

Investigating the Utility of the User Type Hexad for Educational Gamification Design

by

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Abstract

Applying game mechanics outside of digital game contexts to improve learning outcomes is known as educational gamification. Games can be highly motivating and engaging to players but not all games are equally motivating to all players. Gamification works best when the type of game mechanic matches the intrinsic motivational needs of a student. This thesis investigates the concept of customizing gamification to match individual user preference categories. Throughout this thesis, I document how one novice game designer and researcher attempts to simultaneously use and investigate a bleeding-edge motivational gamification design tool, the User Type Hexad framework (Marczewski, 2015; 2018; Tondello, Mora, Marczewski, & Nacke, 2018) to create an educational application intended to teach life skills through motivationally customized gameplay in the real world.

This thesis also details the creation and validation of a new instrument, LifeLeaps (Life Skill Learning Preference Survey), which I hope can assist future researchers, game designers, and educators, to assess life skill learning preferences.

The goal of this work was to investigate if clusters of motivational preferences (User Types) are correlated to life skill learning preferences and to create gamified instruction which pairs learning preferences with gameplay preferences.

Keywords: Gamification; Educational gamification; Life skills; Education; Serious games; Design-based research; Games for learning; Motivation; Engagement; Higher learning; Engagement; User type hexad; Player type; Self-determination theory

Dedication

This thesis, and myself entirely, are dedicated to my wife Robyn. It is fitting that motivation is the topic of this thesis because you are my motivation and true love.

To my son. I look forward to seeing you grow, Boaz, into the kind, compassionate little scientist you are starting to become at the young age of three-and-a-half. You have light inside you that shines through your blue eyes like the summer sky on Gabriola island.

To my daughter. Tova, you are so amazingly strong and vibrant. You were born near the end of 2020 – one of the craziest years I could imagine, but you are a blessing. Your name means “good” in Hebrew, and that is what I hope you hold in your heart as you grow. You are so very good. We are lucky you chose us.

To my supervisor Dr. David Kaufman. You are wisdom and kindness. You are patience and understanding. Thank you for the work you have done in the field of education, the guidance you have given to your students along the way and the person you are, who makes people believe in themselves.

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To my loving sisters and my little nieces and nephews who are now somehow already adults, thank you for your love and support. I appreciate you and love you all.

To Kevin and Patty. Thank you for being there for us. You are amazing grandparents. I hope one day I can follow in your footsteps and imbue the same love and generosity.

To my mother Dr. Nancy Lipsett. Thank you for gifting me with a love of learning. I work each day to pass that gift along, yet it remains. I am grateful to you for being enthusiastically and lovingly there for me my entire life. You showed me the path.

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I acknowledge that my home is located on a magical rock known as Gabriola Island which is unceded Coast Salish Territory, specifically of the Snunéymuxw (snu'neiməx^w) First Nation. Snunéymuxw Territory on the eastern coast of Vancouver Island, the Gulf Islands, and the Fraser River in the British Columbia was in the center of Coast Salish territory. Their language is the Hul'qumi'num language.

I wish to acknowledge that this world is not fair, nor just, and I was fortunate to be born a middle class cis-gendered white male, in Canada, which comes with significant layers of privilege. Throughout life I have been allowed, and encouraged, to study whatever I wanted to learn and pursue my passions without added social encumbrance. I understand that this may cause a bias toward the acceptance of games as tools of positive change due to not having to face issues of extreme poverty, circumstance, mental illness, or societal oppression that many others must face. I acknowledge that games are not the solution to all problems, nor should other potential ways to address problems of motivation and engagement be ignored.

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List of Acronyms

DBR	Design-Based Research
LifeLeaps	Life Skill Learning Preference Survey
MBTI	The Myers-Briggs Type Indicator
MMORPG	Massively Multiplayer Online Roleplaying Game
RAMP	Relatedness, Autonomy, Mastery and Purpose
PLS-SEM	Partial Least Square Structural Equation Modeling
SDT	Self Determination Theory
SFU	Simon Fraser University

Chapter 1. Introduction

1.1. Preface: My Positionality to Games as Tools of Motivation

Games are extremely motivating and engaging. I have spent an absurdly long time (over 600 full days, or 15,000 hours collective playtime) developing digital avatars in MMORPG (Massively Multiplayer Online Roleplaying Game) worlds such as EverQuest and World of Warcraft alongside other players in my various guilds throughout the last two decades. When new content was released, it was not uncommon to spend five to seven hours per day in groups of 6, 24, or 54 guild-member *raids* of varying levels of complexity to get loot, and progress through the latest zone before any other guilds on our server (or sometimes the world) could manage to figure out the strategy and practice enough to defeat the raid bosses. When it went well, combat flowed with the practiced harmony of an elite military unit to topple the very gods themselves from their thrones in the Planes of Power. Eventually, I would come to lead these collaborative efforts, using voice chat to organize the guild raids.

Games are, perhaps, too engaging. As one might imagine, that amount of sitting can take its toll on one's body. They scratched a motivational itch; they satisfied my needs for feelings of progression, accomplishment, recognition, and human connection that were missing in my life in a way that let me keep trying until I got it right. They satiated a hungry mind with dopamine-producing feedback loops which meshed well to existing intrinsic motivational needs and coincidentally taught me things I desperately needed to know about relating to other people, both as a leader and a trusted team member. How could these MMORPGs capture my attention so completely that I ignored my physical self? Recent research on the motivational power of games presented in this thesis provides an answer that makes sense.

I have always been unskilled at reading and navigating social situations. Yet, I was not blind to the troubles that my lack of social intelligence caused and had a desire to improve. The technology-mediated socialization that collaborative strategic play provided and the long-term social exposure and group activities that guild-based MMORPGs provided to me was like water to dry stone. I have always loved playing games with, and connecting with, other people; I was just never good at it in person. As

a young teenager, I was irrationally upset when I failed at something and always took the easiest path. I had few friends and would avoid most people for fear of rejection. Yet, through trial and error and over nearly 15 years of digital play, MMORPGs allowed me the practice I needed to become more proficient at socialization, made me extremely stubborn in the pursuit of goals, and became thick-skinned to the criticism of my peers.

The capstone project of my self-directed game-based learning was self-discipline. I used the principles of motivation that games had aptly demonstrated, to play my own life like a game. I set specific goals and held myself accountable like games do. I tied rewards to progression and was gentle on myself for failures like games do. I started with small challenges and progressed to epic encounters like games do. My quest was to get fit and find my soulmate. Eventually, I got strong and healthy, obtained a culinary degree as a side quest, and found love. I can now say for certain that my life is a game worth playing.

1.2. Background: Education vs. Technology

Humans are accelerating toward the future of technology, but education is lagging slowly behind. Education and technology seem like they should work together to progress humanity, push the limits of what is possible, and allow us to reach our soft hands deep into the rich soil of an endless universe. But, in our push towards an ever-optimistic techno-laden future, we demand an increasingly educated labour force, while wages stagnate, automation threatens to replace workers, and the rich few amass historic levels of wealth (Statcan, 2020). More time in school seems to be the common solution to the problem of our ever-increasingly complex world, but getting a degree today can feel like purchasing an expensive ticket to the lower ranks of the managerial class.

Today, more students than ever before are unsatisfied with their learning experience and feel like higher education is both overpriced and underwhelming (Lederman, 2020). We expect young adults to have undergraduate degrees just to look for a job (Khan Academy, 2019). This is mandated by the steady march of technological innovation which requires workers to be more and more highly trained to be worth hiring, while the delta between diplomas and income is a yawning chasm that has been gaping its economic jaws since the invention of the microchip when technological innovation

began to outpace educational innovation and the value of having a degree began to decline (Emmons, Kent, & Ricketts, 2019).

