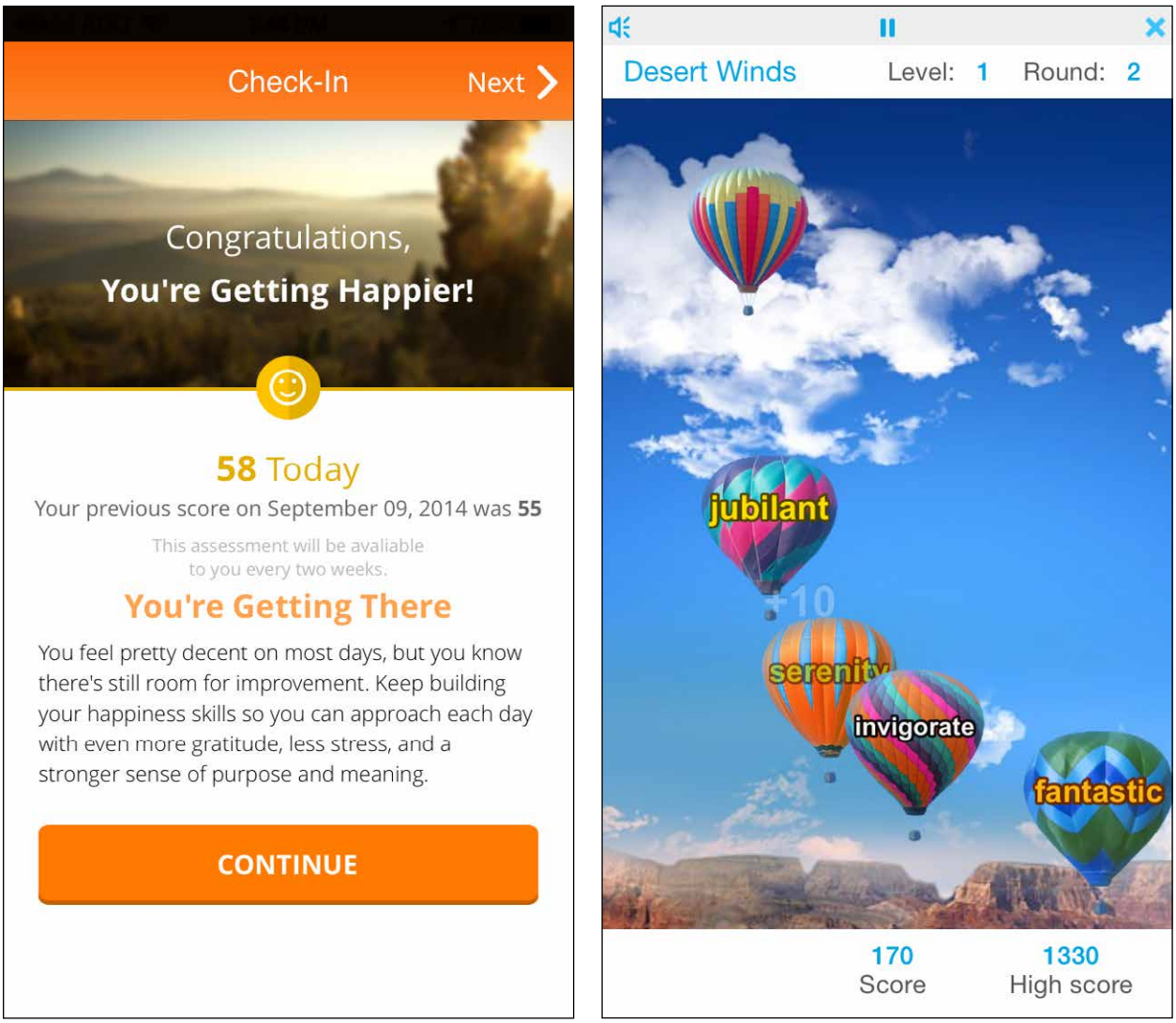

Figure 2.2
The screen images of a gamified happiness app, Happify, showing the happiness points and feedback and one of the game-like activities in the app.

Sometimes, surprise prizes are delivered electronically to players when they complete challenges. These include videos of praise from celebrity athletes and other potential heroes.[14]

Nike+
www.nike.com/us/en_us/c/running/nikeplus/gps-app

Maintaining Relationships and Happiness through Gamification

Gamification apps such as Kahnoodle and Happify try to apply gamification even to areas of relationship and happiness. Kahnoodle debuted in 2013 as the first gamification app for a couple's relationship. In this app, partners are encouraged to fill the so-called Love Tank by taking considerate actions, giving presents, and doing activities together, thereby earning points and getting rewards in the form of a coupon redeemable in reality by his or her partner. Although it received a lot of attention as the first gamification app for relationships, Kahnoodle seems to no longer exist.

Another gamification mobile app, Happify, applies gamification strategies to happiness and wellness (figure 2.2). It claims that it can increase users' happiness with fun activities and games, help people learn life-changing habits based on science, and reduce stress. It presents several questions for you to answer about how you feel about your current life and assigns you

a certain Happiness Score. After that, it asks you to choose a track to work on such as Conquer Your Negative Thoughts. Each track asks you to perform tasks that are game-like, such as popping air balloons with positive words only. By playing these games and other game-like activities you earn points and medals and get to move on to other tracks with different activities. As you advance, Happify regularly asks you the same questions that it asked in the past and informs you if the score went up or down. While creating happiness through gamification may appear to be a dubious idea, reviews by actual users in the Apple App Store are positive.

Happify
www.happify.com

Apple App Store: Happify
https://itunes.apple.com/us/app/happify/id730601963?mt=8

Now that we have seen a number of examples of gamification, it's finally time to think about what these examples have in common. They all appear to share some game elements, which range from challenge, points, levels, badges, and trophies to competition. Not all but some of them also have a social element such as statuses and leaderboards. All of them attempt to transform a mundane activity into something a little more exciting and fun.

The Definition of Gamification and Related Concepts: Game, Playful Design, and Toys

Zichermann and Cunningham define the concept of gamification as follows.

> Gamification is the process of game-thinking and game mechanics *to engage users and solve problems*.[15] (Emphasis added)

This definition focuses on the purpose of gamification and emphasizes its goal, that is, user engagement and problem solving. This definition seems to explain many of the examples of gamification we have seen. Nike+ engages people in their running activities and solves the problem of not exercising enough. Chore Wars motivates people to get their chores done, thereby solving the problem of people neglecting to do or putting off their chores. The Piano Stairs motivates people to stay fit by taking the stairs rather than the elevator. The World's Largest Bin helps people to keep streets clean and litter-free. As a result of gamification, people are engaged and specific problems are solved.

However, this definition does not seem to help us much in distinguishing gamification from games, particularly the game genre called "alternate reality game" (ARG). What differentiates an ARG from other types of video game is that ARG players make their moves in the real world, not in front of a computer or a video game console screen, and interact directly with other players (i.e., characters) in the game. An ARG uses the Internet as well as other forms of communication, such as mail and phone. For example, Zombies, Run seems to meet most of the conditions for an ARG, even though it doesn't necessarily make players directly interact with one another. So what makes Zombies, Run gamification, not an ARG? To answer this question, let's consider another widely accepted definition of gamification by Deterding, Dixon, Khaled, and Nacke.