With this increased demand for education, one would think technologically mediated learning would have become the norm, yet it has not. Recently, the global COVID-19 pandemic has stress tested our unsophisticated remote learning systems. It has shined a light on weaknesses and reinforced the need for well designed technologically mediated remote learning for all students that need it. Education is lagging because technology does not seem to improve education as much as it simply changes it. From my perspective, technology seems to necessitate more for students to learn far faster than improving educational practices or learning outcomes. Educators and institutions are often slow to adopt new technologies because, for all their theoretical promise, technologies do not have a pristine track record of success when implemented institutionally (Fishman and Penuel, 2018).

1.3. How Games Can Help

There have been some promising developments with technology-mediated learning environments that may help advance the state of technologically mediated education. Motivation and engagement are often the missing pieces of the puzzle (Sinatra, Heddy, & Lombardi, 2015) and have been called the “holy grail of learning”. Digital games can be highly engaging learning experiences that allow players to satisfy their intrinsic motivational needs (Tondello, 2018). Games shed light on how we might improve the motivation of students to learn new things and enhance engagement with the learning experience, and the technological delivery platform itself (Dominguez et al., 2013). Games are great educational tools, yet they are widely misunderstood because they tend to teach things tangential to curriculum rather than curriculum itself. As I cover in chapter 2, game structures are better at improving student’s perceptions of learning, and increasing motivation to learn, rather than rote learning outcomes themselves. It is hard to measure the benefit of games when you are looking in the wrong places. Digital games contain sophisticated structures of progression feedback and allow experimentation that leads to playful experiences and deepened engagement (Liu & Santhanam, 2015; Tondello et al., 2015; Hamari et al., 2014).

Technology, in general, has gotten better and better at motivating people to engage with it over the last 20 years (Hamari et al., 2014) due to the lessons learned

from digital games. Modern games use rapid feedback cycles, highly engaging narrative structures, which gives players the freedom to fail over and over again until they get better. They give increasingly scaffolded learning challenges that lead directly to appropriately challenging bosses (i.e., enemy-based challenges with a computer-controlled opponent that usually comes at the end of a video game level, and is akin to a type of final exam for that section of play). These also require a deeply collaborative effort between players to beat the hardest of encounters. Therefore, it is no wonder that games are highly motivating and engaging to play. We have been iterating on digital game design by paying close attention to what players want and pushing the boundaries of technology with each re-imagination of what is possible in the realm of gameplay (Hamari et al., 2014).

To understand the potential benefits of games within educational contexts, it is helpful to look toward gamification, rather than digital entertainment games. Gamification is the use of digital game elements, outside of traditional game structures (Deterding, 2011) and it has been gaining recognition to enhance motivation and promote playful engagement with real learning targets (Gee, 2004). It is an application of technology that may persuade us to become better learners (Kapp, 2012). Though literature abounds with idealistic platitudes of the potential benefits of gamification, it nearly always skims the surface – most research about games only deals with shallow gamification. Shallow gamification can be summarized as basic PBL (points, badges, and leaderboards). Deep gamification calls upon digital game elements such as narrative, exploration, boss battles, character progression, collectables, humor, strategy, and even creativity tools, in conjunction with motivational game elements such as smooth scaling difficulty levels, social collaboration, competition, and freedom of choice to motivate people to complete tasks and engage in learning (Kapp, 2012).

1.4. Research Problem

I became interested in this research topic because I believe in the motivational and transformational power of games, and a life coach by the name of Brodie Whitney was seeking to find a student researcher that could transform his ten-year dream of gamifying young adult life coaching into reality. He posted a MITACS research position for *Facing Dragons* (Pressure Point Productions, 2019), which was proposed as a gamified quest to help young adults *unlock their purpose* in life.

The idea behind *Facing Dragons* is to turn life coaching into a self-directed learning task that motivates young adults to undertake challenges in the 'real' world. I applied for this MITACS accelerated internship position to begin exploring the possibility of gamifying young adults' life skills training.

A problem statement emerged from this need: how could I begin to design a game that motivated young adults to overcome challenges in life, while also collecting usable research data for my thesis? The ETLD (Education Technology and Learning Design) doctoral program at SFU (Simon Fraser University) introduced me to the concept of Design-Based Research (DBR) whereby an evolving design is simultaneously created and tested against the theory it emerges from. DBR inspired me to create a prototype of this app while simultaneously testing the feasibility of customizing game mechanics to match users' motivational preferences in the gamified design of an educational application. I hoped that by implementing and testing a tool used in recent gamification literature while designing the prototype of *Facing Dragons* I could assist in creating a game that was able to motivate users to address real-world challenges intended to lead to personal growth, while simultaneously contributing to the emerging field of gamification research.

Working out of a faculty office at SFU, I had access to many students during the 2019 summer semester. These students were typically between 19 and 29 years old, studying education, criminology, or computer science. These are the students who became participants in the present thesis.

A comprehensive literature review of the topic revealed that the User Type Hexad was a recently validated tool that showed the potential to be a usable framework for the design of customized gamification. This was selected as the tool to test.

1.5. The Present Thesis

Applying game mechanics outside of digital game contexts to improve learning outcomes is known as educational gamification. Games can be highly motivating and engaging to players but not all games are equally motivating to all players. Gamification works best when the type of game mechanic matches the intrinsic motivational needs of a student. This thesis investigates the concept of customizing gamification to match individual user preference categories. Throughout this thesis, I document how one

novice game designer and researcher attempts to simultaneously use and investigate a bleeding-edge motivational gamification design tool, the User Type Hexad framework (Marczewski, 2015; 2018; Tondello, Mora, Marczewski, & Nacke, 2018) to create an educational application intended to teach life skills through motivationally customized gameplay in the real world.

This thesis also details the creation and validation of a new instrument, LifeLeaps (Life Skill Learning Preference Survey), which I hope can assist future researchers, game designers, and educators, to assess life skill learning preferences.

The goal of this work was to investigate if clusters of motivational preferences (User Types) are correlated to life skill learning preferences and to create gamified instruction which pairs learning preferences with gameplay preferences. After receiving substantial research grants to create a working game prototype, I discovered that running a tech start-up and designing deeply gamified instruction is very hard to do.

1.6. Research Questions

Throughout this thesis I explore two main research questions and two sub-questions:

RQ1: Is the User Type Hexad a usable tool to assist a novice designer to create a gamified life skills education application for young adults? In other words, how easy is it to understand and use the data from the User Type Hexad to generate design ideas for a gamified educational application?

RQ1.2: How can storyboards depicting quests and/or challenges that are intended to promote life skill learning targets be designed to appeal to certain User Types by following the recommendations of Marczewski's (2017) Periodic Table of Gamification Elements (Figure 4. Periodic table of gamification elements (Marczewski, 2017).Figure 4)?

RQ1.3: What design improvement feedback do specific User Types have regarding the storyboards that are trying to improve the types of mechanics that their User Type would predict they are most interested in?

For study 1, I created a new tool, LifeLeaps, to assess life skills learning targets, which was intended to assist with answering RQ1

RQ2: What are the best life skills learning targets for gamified instruction?

Can I find, or design and validate, an instrument that quickly and effectively measures young adult life skill learning preferences for topics that show the potential for gamification?

During Study 2 I explored two additional qualitative research questions that are designed to assist with providing rich description or user feedback which will assist in answering RQ1

1.7. Defining “Novice Designer”

This thesis is a case study of the usefulness of a design framework to a novice game designer and researcher, so we must first define the bounds of the case so that inferences might be made about how my perception of usability is based on my specific level of novice. Let us start with the basics. I have never designed any gamified education before in the past. I have created video game concepts and game design documents, but I have never created a working game prototype. I have a basic understanding of programming languages and could write code at approximately the level of a first-year computer science student.

My knowledge of game mechanics, from a player’s perspective, used in commercially available video games and applications is quite deep. I would say have more experience playing video games than 90% of people within my field, Educational Technology and Learning Design, probably average for people in the game design industry. I have attempted to use games as part of education throughout my schooling and time as a teacher. Yet, I have never attempted to create a game or gamified learning platform in the past. I have always wanted to design games, I enjoy documentaries, books, online videos, games and reality TV shows about game design and production. I know the industry terminology well and feel like I could jump into the role of “Game Designer” in a major studio and fake it until I make it, but it would truly be faking it because I have never even been part of a team that took a game from concept to prototype in the past, let alone taking a game to market. I would say my confidence and ability were uncorrelated at the starting point of this thesis.

There is a steep learning curve when it comes to the design of gamification for educational purposes, which is then again compounded by an even steeper curve in the design of digital games; it is very difficult to make high quality digital games that are motivating and engaging. It is also very complex to run a design team, manage meetings, meet deadlines, raise money to keep the paycheques flowing at a tech start-up with a high monthly overhead.

The present case study focuses on only one game designer [Dov Schafer] in my attempt to create a motivating and engaging gamified life skill education application. To make that prototype I relied on the User Type Hexad to chose gamification elements, and pair them with life skill learning targets to create storyboards. I am a novice game designer because I had never designed a game when starting this work; yet I was very familiar with game design from an academic perspective. I hope that this case study of a game design attempt using the User Type Hexad (and the LifeLeaps instrument I created for this thesis) can be expanded upon in future research to include many educational game designers of various experience levels and backgrounds.

1.8. Scope of the Thesis

Literature review. To address these research questions, I undertook several literature reviews to explore each of the above research areas. Reviews of the literature on gamification, self-determination theory, customizing gamification to match user motivational preferences, the User Type Hexad, serious games, game design, deep vs. shallow gamification, DBR, instructional design, and life skills learning tests were conducted. Each of these reviews is presented in Chapter 2.

Study 1. After the literature reviews, I created the Life Skill Learning Preference Survey (LifeLeaps) following an iterative design process. Once the LifeLeaps was ready, ethics approval was received from Simon Fraser University and Kwantlen Polytechnic University to begin Study 1 which was a digital survey that collected User Type Hexad scores, game preferences, and life skill learning preferences of young adults attending class during the summer 2019 semester. Results from Study 1 were analyzed in detail using several statistical methods. The LifeLeaps instrument is validated and User Types are compared to learning preferences in detail to generate design ideas for storyboards used in Study 2.

Study 2. The final question of Study 1 asked if participants would be willing to attend paid focus groups in August 2019 where storyboards of an upcoming quest-based educational game would be presented. As the results of Study 1 filtered through, emerging trends in the LifeLeaps preferences informed the design of 12 storyboards designed to appeal to various User Types. Since there are six User Types identified in recent literature (achiever, disruptor, free spirit, philanthropist, player, socializer), two storyboards were intended to specifically appeal to each User Type following the recommendations of Marczewski (2017) and Tondello et al. (2018) to match certain User Types with certain game elements.

Groups of three to seven participants who scored among the highest in each User Type were invited to a one-hour-long storyboard feedback discussion where each storyboard was presented on a tablet and discussed as a group to generate design-improvement feedback. Study 2 collected quantitative feedback (five questions for each storyboard) before the group discussion and analyzed which storyboards were more preferred by each User Type. The goal was to uncover if different User Types would provide different types of feedback for the storyboards, and to determine if the groups intended to enjoy each storyboard and if they did or did not.

After participants in the focus groups gave their quantitative feedback, there was a five-minute group discussion covering only a single question “what would you do to improve this storyboard?”. The discussions were recorded and analyzed with thematic analysis to uncover what trends existed in the wealth of qualitative data generated.

Game design. After the studies were complete, the data was analyzed to find any emergent trends and to inform the creation of a game prototype based on the Facing Dragons concept – that is, a gamified life skill learning application that helped young adults to unlock their purpose in life through real-world challenges that turned their lives into a game they could play. A corporate body was formed, and \$120,000 worth of grants were secured to begin developing the prototype and potentially bring it to market. I became the Design Director of Facing Dragons.

During development, the project grew in scope and scale, eventually becoming a company with eight employees. The timeline of this development project ran from December 1, 2019 to June 1, 2020 whereupon it collapsed due to the unforeseen impact of COVID-19. The resultant Kickstarter project, investor pitch deck, and working Android

vertical slice prototype of Facing Dragons are presented in Appendix A, along with a story about my little (failed) tech start up adventure.

This thesis represents a year of learning, designing, researching, trying, and failing. I would not trade this experience for anything but would certainly do it differently if I get the chance to try something like this again.

1.9. Outline of the Thesis

This thesis has five chapters. Chapter 1 presents the introduction of the research and the research questions. Chapter 2 provides the literature review, which provides the relevant literature used for the study. Chapter 3 presents the methodology of the two mixed methods studies which together comprise a case study examining the potential utility of a design tool in the gamification of life skills education; the research design, research questions, research sites, and participants are presented, followed by a description of the instruments and consent process. The data analysis process for each of the parts of the research is also explained.

Chapter 4 consists of the presentation of the qualitative and quantitative results of this mixed methods study. The chapter is organized into two major sections: discussion of qualitative results and quantitative results. Qualitative findings are presented according to the six User Types (Socializer, Free Spirit, Achiever, Disruptor, Player, and Philanthropist) from which the themes are described accordingly. Quantitative results consist of intercorrelations between User Type scores and life skill learning preferences, structural equation modeling, multiple regression, canonical covariance analysis, as well as the visual modeling of the quantitative findings based on gender identity and LifeLeaps or User Type Hexad subscale item answers.

Chapter 5 concludes the thesis by presenting a summary of the major findings and their connection to the literature. It begins by presenting quantitative conclusions, then qualitative conclusions, followed by a combined discussion of the mixed methods study. It covers implications which answer research question 1: "How Could the Hexad Help a Novice Designer?" and then "How Could it Get in the Way". After the implications, directions for future research are suggested. The thesis concludes with my final thoughts.

After the reference section, there are five appendices. Appendix A showcases the game design project that rose from this research, while B and C present the LifeLeaps instrument and associated validation from Study 1. Appendix E shows all 12 storyboards used in Study 2. Appendix F shows the complete list of codes and themes per user type from the thematic analysis of focus group transcripts generated in Study 2.

Chapter 2. Literature Review

To collect information for the present literature review and to become fully aware of the emerging research field, I undertook a systematic literature review during January 2019 to be sure of including all recent and relevant work on the topic (Webster & Watson, 2002). Then in June 2020, I followed that up with a second scan to ensure this thesis captured the most up-to-date research available in gamification and design. The first step was identifying and searching Google Scholar, ISI Web of Science, IEEE, Research Gate, Psych Info, Springer, and Taylor & Francis. The searches consisted of several sweeps of related keywords such as *gamification*, *User Type*, *User Type*, *User Type Hexad*, *serious games*, *games for a purpose*, *behavioural games*, *as well as other grammatically equivalent terms such as gamified, gamify, gamifying, and gamify* following the recommendations of Bapista and Oliveira (2019). I combined all the searches with (and without) the terms education OR learning OR training to find relevant gamification literature to the learning sciences. The results were then filtered to include only articles, conference papers, books, and theses/dissertations, published between January 2010 and January 2020. This search was then updated in March 2021 before submission.