> Gamification is the use of game design elements characteristic for games *in non-game contexts*, which is differentiated from playful design and a full-fledged game.[16] (Emphasis added)

By specifying the context to which game design elements are applied, this definition makes a clearer distinction between games (including ARGs) and gamification. The nature of the problem that gamification tries to solve is not fictional but real. In order for something to count as gamification rather than a game, its goal must be solving a real-world problem. Deterding et al. also differentiate the game from "play" relying on Caillois's concept of *paidia* ("playing"), a more free-form, expressive, improvisational, even "tumultuous" recombination of behaviors and meanings versus *ludus* ("gaming"), playing structured by rules and competitive strife toward goals.[17] They find the main characteristic of gaming in explicit rule systems and the competition or strife of actors in those systems towards discrete goals or outcomes and conclude that gamification relates to games, not "play," which lacks those characteristics.[18] Deterding et al. show how gamification is situated in comparison to games, toys, and playful design using a quadrant diagram. The horizontal axis runs from Whole (left) to Parts (right) and the vertical axis runs from Playing (down) to Gaming (up). They place gamification (or "gameful design/gamification") in the top right quadrant between Gaming and Parts. By contrast, games (or serious games used for educational purposes) are in the top left quadrant between Gaming and Whole; toys are in the bottom left quadrant between Playing and Whole; and playful design is in the bottom right quadrant between Playing and Parts.[19]

This distinction is useful in clarifying borderline cases such as the Piano Stairs and the World's Deepest Bin. There is certainly an element of fun in those examples, and they were intentionally designed to solve real-world problems. But they have neither

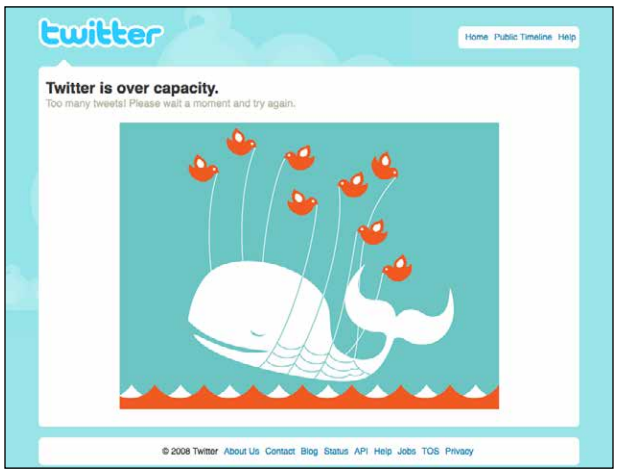

Figure. 2.3
The Fail Whale shown on a computer screen when Twitter was down. [Photo credit: "Twitter Fail Whale is back," https://www.flickr.com/photos/playerx/3090739418, by Flickr user Rob Friedman / playerx / @px, playerx.net, licensed under the Creative Commons Attribution 2.0, https://creativecommons.org/licenses/by/2.0.]

explicit rules nor competition (with others or with oneself) towards a goal, which seem to be essential parts of a game. Consequently, they are more accurately classified as examples of "playful design" than of gamification. Playful design is not 100 percent a plaything (i.e., a toy), just as gamification is not 100 percent a game. Playful design and gamification are both "part of" something that is neither a toy nor a game but serve a purpose similar to that of a toy or a game. The difference between playful design and gamification is that playful design lacks elements such as rules and a specific goal. A famous example of playful design is Twitter's Fail Whale (see figure 2.3). This playful image of a huge whale lifted into the sky from the ocean by many birds appeared in the past whenever Twitter went down and became unavailable to users due to its system overload. By using this playful design as an alternative for the common system error message, Twitter succeeded at mitigating users' frustration, and users came to even find the image of the Fail Whale itself endearing.[20]

Compared to games, gamified applications afford a more fragile and unstable "flicker" of experiences and enactments between playful, gameful, and other more instrumental-functionalist modes.[21] From the perspective of the game designer, gamified applications are built with the intention of a system that includes elements from games, not a full "game proper," but from the user's perspective, such gamified systems can then be enacted and experienced as "games proper," gameful, playful, or otherwise.[22] Marczewski also provides a helpful distinction of gamification from gameful design and serious games as well. According to him, gamification is distinguished from games in that it lacks gameplay and is different from gameful (or playful) design in that gamification possesses game elements while playful design does not.[23]

But not all game researchers agree on this distinction between playful (or gameful) design and gamification and between gamification and games. For example, Kapp defines gamification in the context of learning and instruction much more broadly as follows.

> Gamification (of learning and instruction) is the delivery of content—*for a purpose other than pure entertainment*—using game-based thinking and mechanics.[24] (Emphasis added)

Note that this definition of gamification does not require a rule-based system, unlike the one from Deterding et al. quoted above. Instead, this definition requires only a purpose other than pure entertainment as the defining characteristic of gamification. For this reason, Kapp does not distinguish gamification from playful design nor from full-fledged games as long as they serve a purpose other than pure entertainment. In Kapp's view, the creation of an educational game, which is often called "serious game," falls under the process of gamification because its primary goal is education, not pure entertainment. According to such a broad description of gamification, the Piano Stairs and a full-fledged game that teaches sales skills would both count as examples of gamification.

Whether something is played entirely for its own sake or for some external purpose is, however, a hard question to answer because people can always use one thing for both purposes. One may take the Piano Stairs for both exercise and fun at the same time. This may be why Gartner's redefinition of gamification includes the phrase "experience design." Gartner, a research company, rephrased its definition of gamification "to avoid market confusion, inflated expectations and implementation failures"[25] as follows.

> Gamification is the use of game mechanics *and experience design* to *digitally* engage and motivate people to achieve their goals.[26] (Emphasis added)

This definition is different from the previous definitions of gamification in that it separates "experience design" from game mechanics and specifies the medium of gamification as "digital." It is true that a lot of gamification takes the form of digital media. As shown in the many examples of gamification we have seen in this chapter, the mobile app seems to be a form particularly suitable for gamification. In addition, in the previous chapter I argued that the smartphone, the mobile web, and social media played a crucial role in the concept of gamification gaining popularity. Dominguez et al. go one step further and limit gamification to the domain of software application.

> Gamification could be more narrowly defined as incorporating game elements into a non-gaming *software application* to increase user experience and engagement.[27]

While there is a close relationship between gamification and software application, limiting gamification to the digital realm or software application is overly restrictive. As Deterding et al. argue, games and game design are themselves transmedial categories, and media convergence and ubiquitous computing are increasingly blurring the distinction between digital and nondigital.[28] This is a legitimate argument against restricting gamification to the digital realm only. Gamification can take the form of a paper-and-pencil game or that of a mobile app. What is important in gamification is that it does engage and help people to achieve their real-life goals using appropriate gaming elements and dynamics.

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Chapter 3

Game Mechanics, Dynamics, and Aesthetics

In the previous chapter, we reviewed fourteen examples of gamification and discussed five different definitions. We also compared gamification with three other related concepts—game, playful design, and toys—and clarified how they differ from one another. For the purpose of this report, I adopt the definition by Deterding et al. as the most useful one; that is, gamification is "the use of game design elements characteristic for games in non-game contexts."[1] But we have not yet covered what those game design elements are exactly. In this chapter, we will take a look at game design elements in order to better understand how gamification works.

Game Design Elements

By now, you must have noticed some of the game elements that have been recurring in our examples of gamification, such as points, badges, levels, leaderboards, challenges, rewards, and so on. Other examples of game elements included avatars, teams, narrative, treasures, and ranks. Game elements are relatively easy to identify, probably because all of us have played games before. Points generally indicate how much time and effort a player has spent or the level of achievement reached. While points represent a player's state since the beginning of a game, badges are used to signify the successful completion of a given task. Levels are a kind of stage in which a player grows abilities and powers until she can unlock a new level to move up to. Levels often function as a reward system to encourage players to continue the game. Leaderboards list players by their scores or achievements to create an environment for competition. The *Gamification Wiki* has a useful list of gamification mechanics: achievements, appointments, behavioral momentum, blissful productivity, bonuses, cascading information theory, combos, community collaboration, countdown, discovery, epic meaning, free lunch, infinite gameplay, levels, loss aversion, lottery, ownership, points, progression, quests, reward schedules, status, urgent optimism, and virality.[2]

The *Gamification Wiki* also claims that these game mechanics fall into three types: *behavioral, feedback,* and *progression*. It refers to these types as "game dynamics" and provides the following explanations: (a) the behavioral type of game mechanics (i.e., the behavioral game dynamics) "are solely focused on human behavior and the human psyche"; (b) the feedback type of game mechanics, (i.e., the feedback game dynamics) "complete the feedback loop in a game mechanic"; (c) the progression type of game mechanics (i.e., the progression game dynamics) "are used to structure and stretch the accumulation of meaningful skills."[3]

On the other hand, Priebatsch lists *appointment*, *progression*, and *communal discovery* as three examples of game dynamics. According to his explanation, "The appointment dynamic is a . . . game mechanic in which . . . a 'player' must return at a predefined time to take a predetermined action" (such as "happy hour") to succeed; the progression dynamic is used to display "a 'player's' level of success" and to gradually improve it "through the completion of granular tasks"; and communal discovery is a game dynamic "which involves an entire community working together to solve a problem."[4]