2.1. Game Design

Game design is the root of gamification design. It is appropriate to dive into a quick discussion of what game design is to frame the work presented in this thesis. The design of games can be simply understood as an art, or best practices, of conceptualizing and developing a game in an intentional manner. I have crafted that definition based on Jesse Schell's book *The Art of Game Design* (2008) – an important text on the subject that nearly every game designer I spoke with recommended when I set out on this journey to understand gamification. Schell (2008) called game design “the act of deciding what a game should be”.

Salen and Zimmerman (2003) also drew attention to the iterative nature of game design when they defined a set of fundamentals that have been widely cited in the literature. They stress how systems and interactivity should be considered in terms of player choices, which lead to actions and outcomes. Concurrently, the designer and player enter a dialogue about rulemaking, rule-breaking, complexity, and the emergence

of play experience; this creates a game experience and leads to game representation and, optionally, social interaction within the game. This framework helps conceptualize the many interconnected elements of game design and the central role of the player in the process, similar to how a book is given life by the reader who reads the book with the lens of their own life experience. Game design is a conversation about the possible actions a player might take and stresses what Salen and Zimmerman (2003) call *powerful connection*.

Many frameworks attempt to operationalize game design. It is a topic, like design-based research, that still does not have a canon of agreed-upon best practices and is very much still a field in development. Brathwaite and Schreiber (2009) undertook a systematic review of all available game design frameworks to present an appealing metaphor to encapsulate the findings. They stress the importance of attending to the smallest individual components of a game design that can be isolated and studied, which they refer to as *game atoms*. In this view, game design becomes a collection and arrangement of these atoms. This atomic perspective is echoed by Reeves and Read (2009) who build a formula of ten game “elements” that should be considered: self-representations, environments, narrative, feedback, reputations (ranks/levels), economies, competition, communication, teams, and time pressure. Reeves and Read propose that all these elements interact and appeal to different sorts of players.

We can see similar themes emerging between gamification and game design if we study these frameworks. One of these individual atoms are put into a design they are referred to as game elements. Each framework gives different names and significances to individual game elements, but some common themes emerge across the literature. Game design frameworks are standardized sets of concepts that are intended to assist the people who use them to solve problems of similar nature to those confronted by people in the past. They are a way to prevent people from having to break new trail to risk tripping on every stone or getting lost, and instead, follow a path that has been trampled flatter. Yet, authors as early as Crawford and Crawford (1984) have cautioned that game design is too complex to be reducible in any meaningful way.

In the past, game design relied on book-long game design documents and was essentially fully realized before the process of prototyping even begun. This was necessitated by the incredibly technical and complex nature of software development. The emergence of agile methodology in the game design world speaks to a process of

rapid prototyping and iteration that does not necessarily follow a framework. Agile is a system of project management that has gained widespread adoption in the design world. Within an agile system, there is a two-week design-focused goal set, which is known as sprints, that are drawn from a backlog of ideas based on something called *user stories*. These stories are statements from the perspective of the imaginary user that identify some element of interaction that they either want to see or are having trouble with. If we look at game design as an agile process, it is easier to conceptualize how the big game studios make such complicated games with such large teams. Each person takes ownership of a small hierarchy of tasks during each sprint while the game designer keeps the direction of the project in line with the long-term vision. This is how Facing Dragons was designed – not with a game design framework, but with an agile methodology that was open to change at every step and adaptable to the ever-changing backlog.

Calvillo-Gómez, Cairns, and Cox (2010) made a good argument for frameworks being mere fractions of a larger picture in his core elements of gaming experience model. They can allow designers a good foundation from which to craft user experience but are not to direct the design process. Games do not have a recipe but looking at other popular games can help craft a user experience that is compelling and motivating to players. These game design patterns and mechanics are all core to game design, but also the design of motivational applications of games in the real world.

The art of game design may be deciding what to add, but the process of game development that springs directly from that design benefits greatly from a focused prototype that resists trying to do too much. In the next section, I discuss the history and current state of gamification – an application of game elements to non-game situations.

2.2. Gamification

Gamification has been hailed as one of the most important technological trends of the last decade (Morschheuser, Hamari, & Koivisto, 2016) and it affects everyone daily, even if it goes unnoticed (Dias, 2017); in fact, it is not even a recent development. Throughout history, humans have used game-like structures as tools for motivation and engagement; the Olympics, for example, can be understood as the gamification of ancient Greek military training (Lee & Hammer, 2011). Alongside advances in the internet and mobile computing devices in the early 2000s, gaming began to take on new

and interesting forms; digital and mobile games emerged as a cultural obsession, capturing the attention of players and researchers alike. Researchers began to explore if game structures can motivate people to act outside of games by applying game structures to non-game situations (Deterding, Dixon, Khaled, & Nacke, 2011). A significant problem that many schools and educators face is student motivation (Zichermann, & Cunningham, 2011). The study of game mechanics as motivational affordances shows great promise in educational contexts, where learner motivation is often the missing puzzle piece (Kapp, 2012).

As a research field, gamification has grown steadily over the past seven years. There were more articles written on the topic in the past two years, than in the first five combined (Subhash & Cudney, 2018). The first five years of gamification research from 2011-2016 consisted of (a) definitions, frameworks and taxonomies for gamification and game design elements; (b) technical papers describing systems, and designs; and (c) user/effect studies of gamified systems (Hamari et al., 2014; Seaborn & Fels, 2015). Initially, research came mostly from computer science, marketing, human-computer interaction, game studies, and psychology. Today, gamification research takes its place as an institutionalized cross-disciplinary field in the form of dedicated professorships, educational programs, gamification journals, collected volumes (Stieglitz, Lattemann, Robra-Bissantz, Zarnekow, & Brockmann, 2017), and academic conferences such as Gamification Con (<https://gamificationcon.com/>).

Hamari et al. (2014) conducted the first highly influential systematic overview of cross-disciplinary research on gamified applications. Their results suggested that gamification research was not only becoming more popular but that the results support it being an effective form of motivational affordance. More recent reviews of the field suggest that more evidence regarding the effectiveness of gamification is not what is necessary. The questions of *what is it?* and *does it work?* have been addressed. What is necessary is to have a focus on how best to utilize individual game mechanics in real-life settings and answering the questions of *how?* and *when?* will be most impactful in this second wave of research (Nacke & Deterding, 2017).

Lee and Hammer (2011), who are well-known researchers of serious games in education, discussed digital gamification as the addition of game mechanics to non-gaming applications to enhance user experience and engagement. Their definition is what initially led me to investigate gamification as a topic when seeking ways to create

an application designed to increase user engagement in an application designed around experiential learning. Kapp (2012) researched gamification from an educational perspective and further defines it as “using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems” (p. 10). Kapp’s (2012) definition was adopted to guide inclusion and exclusion criteria when reviewing the literature for the present work.

By 2010, businesses and academic institutions had begun testing the motivational power of game scoring elements like point systems, levels, badges, and social leaderboards, outside of game settings. Showing positive results, these game elements became more widely used and tested in mobile applications such as Foursquare, and websites that were seeking participatory engagement, such as StackOverflow (Hamari, Koivisto, & Sarsa, 2014; Nacke & Deterding, 2017). This practice quickly became known as gamification, which was initially defined as the use of game design elements in non-game contexts (Deterding et al., 2011). Gamification was even awarded runner-up for the word of the year by Oxford Dictionaries in 2011 (Burke, 2014).

2.2.1. Gamification vs. Serious Games or Educational Games

Games have always been tools capable of changing people’s lives; since early recorded history, games have been used to transmit cultural meaning and reinforce social structures (McGonigal, 2011), current day initiatives seek to synthesise emergent technology and gameplay whilst employing some explicit educational or social purpose. According to Bogost (2007), “Videogames can disrupt and change fundamental attitudes and beliefs about the world, leading to potentially significant long-term social change”. It is often the case that this social/health/educational messaging is achieved through narrative. Traditionally, narratives have been shown to have the capacity to influence cognition, emotion, and potentially behaviour as mediated through the transportive nature of narrative immersion (Green & Brock, 2000). New technologies enable narratives to be consumed interactively in the form of videogames. These serious games provide individuals with the opportunity to explore possible selves and different perspectives in infinitely creative and unique ways. As such, games are in a unique position to inform, persuade, motivate, and create change by providing individuals with new tools for positive health-related change.

While gamification uses game-like features in a way that is meant to persuade users to engage in non-game tasks, serious games attempt to craft digital games that are solutions to real problems. They are not designed specifically to entertain players, but instead to provide educational experiences that are engaging or help reconceptualize real-world objects and situations (de Byl, 2013). Overall, gamification's main goal is to deepen engagement and enhance motivation to perform tasks in everyday life, while serious games are designed to train players, or simulate the world in a virtual environment specifically designed learning objectives (Kim & Lee, 2015).

Gamification differs from serious games in that it uses principles of game design outside of a true game setting, yet both utilize the persuasive and motivational power of game structures for serious purposes such as therapeutic applications and behaviour change. Serious games are a young and rapidly growing field (Laamarti, Eid, & El Saddik, 2014). Both serious games and gamification are implementations of game mechanics to motivate real-world change in people and therefore it is helpful to look at the benefits of serious games when designing gamified instruction. As will be discussed later, sometimes gamified instructional design can even start to become a serious game, when the scope of the design creeps ahead. It is easy to see, then, that both serious games and gamification occupy the same spectrum of psychology-based motivational and behavioral change instruments.

2.3. Gamification in Education

Game-inspired design in education, also known as gamification or gameful design, is about redesigning elements of a course to support intrinsic motivation; it has been positively correlated to students working harder and feeling more in control of their learning (Aguilar, Holman, & Fishman, 2018). In educational contexts, gamified digital applications and learning management systems have become increasingly popular due to their utility as motivational tools, especially to engage students with content that is otherwise less intrinsically interesting to them (Alsawaier, 2018).

2.3.1. Gamification of Learning Environments

There are two distinct categories of game elements that can be used to design learning environments: structural gamification and content gamification (Kapp, 2016).

Adding only the scoring elements of digital games to real-life metrics, such as points, levels, badges, and leaderboards, is structural gamification. Critics of gamification often point to a purely *PBL* (points, badges, and leaderboards) focus as being ineffective at sustaining motivation (Nacke & Deterding, 2017). Content gamification uses game mechanics and game thinking to guide content creation, structure a series of events, or provide a lens that makes learning content more game-like. Focus on story, challenge, discovery, exploration, mystery, and characters are forms of content gamification. Mixing content and structural gamification can lead to a better design, but also has the possibility of becoming a digital learning game, rather than an example of gamification; the line between gamification and game-based learning is blurry and a subject of ongoing debate in research (Kapp, 2016; Mora, Riera, González, & Arnedo-Moreno, 2017).

Most early gamification research has focused on describing gamification and asking whether it *works* (e.g. Hamari et al., 2014) in various contexts. The evidence indicates that it can work as a motivational technology; the next generation of gamification research should focus on establishing how best to implement specific strategies (Nacke & Deterding, 2017). It should be possible to find ways to customize the delivery of persuasive technology to increase learning and leverage the features that are most motivating to learners while avoiding mechanics that are not.

Nearly all gamification research before 2017 was focused on structural gamification such as leaderboards, badges, metrics, and reward systems (Alsawaier, 2018), barely skimming the surface of possible mechanics that make games enjoyable or motivating. Much of the gamification research to date has ignored the deeper side of gameplay, such as social connection, personal journey, flow (Csikszentmihalyi, 1997), and narrative, described by Kapp (2016) as content gamification. These elements are related to intrinsic motivation through needs satisfaction of relatedness, autonomy, mastery, and purpose (Tondello et al., 2018).

While there can be skill-learning and motivational benefits to purely structural gamification for certain users, it has been criticized as mashing together irrelevant game elements while ignoring aspects of game design that motivate and engage people to play games. The most common critique of existing gamification frameworks is that they work within a small set of progress feedback interface patterns (Alsawaier, 2018). Criticizing the field of game-inspired motivational design based on poorly implemented

and shallow applications of PBL is akin to blaming the hammer when a person misses the nail. It is easy to say a tool is ineffective when it is being used incorrectly.

Ian Bogost (2011) famously called gamification “bullshit” because the shallow, trendy, corporate PBL gamification apps lack the core aspects of actual games and try to inject fun into a broken system simply by scoring it. Bogost referred to them as *exploitationware*. Robertson (2010) adds that gamification could be called *pointsification* since it appears to be about adding point systems and badges in hopes it will improve something. Robertson (2010) considers scoring elements as the least essential components of games. Bogost (2011) and Robertson (2010) were writing from a time early in the development of gamification research, but their criticisms are still valid today. Using principles of game design to improve learner engagement requires more than structural game elements alone.

Researchers are going beyond the standard PBL menu of point mechanics and have begun experimenting with alternative game elements (Rapp, 2017a). Successful multiplayer games, such as World of Warcraft, have a lot they can teach us about gamification of social networks to create highly engaged and lasting communities of active players (Rapp, 2017b). Rapp (2015, 2017a, 2017b) conducted an ethnography of World of Warcraft to present possible game-mechanic justifications for its over 13-year-long highly engaged player base. Rapp presents nine suggestions for the future design of gamified systems. There are a lot of exciting new directions that gamified learning design can explore.

2.3.2. Application of Gamification in Higher Education

Gamification has aroused considerable attention in higher education and digital learning environments. Since its beginnings in the business world, game elements have been applied to digital platforms in attempts to compete within an attention economy. Just as it is beneficial for a company to increase engagement with its customers, education benefits from increased engagement with students. This is especially true for millennials and Generation Y (Elam, Stratton, & Gibson, 2007) who are referred to as the first generation of digital natives. They have been saturated with digital information technology since birth and used to the grammar of game design. Millennials respond well to technology; they seek out technological solutions to problems. They are goal-

focused, multi-taskers, able to navigate trans-media environments, are team-oriented, and have digital social networks (Shih & Allen, 2007).

The trade-offs for this improved technological affinity are a shorter tolerance for long format tasks, desire for stimulation and gratification, lack of critical reflection, and lack of desire to develop mastery level knowledge (Howe & Strauss, 2003). One can see how these tendencies could make education, especially distance education and self-directed learning, less effective. Gamification promises to improve engagement and motivation, two things which very well could offset the deficits that being raised in a technologically rich environment can engender.