Schonfeld presents another list of the forty-seven game dynamics used by SCVNGR, a mobile, location-based gamification company.[5] Among those forty-seven game dynamics, the following are the unique ones that do not show up in the game mechanics list

in the *Gamification Wiki* mentioned above: avoidance, behavioral contrast, chain schedules, companion gaming, contingency, cross situational leaderboards, disincentives, endless games, extinction, fixed interval reward schedule, fixed interval ratio schedules, fun once fun always, interval rewards schedule, lottery, loyalty, meta game, micro leaderboards, modifiers, moral hazard of gameplay, pride, privacy, ratio reward schedule, real-time vs. delayed mechanics, reinforce, response, reward schedule, rolling physical goods, shell game, social fabric of games, variable interval reward schedule, variable ratio reward schedule, and virtual items.[6]

Each of these is explained in more detail. For example, *behavioral contrast* means the shift in behavior depending on changed expectations; *chain schedules* refers to "the practice of linking a reward to a series of contingencies"; *free lunch* means a situation in which a player gets something because of the efforts of other people; *fun once, fun always* refers to the idea that a simple action maintains a minimum level of enjoyment no matter how many times you do it; *cascading information theory* refers to the tactic of giving out information in the smallest driblets possible to keep players guessing and moving forward; and *moral hazard of gameplay* means the loss of the actual enjoyment of an action itself due to too many artificial incentives to take the action.[7]

These lists were compiled as quick resources for software developers and are not based upon any theoretical or empirical studies. As such, they need to be taken with a grain of salt. Nevertheless, many seem to equate listing game elements like these with understanding gamification itself and identify gamification with game mechanics such as points, badges, and leaderboards. Even the education literature on gamification explains game elements used in learning contexts merely by listing game mechanics such as: points, levels/stages, badges, leaderboards, prizes and rewards, progress bars, storyline, and feedback.[8] While these are legitimate game elements, simple lists do not distinguish the different levels of abstraction in which those different game elements operate. This applies to the existing literature on games and gamification as well.[9]

Understanding How Games Work: The MDA Framework

The MDA framework is a formal approach to understanding games, and it provides a useful model for us to grasp how gamification works. The MDA (mechanics, dynamics, and aesthetics) model breaks down a player's consumption process of game into three parts: *rules*, *system*, and *fun*. These correspond to the following counterparts in a game designer's design process: (a) *mechanics*, (b) *dynamics*, and (c) *aesthetics*.[10] Let's take a look at what the MDA model means by these three counterparts. For ease of understanding, I will start with aesthetics and then move on to dynamics and mechanics in descending order of generality.

Under the category of *aesthetics* are *sensation* (game as sense-pleasure), *fantasy* (game as make-believe), *narrative* (game as drama), *challenge* (game as obstacle course), *fellowship* (game as social framework), *discovery* (game as uncharted territory), *expression* (game as self-discovery), and *submission* (game as pastime). These aesthetics can be understood as different goals of games and the components of *fun*.[11]

Dynamics in the MDA model are the game design principles that create and support aesthetic experience. For example, *time pressure* and *opponent play* are two game dynamics that create and support the aesthetic of *challenge*. The dynamics of sharing information across certain members of a session (a team) or supplying winning conditions that are more difficult to achieve alone are for the game aesthetic of *fellowship*. The aesthetic of *expression* is created and supported by the dynamics that encourage individual users to leave their mark, such as systems for purchasing, building, or earning game items; for designing, constructing, and changing levels or worlds; and for creating personalized, unique characters.[12]

Mechanics refers to the various actions, behaviors, and control mechanisms afforded to the player within a game context. For example, the mechanics of card games include shuffling, trick-taking and betting, from which dynamics like bluffing can emerge.[13]

Another good explanation of the distinction between game dynamics and game mechanics is found in Marczewski's book *Gamification: A Simple Introduction and a Bit More.* He explains that game mechanics are a distinct set of rules that dictate *the outcome of interactions within the system* with an input, a process, and an output, while game dynamics are *users' responses to collections of those mechanics.*[14]

The MDA model is useful because it allows us to consider the perspectives of a game designer and a game player at the same time. Players experience game mechanics as the rules of a game, while designers think of them as various player actions and control mechanisms. Dynamics appear to game players as the system that creates the desirable game experience, while game designers see them as design principles for the interaction between game mechanics and players. Lastly, aesthetics are the goal of gameplay itself for game players. But to game designers, they are the ultimate emotional responses or states that they want to generate in people through the use of game dynamics and game mechanics.

Armed with this understanding of game mechanics, dynamics, and aesthetics, we can now approach the game elements that we have previously seen with a fresh set of eyes. Points, badges, leaderboards,

statuses, levels, quests, countdowns, tasks/quests/missions, and other particular rules and rewards all fall under the category of *game mechanics*. These constitute most of what we immediately notice as game elements. By contrast, those game elements that are concerned with the interaction between concrete game mechanics and players at a more abstract level are *game dynamics*. Examples of game dynamics include appointment, behavioral momentum, feedback, progress, time pressure, and certain abilities that game avatars can develop. Some game elements that we identified, on the other hand, are more accurately classified as *game aesthetics* since they are the desired experience that games attempt to generate through gameplay. Those game aesthetics include elements such as achievement, challenge, discovery, epic meaning, blissful productivity, sensation, and fantasy.

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Chapter 4

Gamification in Education and Libraries

In the previous chapter, we saw that even simple-looking games have a complicated structure of game mechanics and dynamics that are designed to generate the desired game aesthetics. Those game aesthetics constitute what we refer to as the "fun" part of gameplay whether it is the sensation of excitement and joy, the emotions of wonder and curiosity from the discovery of a new world that the game presents, the immersive narrative, the challenge that tests our abilities and boosts our confidence, or the chance to release stress and clear the mind from everyday worries.

If we can experience these game aesthetics in real life as well as in front of a video console or a computer screen, why wouldn't we? If everyday drudgery, dull learning experience, and stressful tasks can be ameliorated with the application of game dynamics and mechanics, wouldn't that be a great thing? Talking about Chore Wars and other apps that gamify reality, a game researcher, Jane McGonigal writes that alternate reality games (ARGs), or in this case gamified applications, are games that you play to get more out of your real life as opposed to games that you play to escape it. She believes that gamification enables people to participate in their real lives as fully as they do in their game lives.[1]

Why Gamify? The Power of Gamification

Gamification is a powerful tool due to its ability to capture people's attention, to engage them in a target activity, and even to influence their behavior. We have already had a glimpse of the power of gamification in the examples introduced in chapter 2:

- The Bottle Bank Arcade machine was used by nearly one hundred people over one night. During the same period, the nearby conventional bottle bank was used only twice.[2]
- During the three-day trial period, 24,857 cars passed the Speed Camera Lottery machine. The average driving speed went down from 32 kilometers per hour to 25 kilometers per hour, a 22 percent reduction.[3]
- When the Piano Stairs were installed in Odenplan, Stockholm, 66 percent more people chose the stairs over the escalator.[4]
- The winner of the Biggest Energy Saver Contest by San Diego Gas and Electric achieved as much as 46.5 percent energy savings, equal to 1,356 kilowatt hours for her family of three, and those who used the same energy-saving gaming app achieved 20 percent savings on average, compared to 9 percent by those who used only the device without the app.[5]
- Approximately 18 million people worldwide play Nike+.[6]

These figures and the impact of various gamification projects well illustrate the real power of gamification in motivating people and even enabling them to change their behavior for a goal that they decide to achieve. Gamification can function as a win-win strategy that results in fun, self-improvement for individuals, and even a social good all at the same time when it is carefully designed to create fun and joy with a goal closely aligned with players' own desires and values.

Game-Based Learning and Serious Games

If gamification can help people to save electricity and exercise more, could it help them learn better as well? Game-based learning and serious games had been a topic of much discussion and many studies in education even before gamification became popular.[7] Game-based learning and serious games focus on using commercial video games or creating full-fledged video games for education. Since gamification uses game mechanics and dynamics for educational purposes, serious games and gamification are often discussed together, and their boundaries tend to blur.