In a recent meta-analysis of the effects of gamification on user behavior and intentions, Baptista and Oliveira (2019) found strong β values between the meta-variables in recent quantitative gamification research for several pairs of variables. They found a user's intention to use a gamified system is strongly related to a user's attitude toward the application ($\beta=0.520$). This indicates that gamified systems that improve player attitude toward engagement with that system were significantly different than those that were not gamified. Perhaps most interesting for the learning science was that improved learning opportunities were closely related to perceived usefulness ($\beta=0.543$) and socialness is related to the perception of usefulness ($\beta=0.472$). As this was a summary of nearly all quantitative data on gamification in the last 10 years, it can be understood to mean that there are strong relationships to be further explored in gamified e-learning design. It stands to reason that gamifying e-learning systems to be more fun to interact with by actively managing player attitude through game mechanics which promote social interaction among users will lead to improved desire to engage with the system and higher perceived usefulness (and therefore improved learning opportunities) for users.

Several studies indeed do report that gamification improves students' engagement and motivation in a variety of learning activities (Anderson, Turner, Dierksheide, & McCauley, 2014; Barata, Gama, Jorge, & Gonçalves, 2017). Dicheva, Dichev, Agre, and Angelova (2015) presented a systematic mapping study of gamification research in education that is widely cited in literature review sections across the works reviewed for this paper. They analyzed 34 different empirical studies and sorted them into a framework based on the design principles, game elements, context of the application, and educational content. By mapping the published works based on the

above classification criteria and analyzing them, they illuminated the state of the young field of educational gamification research in 2015. They found promising effects on student perceptions of their depth learning, as well as a general trend of higher self-reported satisfaction with learning, in the gamified courses.

Interestingly, few studies that Dicheva et al. (2015) mapped found significant effects on post-test measurements of knowledge on summative assessment following a gamified course when compared to the same course being delivered through lectures alone. Few of the studies Dicheva et al. (2015) reviewed isolated the effect of different individual game mechanics or adequately measured the learning effects. Their results also suggest that there is a need for more empirical research on the specific game elements that improve the learning process within different contexts. They conclude by noting that future researchers should investigate ways to create reward structures that are more intrinsically motivating to students. They state, "While the concept of gamification may look simple, the analyzed work demonstrates that gamifying learning effectively is not" (Dicheva et al., 2015. p. 84).

Online learning platforms that are based around chat boards, such as Moodle, are great starting points for gamification. Strmečki, Bernik, and Radošević (2015) found that points, badges, customization, leaderboards, levels, challenges, quests, feedback, and freedom to fail are cited across literature as game elements suitable for use in e-learning systems. These game elements were incorporated into an online computer programming course and compared against a non-gamified version of the same course. Students were split between two experimental groups and two control groups. A pre-test evaluating prior knowledge showed no statistical difference. After the gamified e-learning course, the experimental group performed statistically better according to an independent sample *t*-test on the post-test scores. This finding also indicates that existing e-learning platforms would be useable for rapid prototyping of standalone gamified learning applications.

Adding educational game elements to a social network creates a social e-learning game. De-Marcos, Garcia-Cabot, and Garcia-Lopez (2017) tested whether social gamification mechanics can positively impact student learning or attitudes. Students reported enjoying the social gamification approach and outperformed the control group on all assignments but underperformed on the written summative evaluation. This finding supports the notion that game elements can improve motivation

and engagement, but do not always translate well to the acquisition of the content knowledge that traditional tests measure. It is interesting to note that students enjoyed the experience of learning significantly more in the gamified group, spent significantly more time interacting with the online platform, and tended to pick more challenging readings and homework assignments than the control group.

Subhash and Cudney (2018) recently completed a review of the literature from 2012 to late 2017 in gamification in post-secondary settings. They found that points, badges, leaderboards, and levels were still the most frequently tested game mechanics in higher educational contexts. Improved engagement, motivation, and student attitude improvements were the most widely cited benefits. While improved student performance was observed in some studies, many reported on perceived learning and enjoyment gains without significantly improved performance on post-test measures of learning (Subhash & Cudney, 2018).

As all studies differ significantly in terms of context, learning content is full of uncontrollable variables such as teacher engagement, students' prior gaming experience, and the variety of design strategies implemented. Because of this, it is hard to generalize findings or report that gamification is positively correlated with improvements in student learning. What is clear is that improved student engagement and attitude towards learning are widely reported benefits to persuasive gameful learning design; skill-based learning targets seem to benefit most from this increased engagement (Alsawaier, 2018). To begin to predict why some gamified learning environments motivate students, while others do not, one must look toward theories of human motivation.

2.4. Theories of Gamification

For the last 40 years, Richard Ryan and Edward Deci have been working together to develop, test, refine and elaborate a theory of motivation, development, and wellness they call *Self Determination Theory* (SDT). Though it fits within the domain of cognitive behaviorism, SDT has its roots in humanistic psychology and maps on to the upper tiers of Maslow's hierarchy of human needs (1943). It is the most widely cited theory in gamification research (Seaborn & Fels, 2015). SDT (Ryan & Deci, 2000) begins with a primary distinction between what they call *autonomous motivation* and *controlled motivation*.

Autonomous motivation names what one is doing when they are feeling a full sense of willingness, volition, and choice. If one is doing something with a sense of interest, enjoyment, and value, then it is likely they are autonomously motivated. In contrast, is controlled motivation which refers to doing something to get some reward or to avoid punishment. It means doing something because you are feeling the pressure, demand, or obligation to do it. When people think about increasing motivation, they are more often discussing controlled motivation, but Ryan and Deci (2000) found that when people are more autonomously motivated, performance, wellness, and task engagement are greater than when they are controlled in their motivation

SDT claims that autonomous motivation arises from the satisfaction of three shared, human psychological needs: competence, relatedness, and autonomy. Competence is the need to feel confident and effective with what it is someone is doing. relatedness is feeling cared for by others, to care for others, and to feel that one belongs in various groups that are important to them. Autonomy is feeling in control of one's choices and having meaningful options. These basic needs must be satisfied to get optimal motivational performance (Ryan & Deci, 2000).

Sailer, Hense, Mayr, and Mandl (2017) use SDT to explain the motivational power gamification and capture some of the interaction between game element choice and behavioral outcome. They present a fascinating overview of the various game elements encountered in literature, and the psychological aspects related to them, to guide future gamification designers to think with theory. The role of competence, autonomy, and social relatedness presented in SDT (Ryan & Deci, 2000) is demonstrated in the context of gamification. The study found that performance-based game design elements such as badges, leaderboards, and graphs were related to increased competency need satisfaction. Autonomy needs-satisfaction was met when tasks seemed meaningful to students. Avatars, meaningful stories, and co-operative play fostered social relatedness needs-satisfaction.

One key component of SDT closely related to educational gamification is the distinction between intrinsic and extrinsic motivation. Intrinsic motivation is a drive to take action that originates from within a person. Extrinsic motivation originates from outside a person, such as a monetary reward. A good game generates intrinsic motivation by creating conditions that compel users to participate willingly. It is not

relying on extrinsic rewards because the motivation those generate only persists if the rewards seem worth the effort (Sailer et al., 2017; Orji, Tondello, & Nacke, 2018).

Dan Pink's drive theory (2011) shares many similarities to SDT; it points to three intrinsic motivational components: autonomy, mastery, and purpose. *Purpose* can be understood as the need to see the deeper meaning in the actions we are taking. That can be helping others or advancing a cause they believe in. Another form of purpose is connecting a task to oneself (including family) or one's future self. If one thinks it will improve their life in some way, that leads to purpose satisfaction.

Andrzej Marczewski (2015) and Tondello et al. (2016) combined SDT and drive theory specifically for gamification context to generate *RAMP* (Relatedness, Autonomy, Mastery, and Purpose). RAMP is ideal for generating design recommendations for gamified learning contexts because it focuses on the necessary components for stimulating intrinsic motivation. Tondello and colleagues (2016) worked with Marczewski's Hexad model of game user motivation (Figure 3) and does a great job breaking down the four needs into related game mechanics and ascribing player behavior profiles that value each need more than others. See the "User Types" section of this paper for more detail about the player behavior profiles and gameplay preferences.

Fogg's behavior model (2009) is another popular theory for creating persuasive technology. It is extremely relevant to gamification since it essentially a formula for describing the necessary conditions for behavior change. The model states $B=MAT$; behavior is the result of motivation (M), ability (A), and trigger (T). For an individual to perform a task, "he or she must be sufficiently motivated, can perform the task(s), and be triggered to perform it" (Fogg, 2009, p. 40). It is important to note that all three elements are necessary simultaneous conditions and if any of them are below the threshold of action, the behavior will not happen.

While it sounds simple, there are a lot of complex interactions at play when it comes to human motivation, actual vs perceived ability, and various behavioral triggers. Some people may have the ability but are not motivated to try, while others may have enough motivation but lack confidence in their abilities. It is possible that triggers may not be essential to actions themselves but may instead represent a pathway to

researcher intervention. Different triggers could be tested as ways to make up ground in motivational or perceived ability deficits.

Fogg (2009) discussed three types of triggers: spark, facilitator, and signal. A *spark* attempts to increase motivation along with the trigger. An example of this would be a game mechanic that tempts the player with some promised reward when it gives a task to perform. *Facilitator* triggers are for those who are motivated but perceive a lack of ability; they often highlight the simplicity of a task or are incremental steps toward a final goal that may seem impossible if presented at the outset. *Signal* triggers are for those with both motivation and ability at appropriate levels. They are essentially reminders and should be used to encourage practice. Signals should not be used to attempt to motivate those who are already motivated since that can lead to annoyance, which decreases the effectiveness of subsequent triggers.

The Fogg model has been used by other theorists, such as Landers et al. (2018), who have developed a more game-focused behavioral change model by replacing the concept of *gamefulness*, often seen in design literature, with three distinct psychological states that attempt to bridge literature from psychology, human-computer interaction, healthcare and education to describe how prompts and abilities interact with motivation to generate desired behavior.

Landers et al. (2018) defined gameful experience as a psychological state occurring when a person perceives non-trivial achievable goals created externally, is motivated to pursue them under an arbitrary set of behavioral rules, and evaluates that motivation as voluntary (Landers, et al., 2018). They present six facets of the theory. Gameful systems: (1) lead to gameful experiences; (2) impact psychological characteristics; (3) result from effective design; (4) lead to behavioral change; (5) appropriate behavioral change causes the distal outcomes gamification designers target; and (6) individual differences moderate the effectiveness of gameful systems.

Other researchers have begun creating *gamefulness* scales to measure the extent to which gamification gets users to more engaged states (Eppmann, Bekk, & Klein, 2018). This gameful experience model provides researchers with a way to operationalize their designs to generate behavioral data consistent with the definition of autonomous motivation suggested by SDT. Landers and colleagues stressed that individual differences moderate the effectiveness of gameful systems; this supports the

conjecture that customizing gamification elements to match gameplay preferences will promote the intrinsic motivation of students and lead to behavioral change.

2.5. Motivational Personalization and Individual Differences

When designing a motivational intervention, it is important to identify which people the designer is most interested in reaching, and in what specific ways they want them to be motivated (Van Roy & Zaman, 2018); there is no way to reach all people equally. Journalist Malcolm Gladwell discusses choice and happiness, in the context of food preference research (Gladwell, 2004). When trying to create the perfect diet Pepsi recipe, famed Harvard psychophysicist Howard Moskowitz was confounded by the lack of any trends of central tendency on a large-scale Diet Pepsi taste test, there were only weak clusters of preference. Aiming right for the middle of the pack was not the most efficient way to reach the most people (Moskowitz, 1985).

Moskowitz was later hired by Campbells to define the perfect spaghetti sauce. He decided to break the concept of tomato sauce down into subcomponents (tanginess, spiciness, sweetness, viscosity, visible solids, etc.) to see if any of those subgroups were co-variant among different consumer taste preferences. He discovered that three clusters congregated around certain sauce ideals; some people like their spaghetti sauce plain, those who like it spicy, and those who like it extra chunky. At the time, there was no such thing as 'extra chunky' in the consumer market. Campbells created the Prego sauce line for each preference category and over the next 10 years, they made 600 million dollars off their line of extra chunky sauces (Gladwell, 2004).

Gameplay preferences are like taste preferences; there is not one perfect game, or game mechanic, that will engage all people. Van Roy and Zaman (2018) use SDT to analyze needs satisfaction (autonomy, competence, and relatedness) of individual game elements. They note previous research conducted in educational contexts is rarely focused on how learner differences can play a role in the effectiveness of gamified designs. Their results indicate that the context and the personality traits of the learner seem to play a role in the effectiveness of individual game elements on learning and motivation. The exact mix of ingredients needed to craft *the perfect sauce* for a specific group of learners may be unknowable, but more understanding of which game mechanics tend to lead to distinct needs-satisfaction domains is a rich area for future research.

Psychologists have been attempting to describe individual personality differences for a long time and have developed some tools to map trends in human trait patterns. The Myers-Briggs Type Indicator (MBTI; Myers, 1962) has been used widely by researchers across many fields when considering the different types of people. The MBTI has eight opposed scales (Extraversion/Introversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving), which are scored on a continuum to create a four-letter label. The MBTI is less widely used now than the Five Factor Model (FFM) of personality, also known as the “Big Five” (Goldberg, 1990). It does away with paired opposites and rates people on five separate subscales: O (openness), factor C (Conscientiousness), factor E (Extraversion), factor A (Agreeableness), and factor N (Neuroticism). The recent literature agrees that the FFM model is preferable to the MBTI model due to increased reliability (Costa & McCrae, 1998). Regardless of what instrument researchers use to define individual differences, the goal is to find if there are clusters of people who have similar definable characteristics that designers can consider in the gamification design process.

Gameplay preferences also tend to cluster into categories. Bartle (1996) wanted a way to show game designers how to consider user gameplay motivations when designing their games, so they did not only make games they wanted to play – a practice in gamification design called self-hugging (Cornetti, 2017). The Bartle type quadrant attempts to describe the ways that a player interacts with game content, and other players.

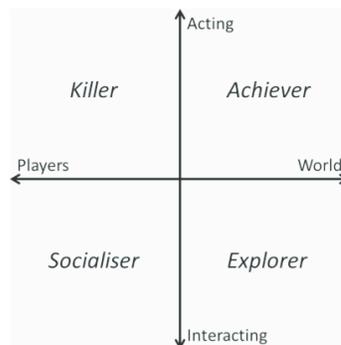


Figure 1. Bartle's User Type axes (Bartle, 1996).

Though the Bartle types have been correlated with MBTI personality trait clusters, they are not distinct personality traits (Bateman, Lowenhaupt & Nacke, 2011) and Bartle (1996) himself warns against using them as such. The four basic types

(socializer, killer, explorer, and achiever) have been expanded to a score known as the *Bartle quotient* which includes crossover categories between each type; for example, if one scored 67% achiever, 60% killer, 47% explorer, 27% socializer on the most recent version of the test (<http://matthewbarr.co.uk/bartle/>) it would make them an 'AKes' type. The achiever/killer type is motivated most by the recognition that their performance was better than their peers, especially when the challenge level is high.