We have previously differentiated gamification from a game in that gamification is not a full-fledged game following the distinction made by Deterding et al. and Marczewski.[8] But we also saw that some gamification researchers, such as Kapp, use a broad definition of gamification, including both full-fledged games and playful design under gamification.[9] Serious games tend to give a much stronger role to certain gaming elements, such as avatar, fantasy, story and narrative, and fully virtual environment for play. The discussion on serious games also tends to focus more on the content of learning, while gamification is more broadly applied for motivating and engaging learners. However, in reality it can be tricky to identify the point where gamification ends and a full-fledged serious game begins, as shown in the examples such as New York Public Library's "Find the Future" and the Metropolitan Museum of Art's "Murder at the Met." This is even more so in serious games because just like gamification, a serious game has a purpose that is always more than entertainment. For this reason, some of the examples in this section may appear closer to a serious game than gamification depending on how you see it. With this in mind, now let's take a look at some examples of gamification used in businesses and workplaces, education, and libraries.

New York Public Library: Find the Future
http://exhibitions.nypl.org/100/digital_fun/play_the_game

The Metropolitan Museum of Arts: Murder at the Met
http://metmystery.toursphere.com/pages/

Examples of Gamification of Learning in Businesses and Workplaces

A large consulting company, Deloitte, developed a gamified online training program called Deloitte Leadership Academy. Gamifying this training program resulted in a 37 percent increase in the number of users returning to the site each week while also increasing the amount of time people spent on the program and the number of programs completed.[10] Cisco developed an arcade game called the Binary Game. It teaches the concept of binary numbers and how to think in binary by walking players through from forty to fifty problems in five minutes.[11] Cisco offers several other games related to computer networking as well. IBM created a first-person 3D interactive simulation game called INNOV8, which allows players to practice business decisions by running a fictitious company, After Inc. This game is used in many schools in business and IT programs including University of Southern California, Marshall School of Business. INNOV8 teaches the complex idea of business process management and skills such as business problem solving, prioritization, and consensus building by helping players make decisions that impact a fictitious company.[12]

Gamification is also used at workplaces for recruitment and training as in America's Army, lead generation in marketing, public relations (e.g., intelligence agencies), selection (e.g., problem-based interviewing), training, continuous professional development and up-skilling of the workforce (e.g., health professions), planning, performance and review processes (e.g., public sector), skill-based promotion (e.g., engineering), and development of personal health skills as shown in Keas.[13]

America's Army
http://www.americasarmy.com/

Keas
http://keas.com/

Cisco Binary Game
http://http://forums.cisco.com/CertCom/game/binary_game_page.htm

Cisco: Games and Mobile Apps
https://learningnetwork.cisco.com/community/learning_center/games

IBM INNOV8
http://http://www-01.ibm.com/software/solutions/soa/innov8/index.html

Stack Overflow, a popular question-and-answer forum for programmers, uses gaming elements such as points, badges, and privileges. Stack Overflow users earn points and badges by participating in the forum, answering questions, and gaining votes from other users. The privileges are directly tied to the reputation

points, so that users have to earn their privileges such as voting down an answer, creating a tag, or creating a chat room.[14] Two software companies, Adobe and Microsoft, used gamification to help users learn how to use their software. Adobe created LevelUp, which gamified the process of learning the image-editing software Photoshop by giving players missions to complete and rewarding them with badges and awards.[15] The support and development of *LevelUp*, however, was discontinued in June 2014. Microsoft developed Ribbon Hero, a game that teaches people how to use Microsoft Office software. It takes users through different scenarios that require them to use Microsoft Office skills to solve problems and awards points and levels that are displayed in the corner of their Office application.[16]

Stack Overflow
http://stackoverflow.com

Ribbon Hero
http://ribbonhero.com

Codecademy, an online learning website that offers free computer programming classes in several different programming languages, drew a lot of attention by rolling out its CodeYear program in 2012. CodeYear was designed to encourage people to learn how to code throughout the year. People who signed up for the CodeYear program earned points, badges, and trophies as they progressed and successfully finished courses on the track of their choice. Codecademy released new courses every week to keep learners motivated and encourage them to continue their learning. According to the article about Codecademy in *Wikipedia*, over 450,000 people took courses during the year of 2012, and as of January 2014, over 24 million users completed over 100 million exercises in Codecademy.[17]

Examples of Gamification in Education

Fantasy Geopolitics was developed as an auxiliary tool for ninth grade students taking social studies in 2009. Eric Nelson, a high school teacher at North Lakes Academy Charter School in Forest Lake, Minnesota, developed this lightweight game in order to encourage his students to care about geopolitics and see world news as something relevant to their lives. Fantasy Geopolitics starts with a draft session, during which students select a team of three countries (except the United States and China due to their domination of the news); then the players track stories about those countries in the news and get points for every mention of a country in a particular news source.[18] Fantasy Geopolitics motivates students to learn more about their countries by gamifying news reading, so that it no longer appears to students as a difficult task. Fantasy Geopolitics has been used as a six-month civics course foreign policy primer, a scaffolding tool used while studying the world wars in US and world history, and a creative way to engage students outside class in a middle school humanities seminar.[19] In February 2014, it successfully raised $12,706 for improvement through Kickstarter, a crowdsourcing fundraising website.

Fantasy Geopolitics
www.fantasygeopolitics.com

Cliff Lampe, a professor at the University of Michigan School of Informatics, gamified his undergraduate class. Lampe provided his students with the freedom to choose their options to accomplish the learning goals of the class, encouraged them to participate in "guilds," and gave them rapid feedback on their performance via a monitoring system managed by his teaching assistants to further empower the students. The central theme of this gamification experiment is providing autonomy to students to become more invested in what they learn and how to approach it.[20]

Dartmouth College and Webster University used gamification in order to make their student orientations more informative and interactive. They provided their new students at the orientation with SCVNGR, a location-based mobile gamification app with customizable treks and challenges, instead of a paper handout, so that each student could discover more about the school and the campus in the form of a scavenger hunt using a smartphone.[21] SCVNGR was retired, however, in December 2012.

Purdue University developed its own digital badge platform called Passport. Passport enables instructors to design digital badges and issue them to students. Students can earn and display those digital badges in Passport to demonstrate their competencies and achievements and share them in social media such as LinkedIn and Facebook. Passport was used to give out badges to students who passed an eight-week MOOC-like course in nanotechnology with no credit attached and to give out a badge related to intercultural learning to students for their work in different disciplines and departments.[22] Badges are currently in use or in development at institutions of higher education, such as MIT, Carnegie Mellon, the University of California, Davis, and Seton Hall, and they are also issued by organizations including NASA, the National Oceanic and Atmospheric Administration, the US Departments of Veterans Affairs and Education, the

Corporation for Public Broadcasting, and the movie studio Disney-Pixar.[23]

Recently, Purdue University created a competency degree program, in which students progress at their own rate as they demonstrate mastery of specific skills rather than by performance measured only at fixed calendar intervals of classroom time. Instead of letter grades, this program provides students with their competencies, which will indicate to employers what graduates can do.[24] As more emphasis is given to students' competencies and skills than their general accomplishments in the classroom, digital badges, one of the most prominent gamification elements, will gain more popularity in education.

Passport
www.itap.purdue.edu/studio

NASA: Digital Badges
www.nasa.gov/offices/education/programs/national/dln/special/DigitalBadges.html

In 2014, Nah et al. published a literature review on gamification in the educational and learning contexts and identified fifteen studies that incorporated game design elements into education.[25] The game elements utilized for the gamification of learning in those studies included points, levels, leaderboards, challenges, badges, progress bars, immediate feedback, peer interaction and collaboration, prizes, in-game rewards, onboarding, replay, unlockable content, customization, achievement, storytelling, stages, storyline, visual elements, goals, character upgrade, peer motivation, and scoreboard. The learner outcomes that some of these studies aimed at included engagement, participation, motivation, enjoyment, productive learning experience, sense of achievement, sense of accomplishment, performance, recognition, and interest in course.[26]

Examples of Gamification in Libraries

Libraries provide an interesting platform for gamification. Gamification in libraries can play both an educational and a semi-business role. The educational function of a library clearly lies in its instructional and teaching-support activities. But libraries also have semi-business-like functions such as marketing library services, promoting library programs to boost the attendance, and raising awareness of various learning resources that libraries offer. This function is not directly tied to libraries' revenue since most libraries are nonprofit organizations. Nevertheless, libraries are often asked to justify their operation by providing numbers of visitors, the usage statistics of library books and resources, and the attendance at library programs and events. Libraries are also in constant need of sustaining continuous public funding. For this reason, libraries are naturally interested in using gamification for the purpose of improving the pedagogical efficacy of library instruction as well as both raising library patrons' awareness of available library services and resources and promoting their use.

Gamifying the Summer Reading Program

Canton Public Library in Michigan gamified its summer reading program. This gamified summer reading program, called "Connect Your Summer" runs on a website that provides a variety of badges for library patrons who participate in the program and follow the paths such as Super Bookworm Path, On the Scene Path, and eLectrified Path. Each of these paths feature different activities to earn twelve different badges. If a patron follows each theme on all three paths and earns all thirty-six badges, she is awarded a MEGA badge and entered into a special drawing. If she also completes the online survey, she earns the Super Mega Ultra badge and is entered into a Super Mega Ultra prize drawing. While this program uses an online platform created with Drupal and its 'User Badge' (forked version), Content Construction Kit (CCK), Views, and Rules module, it also offers a way to participate in the program with a paper version.

Canton Public Library: Connect Your Summer
https://www.cantonpl.org/connect-your-summer/2014

Connect Your Summer: Paper Reading Log
https://www.cantonpl.org/sites/default/files/2014CYSReadingLog.pdf

Another library that gamified the summer reading program is Pierce County Library in Washington State. Its "Teen Summer Challenge" website opened in 2012. Anyone can register and participate, but in order to earn prizes, a participant must be a teen with a valid Pierce County library card. As of September 2014, 126 people participated in the Teen Summer Challenge and completed 3,071 activities, thereby earning 21,056 points and 234 badges.[27] Each badge requires the completion of multiple activities such as answering a question after watching a video or visiting a local bird sanctuary. And each activity has certain points assigned to it. You can see the leaderboard and badges at the links in the gray box. Pierce County Library also organizes meet-ups where teens who participate in this summer reading program can get to know one another and work on challenges together.

The content of this gamified summer reading program was created by a team of youth services librarians, and the game platform increased participation in summer reading from about 200 participants county-wide to about 650 with practically no marketing.[28] The online game platform was originally built in-house by a staff member with WordPress and was improved with more customizations by hired programmers as the project grew and got grant funding.

Teen Summer Challenge
http://challengebeta.mypcls.org

Leaderboard
http://challengebeta.mypcls.org/leaderboard

Badges
http://challengebeta.mypcls.org/badge-catalog

Teen Summer Challenge Meet-Ups
http://challengebeta.mypcls.org/teen-summer-challenge-meet-ups

Gamifying the Library Experience

Pierce County Public Library also provides online gamification for adults called "Scout." Scout invites library patrons to explore the library, complete various activities, earn badges, qualify for prizes, and share their experience. The badges belong to one of the four categories, which match the type of prizes: food, do-it-yourself, local, and books. Participants register at the Scout website and can check their statuses in the leaderboard. Scout also provides a forum where participants can ask one another questions about badges and challenges. As of September 2014, 1,693 people participated and completed 28,381 activities, thereby earning 187,003 points and 3,965 badges.[29]

Scout
https://scout.pcls.us

The University of Huddersfield Library in the United Kingdom took a holistic approach in gamifying the library experience. Instead of gamifying a library program or library instruction, it developed a social online game called Lemontree. The primary purpose of this game is increasing engagement around the usage of library resources with the game element of competition.[30] Lemontree gives points and badges for students' library activities, such as visiting the library, checking out a library book, and logging in to use the library's e-resources. Students can display the badges that they earned in social networks such as Facebook and Twitter. The goal of this game was to nudge positive behavior, supporting and increasing intrinsic motivations, and for this reason, Lemontree does not offer any real-world rewards.[31] Also in order to achieve its goal of reducing library anxiety and engaging students who use few library resources, its user interface was designed to look as fun and lighthearted as possible, with no university or library branding visible.[32] According to the student feedback and the evaluation survey results, those students who chose to play Lemontree self-reported an increase in engagement as measured by the reported usage of library resources.[33]

Lemontree
https://library.hud.ac.uk/lemontree/about.php

Gamifying Library Instruction

The North Carolina State University (NCSU) Libraries gamified traditional library instruction. As an alternative to the usual one-shot library instruction, which often consists of showing the library website and explaining how to use the library and its resources to students in a classroom, NCSU Libraries created a mobile scavenger hunt that gets the students out into the library itself and makes them interact with the library staff, explore the library spaces, and discover the library's collections themselves.[34] In this gamified library instruction, students were divided into several four-member teams, each of which was given a packet with a list of fifteen questions and an iPod Touch. Students got twenty-five minutes to submit their answers to the questions using the iPod while roaming the library. These answers were checked by librarians in real time, and each team earned points for correct answers. When the time was up, students came back to the classroom, got to see the photos they took, learn the correct answers to the questions, and find out which team won the game and receive prizes. Both students and faculty responded positively to this gamified library instruction. During two semesters, NCSU Libraries ran over ninety scavenger hunts, thereby reaching more than 1,600 students. Of the surveyed students, 91 percent considered the activity fun and enjoyable, 93 percent said they learned something new about the library, and 95 percent indicated that they felt comfortable asking a staff member for help after having completed the activity. Instructors also praised the activity for its ability to lead students to increased understanding, deeper learning, and almost complete recall of important library functions.[35]

Using the Passport platform for digital badges

developed by Purdue University, University of Arizona Libraries have also undertaken gamifying library instruction to direct student motivation at developing research skills that can be visually demonstrated to instructors and future employers through digital badges, with points serving as feedback and further motivation.[36] For this goal, they are using the ACRL *Information Literacy Competency Standards for Higher Education* as an outline to design the badges such as Research Initiator (Standard 1), Research Assailant (Standard 2), Research Investigator (Standard 3), and Research Warrior (Standard 4) and creating a variety of tasks that will serve as challenges to meet for earning each badge.[37]

ACRL Information Literacy Competency Standards
www.ala.org/acrl/standards/informationliteracycompetency

Portland State University Library created a digital badge system and a digital badge curriculum to certify and acknowledge skills attainment for creativity and critical thinking and deployed this curriculum for a subset of more than 250 undergraduate students in community health in the fall of 2014.[38] The digital badges have been created and administered using the digital badge site Credly. The badges that students are earning in the fall term of 2014 included Web Ninja, Source Sleuth, Keyword Hacker, Recorder, Silver Pen, and Master Info Analyzer, which certify website evaluation, understanding of information formats and audiences, search techniques, citation style, and a peer review and writing exercise, respectively.[39] Students earn these badges through the D2L Learning Management System.

Credly
https://credly.com

Gamifying Library Orientation

Some libraries have also experimented with gamifying library orientation using the mobile app SCVNGR, which was mentioned above and is no longer available. SCVNGR allowed users to find treks within a twenty-five-mile radius, visit their locations to complete challenges such as taking a photo or answering a simple question, and earn points. Organizations could purchase a SCVNGR plan to create their own treks and challenges suitable for their target users. Oregon State University Libraries used SCVNGR for

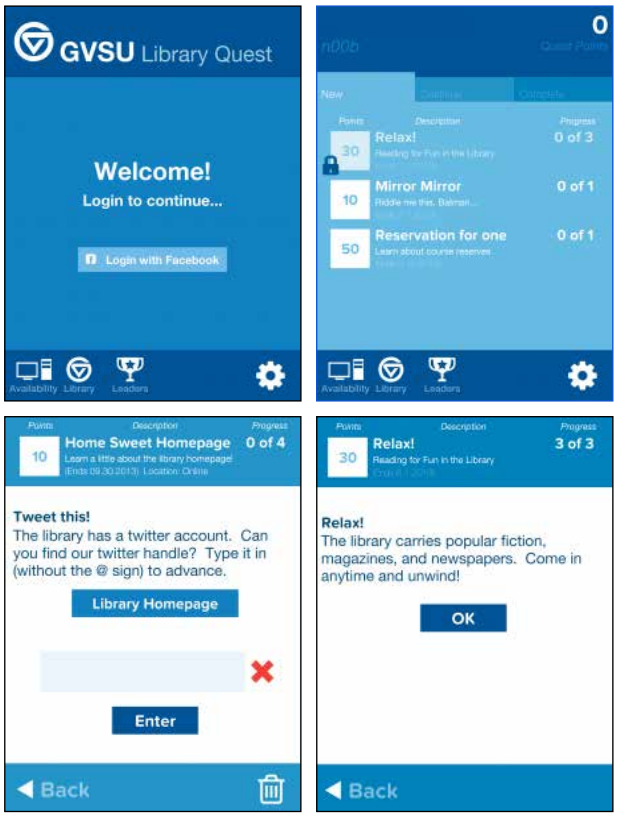

Figure. 4.1
Various screens of the Library Quest app developed by GVSU Libraries. [Images from Kyle Felker, "Library Quest: Developing a Mobile Game App for a Library," *ACRL TechConnect* Blog, September 17, 2013, http://acrl.ala.org/techconnect/?p=3783, licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License, http://creativecommons.org/licenses/by-nc-nd/3.0/.]

the international student orientation to increase the students' awareness of all the library services. Boise State University Library experimented by having students create a SCVNGR trek about the library based upon the previous paper version of a library scavenger hunt, as their final assignment, with great results.[40]

University of California, San Diego, Libraries also launched their own SCVNGR trek in the fall of 2011. University of California, Merced Library ran a similar library orientation using SCVNGR in 2012. In spite of active promotion, the student participation was very low.[41] The result showed that even when students are interested in this type of gamification, a variety of factors, such as an event date, location, and a mobile device required for participation could easily become obstacles.[42] It has been also noted that the reward offered in this case, a chance to win an iPod Shuffle, didn't seem to work as a sufficient incentive to students.[43]

University of Arizona Libraries, mentioned above, also gamified the library orientation using SCVNGR in order to promote the library and increase student

awareness.[44] It was reported that the gamified orientation and instruction had greater success and engagement when the trek was tied to something, such as a class assignment or a required portion of an orientation session that had to be completed.[45]

Building a Library Gamification Mobile App

Grand Valley State University (GVSU) Libraries decided to build a gamification mobile app to engage their library users. The app called "Library Quest" was released in August 2013 for both iPhone and Android smartphones in the Apple App Store and Google Play (figure 4.1). Library Quest offers tasks to students and verifies their progress through multistep tasks by asking users to input alphanumeric codes or to scan QR codes displayed in the library building in order to encourage them to explore the large brand-new library building and to make them aware of various library services.[46] Students earn points for every quest completed in the app, and for every thirty points they earn, they are entered once in a drawing to win an iPad. The first round of the game ran from late August to mid-November, and GVSU Libraries held the drawing, publicized the winner, and then commenced a round of postgame assessment.

Library Quest

Apple App Store
https://itunes.apple.com/us/app/library-quest/id684978642?mt=8

Google Play
https://play.google.com/store/apps/details?id=air.com.yeticgi.libraryquest

This project is a good example of how much investment is necessary for a library to successfully develop and release a mobile library gamification app. Developing this one app cost GVSU Libraries approximately $14,700 without including the library staff time spent on this project.[47] While the actual programming of the app was done by an outside mobile development company, librarians prototyped the game, ran the usability testing, and designed actual quests. Librarians designed from three to five new quests each month while the game was running, and Library Quest offered short-duration quests run at random intervals to encourage students to keep checking the app. GVSU librarians created about thirty quests in total over the course of the game, and each quest was designed with a specific educational objective in mind, such as showing students how a specific library system worked or where something or someone was located in the library building. They discovered that even simple quests required a fair amount of cooperation and coordination. In order to inform the library staff about Library Quest, GVSU Libraries also created a quest write-up sheet called "Raiders of the Lost . . . Bin," which provides information about the name of the quest, points, educational objective, steps, completion codes, and any other information that defined the quest. This Quest Design Worksheet can be downloaded online.

GVSU Library Quest Design Worksheet
http://acrl.ala.org/techconnect/wp-content/uploads/2014/08/Raiders-of-the-Lost%E2%80%A6Bin_.docx

The postgame assessment of GVSU Libraries' Library Quest app revealed some very interesting results. According to the responses to the postgame questionnaire, 90 percent of the respondents to this survey indicated that they had learned something about the library, that they thought the gamification mobile app was a good idea, and that it was something GVSU Libraries should do again.[48] Students' feedback on the game was very positive and showed that students appreciated that the library was trying to teach in nontraditional, self-directed ways. What is most interesting in the postgame assessment results of Library Quest is that students reported that the game changed the way they thought about *themselves* in relation to the library rather than the way they thought about the library.[49] For example, the game made them feel that they are now more aware of, confident to use, and knowledgeable about library services and resources. Students also remembered remarkably well what they learned about GVSU Libraries through the game, such as library-specific lingo and knowledge of specific procedures like document delivery. This matches the findings from NCSU's Scavenger Hunt that the gamified library instruction resulted in the very high recall of library functions by students.

On the other hand, the responses to the midgame survey showed that some students cited a certain quest as their favorite feature of the game while others cited exactly the same quest as their least favorite, often for the same reason.[50] Felker attributes these seemingly contradictory responses to the fact that students had a variety of different reasons for playing Library Quest, ranging from the chance to win an iPad to learning about the library or curiosity about the game itself.[51] This shows that one and the same gamification can be appealing or annoying depending on each player's motivation.

A total of 397 students signed up for Library Quest and completed over 6,000 quests. Felker writes that

although this was close to the number that the project aimed at, the game could have been marketed more effectively to make more students aware of the game considering the fact that the number of FTE students at GVSU is 25,000.[52] More problematic was the low completion rate shown in the fact that only 173 out of 397 registered players actually completed at least one quest. The other 224 players downloaded the app and logged in at least once but failed to complete any quest content. Both technical and nontechnical issues, such as usability, the flow and pacing of new quests, and marketing, were found to be responsible for this.

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Chapter 5

Designing Gamification in the Right Way

Gamification is still relatively new as a topic of research. While the use of gamification is becoming more popular, there are few systematic studies that assess and measure the impact of gamification.[1] For this reason, many benefits of gamification are hypothesized rather than verified at this point. In chapter 2, we saw that gamification of learning is not identical to educational games since the latter are full-fledged games while the former is only a lightweight application that applies game elements to the learning context. But both the gamification of learning and educational games share the same process of gamifying learning elements to create the final product. Consequently, the studies that evaluated the efficacy of educational games are relevant to the discussion on the evaluation of gamification projects.

Previous studies about serious games failed to produce strong evidence for their pedagogical efficacy when compared to other instructional methods due to methodological shortcomings.[2] Furthermore, assessing the effectiveness of an educational game is not a straightforward task because there are many variables to be considered such as whether a game is of the type that is most suitable for the learning content in question, whether the learning content itself is suitable for a game in the first place, students' previous knowledge about the learning content, and what their individual preferences are for a type of game.[3]

A Clear Goal

The examples of gamification in the previous chapter showed that gamification is currently being utilized in education and libraries for the purpose of improving user engagement and instruction. But the goals of many gamification projects do not appear to have been clearly set out before the projects began. This is probably due to the fact that gamification is still seen as a relatively new and experimental strategy. Nevertheless, considering various outcomes from a gamification project in advance and determining which outcome should be given the highest priority can greatly facilitate the evaluation and improvement process of a gamification project. Suppose that an instructor gamifies part of or all homework for a class with a leaderboard, points, teams, challenges, missions, and badges. The goal of this gamification may simply be to increase the number of students who submit the homework on time. Or the goal can be set as better grades from the students in the low performance group, the longer retention time of the subject knowledge taught, or increasing students' collaboration skills through working out challenges and missions as a team. Setting a clear goal for a gamification project makes it much easier to design the project and to evaluate it after it is run.

If we are gamifying library services or programs, here are some examples of questions that we should ask in advance. Do we simply want to advertise various activities taking place in the library more widely? Or do we want to increase the attendance of a library program? Do we want to use gamification as a way for students to understand better why plagiarism is unacceptable? Or do we want patrons to be able to successfully order an interlibrary loan service on the library website? How about retaining the knowledge of different citation style formats? Note that these goals are not necessarily mutually exclusive but are not identical either.

Target Group and User Types

Once a clear goal is set for a gamification project, we need to also consider at whom the gamification is directed and what the characteristics of the target group are. For example, at an academic library, it would be good to think about whether a particular gamification project is to be designed for all students in general or a certain group of students such as freshmen, seniors, international students, business school students in their summer internship, or students with poor grades in writing classes, and so on.

After determining the target group for a gamification project, another important thing to consider is the user type. Bartle classified players in the MUD (Multi-User Dungeon) games into four types: *achievers*, *explorers*, *socialisers*, and *killers*. (MUD is an adventure game played through real-time interaction with other players in a virtual world described only in text.) He describes the four types as follows:

- "Achievers regard points-gathering and rising in levels as their main goal."
- "Explorers delight when the game reveals its internal machinations. . . . They try progressively esoteric actions in wild, out-of-the-way places, looking for interesting features . . . and figuring out how things work."
- "Socialisers are interested in people, and what they have to say. The game is merely a backdrop, a common ground where things happen to players. Inter-player relationships are important: empathising with people, sympathising, joking, entertaining, listening; even merely observing people play can be rewarding—seeing them grow as individuals, maturing over time."
- "Killers get their kicks from imposing themselves on [and causing distress to] others."[4]

It is easy to see that people in different user types may prefer one type of game to another. Bartle's player types have served as a general framework for other game researchers and a guideline for game designers even though they are specific to MUD-type games.[5] Marczewski modifies Bartle's player types to fit the context of gamification as follows.

- *player* (motivated by extrinsic rewards)
- *socialiser* (motivated by relatedness)
- *free spirit* (motivated by autonomy)
- *achiever* (motivated by mastery)
- *philanthropist* (motivated by purpose)[6]

The main difference between Bartle's player types and Marczewski's gamification user types is that the latter accommodates the fact that unlike games whose players always want to play, gamification will have two different types of people: those who are willing to play for extrinsic rewards and those who are not. The "player" type refers to those who are motivated to play by extrinsic rewards. By contrast, the "socialiser," "free spirit" (a type similar to Bartle's "explorer"), "achiever," and "philanthropist" are motivated to play by intrinsic factors such as social connections, self-expression and exploration, personal achievement and mastery, and a sense of purpose.

These user types are theoretical abstractions, and people in the real world are likely to display characteristics of more than one of these types to different degrees. Nevertheless, they provide a useful guide in understanding how different motivations are involved in gamification and how a gamified application can be designed to appeal to those with different motivations. For the "player" type, it is clear that offering external rewards, such as a prize or a gift certificate, will increase user participation and engagement. For the other types, on the other hand, gamification needs to provide different types of incentives that will appeal to them. For example, high achievers in schools with good grades would fall under the category of "achiever" and are likely to be drawn to gamification if the game mechanics and dynamics enhance the sense of personal mastery and achievement. However, gamification that focuses on personal mastery and achievement would have little appeal to other types of users such as "socialiser" and "philanthropist." The "socialiser" type will enjoy gamification that offers a lot of social interactions, while the "philanthropist" type would respond well to gamification for a greater cause. The "free spirit" type will be drawn to game mechanics such as the detailed customization of avatars, space, and journey-type quests where many discoveries can be made and a lot of detours are available.

If you are designing a gamified application, embedding game dynamics and mechanics that appeal to the target group and providing the type of rewards that are attractive to the motivation of the majority of them would significantly improve the appeal of the gamification. For example, medical students are known to be highly competitive but have little time to spare beyond their study. Gamification for such medical students will be successful if it is designed to have the element of competition and can be played during a short break. But the members of the target group may belong to multiple user types. For this reason, in designing gamification, different types of motivation that appeal to different user types need to be carefully considered and balanced out instead of overly emphasizing one of them over others. In the context of education, thinking about these different types of users and their motivation in relation to different learning styles can also be beneficial. Students' different learning styles should be taken into account as an important factor in the design process of gamification

particularly if the majority of the target group prefers a certain learning style to others.

Other Variables: Gender, Age, Culture, and Academic Performance

In designing gamification, one should also be aware of the fact that variables such as gender, age, and cultural orientations can play a role in variance in the reception of gamified application. Kron et al. discovered that female students were about 35 percent as likely as male students to enjoy the competitive aspects of the video games.[7] A different study by Wohn and Lee showed that younger players (under age 32) play Facebook games to pass the time and relieve boredom, while older players (age 32 and up) play Facebook games to help others and also to get support and help from others.[8] Another study by Lee and Wohn revealed that different cultural orientations, such as individualism and collectivism, affect people's expected outcomes of playing social network games such as social interaction, recognition, entertainment, and diversion and that those expected outcomes in turn affect different game usage patterns.[9]

In addition, findings from the studies on serious games need to be taken into account in designing gamification. Kanthan and Senger studied the results of the midterm exam for second-year medical students after the use of a serious game and found that the results indicated that the game improved academic performance outcomes of students at the lower end of the scale more than those at the higher end.[10] They regarded this finding as consistent with Van Eck's claim that serious games benefit students with less self-motivation and lower grades.[11] If this holds true for gamification, educational gamification may be more effective when it is specifically designed as a learning tool for underperforming students. Another interesting observation from students reported in the literature is that serious games may be most beneficial as a supplementary tool in education rather than as a replacement for traditional teaching.[12]

Learning Content

In the context of learning and education, it is inevitable to notice the potential of gamification as a pedagogical tool beyond mere engagement. In 2006, Richard Van Eck noted that the taxonomy of games is as complex as learning taxonomies.[13] He argued that not all games will be equally effective at all levels of learning and that it is critical that we understand how different types of games work and how game taxonomies align with learning taxonomies. For example, card games will be best for promoting the ability to match concepts, manipulate numbers, and recognize patterns; Jeopardy-style games are likely to be best for promoting the learning of verbal information (facts, labels, and propositions) and concrete concepts; arcade-style games are likely to be best at promoting speed of response, automaticity, and visual processing; adventure games, which are narrative-driven open-ended learning environments, are likely to be best for promoting hypothesis testing and problem solving. This means that there is a great need for matching specific learning goals with types of games or gaming elements that are most suitable for those learning goals.

The following list from Kapp presents seven types of knowledge, along with gamification elements and examples for each type. It can be taken as an effort to respond to this kind of need.

- "Declarative Knowledge"
  - Gamification elements: "Stories/Narrative, Sorting, Matching, Replayability"
  - Examples: "Trivia, Hangman, Drag and Drop"
- "Conceptual Knowledge"
  - Gamification elements: "Matching and sorting, Experiencing the concept"
  - Examples: "Whack a Mole, You Bet!"
- "Rules-Based Knowledge"
  - Gamification elements: "Experience consequences"
  - Examples: "Board games, Simulated work tasks"
- "Procedural Knowledge"
  - Gamification elements: "Software challenges, Practice"
  - Examples: "Data Miner, Software scenarios"
- "Soft Skills"
  - Gamification elements: "Social Simulator"
  - Examples: "Leadership simulation"
- "Affective Knowledge"
  - Gamification elements: "Immersion, Providing success, Encouragement from celebrity-type figures"
  - Examples: "Darfur Is Dying"
- "Psychomotor Domain"
  - Gamification elements: "Demonstration, Haptic devices"
  - Examples: "Virtual Surgery Simulator"[14]

Darfur Is Dying
www.darfurisdying.com

Virtual Surgery Simulator
https://smiletrain.biodigitalhuman.com/home

Needless to say, Kapp's is not the only classification of knowledge. In addition, the items that he lists

as gamification elements are closer to a type of game or a gaming activity than the game mechanics or dynamics that we have discussed. But in the context of education, this classification is still useful in investigating further how to best apply gamification to learning and instruction. For example, with the MDA framework that we have seen in chapater 3 in mind, which game mechanics, dynamics, and aesthetics would be best mapped to each of Kapp's seven types of knowledge? This is a challenge for anyone who is interested in gamifying learning. Game aesthetics are less directly tied to the learning content and more closely related to what kind of emotions and experience the gamification tries to deliver. For this reason, any game aesthetics that can serve the purpose of delivering the given learning content can be chosen, whether it is narrative, challenge, discovery, achievement, or fantasy.

On the other hand, coming up with compelling game dynamics and supporting them with appropriate game mechanics is much more challenging. For example, acquiring demonstrative knowledge requires a lot of repetition and association. From this, we can infer that game dynamics and mechanics that facilitate the repetitive performance of tasks without making them boring would be best utilized for this type of knowledge acquisition. Points can be a useful game mechanics here, and feedback, progress bars, time pressure, and countdowns can all work well as appropriate game mechanics for this category of knowledge because they can invoke game dynamics such as a sense of urgency in players and turning the repetition of the same type of task into something exciting. Those who design gamification, however, must go one step further and should ultimately create a playful and fun experience from those game mechanics and dynamics. This is where each designer's creativity and imagination come to play a unique role in creating successful gamification.

What is to be avoided is to blindly set a certain game mechanics, dynamics, or aesthetics as an ideal and to neglect the right fit with the given learning content. The study by Adams et al. illustrates what happens when such a fit is ignored.[15] They measured students' learning outcomes for the same learning content through three different learning methods: a narrative game, a non-narrative game, and a PowerPoint slideshow. The learning content tested in this study was (a) how pathogens work and (b) how various electromechanical devices work. For the content about how pathogens work, students were divided into a game group and a non-game group. Students in the game group played a game called "Crystal Island," in which they were given the challenge of discovering the source of an unknown disease on a remote island through interacting with other characters and using lab microscopes to run tests. By contrast, those in the non-game group learned the same content by viewing a matched slideshow that contained the same text and images used in the game to explain pathogens. For the content about how electromechanical devices work, students were divided into a narrative game group, a non-narrative game group, and a non-game group. Students in the narrative game group played a game called "Cache 17," in which they were tasked to find a long-lost painting in an old bunker system dating back to World War II. To make their way through the bunker system to find the painting, students had to construct electromechanical devices to help open doors. In addition, they were given a narrative about the character and had to interact with other game characters during the game. On the other hand, students in the non-narrative game group played the same game, but neither a narrative nor other characters were given, and the documents they read contained information only about the electrical devices they had to use. Lastly, those in the non-game group learned the same content by viewing a matched slideshow that contained the same text and images used in the game's resources to explain the devices.

The results of these two experiments showed that students learned both sets of content significantly better by viewing a slideshow presentation than by playing a hands-on narrative adventure game.[16] However, this does not mean that discovery and narrative are not useful game elements for the gamification of learning. It simply means that discovery and narrative were not the most appropriate game dynamics for teaching those two particular sets of learning content. Adams et al. also took their study results as supporting the distraction hypothesis, which holds that certain aspects of game playing—discovery and narrative in this case—can distract the learner from the academic content of the lesson rather than facilitating the learning process.[17]

Can Gamification Be Harmful? Tangible Rewards and Intrinsic Motivation

While gamification is touted as a new way to engage and motivate people and even to influence their behavior, there are also critiques of gamification that need to be heeded. For example, some critiques argue that gamification can become "exploitationware" with counterfeit rather than genuine incentives.[18] Rughinis noted that gamification of education can also become exploitative "if it becomes an excuse for a simplistic, inadequate design of learning."[19]

One of the most interesting critiques of gamification revolves around the concepts of external reward and intrinsic motivation. Motivation falls under two categories: extrinsic and intrinsic. When we take an action out of extrinsic motivation, the goal of that

action is not the action itself but something else. On the other hand, when the goal of an action is the action itself, it is intrinsic motivation out of which we take that action. Deci, Koestner, and Ryan conducted a meta-analysis of 128 studies on the effects of extrinsic rewards on intrinsic motivation.[20] Their meta-analysis showed that "engagement-contingent, completion-contingent, and performance-contingent rewards significantly undermined free-choice intrinsic motivation . . . , as did all rewards, all tangible rewards, and all expected rewards. Engagement-contingent and completion-contingent rewards also significantly undermined self-reported interest . . . , as did all tangible rewards and all expected rewards. Positive feedback [i.e., verbal rewards] enhanced both free-choice behavior . . . and self-reported interest. Tangible rewards tended to be more detrimental for children than college students," and verbal rewards tended to be less enhancing for children than college students.[21] That is, external rewards undermine intrinsic motivation.

Since the goal of gamification is always something other than gameplay itself, it seems natural to assume that what motivates people to engage in any gamified application is almost always extrinsic. We turn to EpicWin and Chore Wars because we want to get things done, which we would otherwise procrastinate on doing. We play Nike+ because we want to exercise regularly. We follow along the Codecademy program because we want to learn how to code. This puts gamification in a sharp contrast with a game, which people play for its own sake. Take the Speed Camera Lottery that we saw in chapter 2 as an example. People may not be willing to drive at the given speed limit. With the reward of potentially winning a lottery, however, the gamification generates extrinsic motivation for people to observe the speed limit. Now, what would happen if the camera were removed? It is easy to see that many drivers who were observing the speed limit only for a chance to win the lottery would start driving over the speed limit again.

But not all cases are this straightforward. Let's take the Bottle Bank Arcade machine as another example. The goal that the designers of the Bottle Bank Arcade machine had in mind was to encourage people to collect and recycle more bottles. But that does not prevent anyone from playing the Bottle Bank Arcade game for its own sake. The child who is jumping up and down with joy while playing this game is probably just as intrinsically motivated as someone who watches her favorite movie for the third time. In such cases, the reward that gamification provides becomes nontangible, and the motivation influenced by gamification is no longer extrinsic. The same person may be extrinsically motivated to collect and recycle more bottles, so that she can play the Bottle Bank Arcade game, and at the same time also intrinsically motivated to do so because she wants to protect the environment. Humans are capable of enjoying the gamified experience for its own sake regardless of the designer's intention. It is also possible that intrinsic and extrinsic motivation coexist independently for the same activity.

Unlike in recycling or driving, however, educators care a great deal about whether a student is intrinsically or extrinsically motivated to participate in a learning activity. They do not want the students to play Fantasy Geopolitics only because they want to score more points and win the competition. Educators want them to realize that news reading is not as intimidating and difficult as it may seem and to eventually understand and even enjoy reading about current geopolitical issues. What if Fantasy Geopolitics or any other educational gamification undermines such intrinsic motivation for learning? Would rewards students' as points, statuses, or tangible prizes reduce or destroy students' intrinsic motivation to learn? Is gamification harmful rather than helpful to learning?

One way to solve the problem of the potential long-term negative effect of gamification on intrinsic motivation is to design gamification that does not depend on external rewards. For example, gamification can be designed to give more autonomy to users by allowing them to set their own goals or to guide them to make their own choices about the constraints to be placed for a given learning goal in educational contexts.[22] This can help users realize the relevance of the goal of gamification to them and understand how learning outcomes are connected to game elements in educational contexts. This can also in turn minimize the potential controlling aspect of rewards and instead strengthen their competence-affirming aspect. The challenge in this case is how to make tasks sufficiently fun to engage people without relying on tangible rewards and extrinsic motivation.

However, not all tangible rewards need to be removed from gamification or even from the gamification of learning. Gamification used for one-time activity, such as a library orientation or a promotional campaign, is not subject to its long-term negative effect on intrinsic motivation. Gamifying an activity that participants find dull or boring is also safe from such concerns because there is little intrinsic motivation to begin with to be undermined by rewards.[23] Also, gamification that offers an unexpected non–task-contingent reward can be utilized without the undermining effect on intrinsic motivation.[24] Furthermore, verbal rewards, also known as positive feedback, can be incorporated into gamification to enhance intrinsic motivation for adults as long as it is not given in a controlling manner.[25]

In designing gamification, we need to remember that gamification itself does not automatically generate motivation or engagement. For any gamification to succeed, it needs people's buy-in because they should

care enough to play along. It is for this reason that the more closely the goal of gamification aligns with the goal of a player, the more successful the gamification will be. This strategy also minimizes the potential negative effect of gamification on intrinsic motivation because in such a case players already are intrinsically motivated to a degree to perform the activity. They may need just a little extra push to actually do the work. As the designers of gamification, we also need to ensure that the rewards attached to gamification are appropriate to the context and do not pose the risk of distorting the intended context.

When people feel that gamification attempts to manipulate their behavior, they will inevitably object to and disengage from it. Even verbal rewards that were shown to enhance intrinsic motivation had an undermining effect when they were given with a controlling interpersonal style.[26] While this may be disappointing news to those who want gamification to be a panacea for motivation, people's autonomy should be respected in any attempt to engage them and influence their behavior. The fact that the reach of gamification has limits should not detract from its value. We need to instead apply gamification wisely, thoughtfully, and selectively with a clear goal; a thorough understanding of the target audience, the nature of the target activity, and the gamified learning content; and appropriate and effective rewards for the intended context. How to measure the success of gamification should be also planned ahead in relation to the goal of gamification.

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