Though the Bartle types are commonly found in gamification design frameworks (Hamari & Tuunanen, 2014), Bartle (1996) is clear that his theory only accounts for the voluntary play of online roleplaying games. While game types attempt to explain why people are motivated to play multiplayer games, human motivations are not invariant over time, and one categorical preference does not necessarily suppress another (Yee, 2007).

Stanford communication theorist, Nick Yee (2007), addressed some shortcomings with the Bartle types by proposing an empirical model of player motivation. Yee's model is based on a factor analysis of over 4000 online roleplaying gamers' responses to a 40-item game-motivation questionnaire.

Achievement	Social	Immersion
Advancement Progress, Power, Accumulation, Status	Socializing Casual Chat, Helping Others, Making Friends	Discovery Exploration, Lore, Finding Hidden Things
Mechanics Numbers, Optimization, Templating, Analysis	Relationship Personal, Self-Disclosure, Find and Give Support	Role-Playing Story Line, Character History, Roles, Fantasy
Competition Challenging Others, Provocation, Domination	Teamwork Collaboration, Groups, Group Achievements	Customization Appearances, Accessories, Style, Color Schemes
		Escapism Relax, Escape from RL, Avoid RL Problems

Figure 2. Daedalus project model of player motivation (Yee, 2007).

Yee (2007) uncovered 10 motivational subcomponents that could be clustered into three motivational categories: achievement, social, and immersion. The model includes related game mechanics for each motivational subcomponent (Figure 2) and demographic variable correlations (age, gender identity, usage patterns) to each.

Results indicated that some gameplay motivations were more correlated with gender and age than others. Yee's model is a tool for researchers to consider the motivational power of individual game elements for different players in the context of educational gamification.

Studying how gameplay preferences relate to motivational needs satisfaction allows a gamification designer to use mechanics that are optimally motivating; it promises to improve user engagement with that gamified system by customizing the design to match motivational preferences (Marczewski, 2015). This motivational personalization approach has been taken up by recent gamification research with some promising results (Orji, Nacke, & DiMarco, 2017; Tondello et al., 2018). There appear to be benefits to personalizing gamification, above simply adding all gameplay elements and hoping the user finds the most motivating ones and simply ignores the ones they do not care for. Personalized gamification seems to be simultaneously better at motivating users who enjoy basic gamified systems, and less de-motivating to users not traditionally interested in the standard array of PBL (Busch et al., 2015).

Personalization hopes to increase the chance that behavioral change will occur with the addition of game mechanics to a non-game situation by eliminating the mechanics that are least motivating in a given scenario or to a distinct user group. In this way, it is closer to a practice of editing rather than adding since it would not work to simply use every single game mechanic all at once to motivate every single person. Gamified systems work best when they do not overload the user with too many things at once (Schell, 2008). The art of game design can teach us a lot about the science of motivational personalization within gamification of learning systems; a well-designed game is more engaging in the long run than a poorly designed game – even if that poorly designed game has been customized to theoretically scratches all your motivational itches.

A recent study by Tondello et al. (2018) examined the construct validity and inter-item relatedness of a Marczewski's (2015) player and User Types Hexad model of player motivation (Figure 3) based on the RAMP model of intrinsic motivation. The fascinating thing about the Hexad model is that it is designed specifically to make predictions about User Types for gamification purposes and makes suggestions on how to design around User Type to meet theoretical needs satisfaction targets.

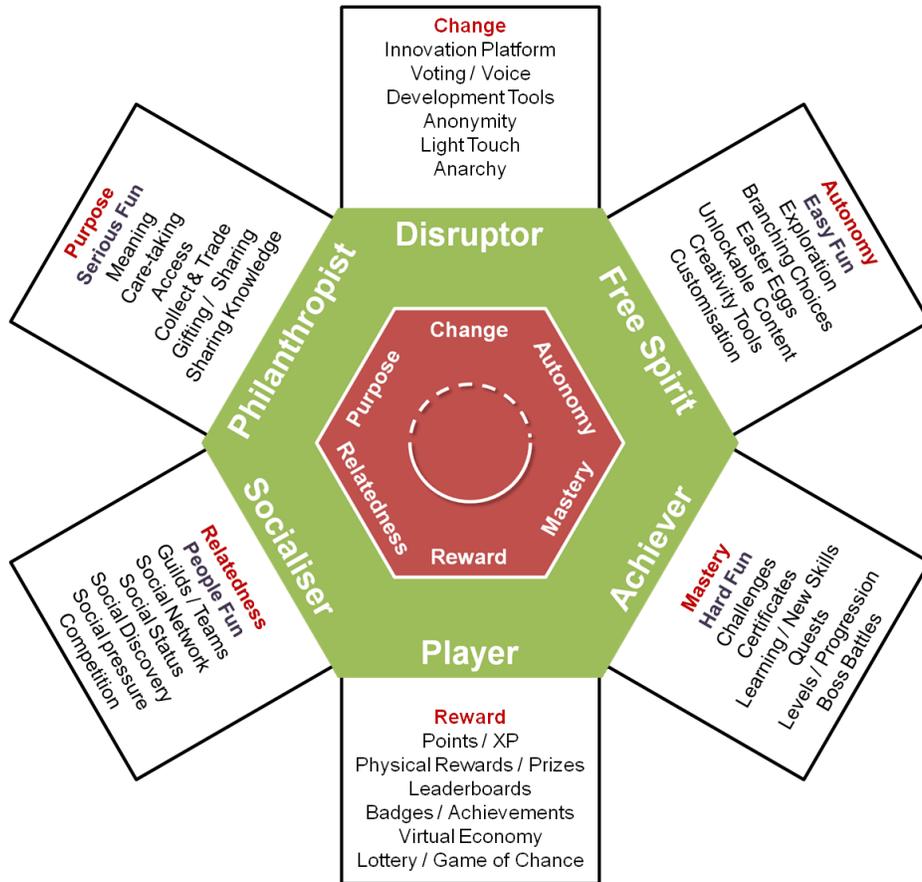


Figure 3. User Types Hexad (Marczewski, 2017).

This framework shows great potential for personalizing gamification applications since it has been conceived specifically for this goal. In this model, six User Types are described, as follows (see Figure 4, above):

- **Socializers:** are motivated by relatedness needs satisfaction. They want to interact with others during gameplay and form connections with other players. Some may enjoy team play, while others thrive on social status and competition.
- **Free spirits:** are motivated by autonomy and self-expression. They want to create and customize. They respond well to branching choice narratives and enjoy the feeling of exploring the boundaries of what is possible.
- **Achievers:** are motivated by feelings of mastery. Achievers enjoy learning new things and improving themselves. They set challenges for themselves to

overcome and are motivated by seeing progress towards those ends. They thrive in challenging situations but are not motivated well by extrinsic rewards.

- Philanthropists: are motivated by purpose and meaning. They want to see a positive effect on their efforts and care about the wellbeing of others, especially if it reflects well on themselves. This group tends towards altruism, appreciating game mechanics like gifting, healing, and collaboration.
- Players: are motivated by reward systems most than most. They are like achievers in the sense that they want mastery satisfaction, but this is a more extrinsically reward focused group. They tend to want to win, rather than improve. This is a User Type that is likely to be motivated by competition mechanics often associated with gamers and has led to the misconception that points and leaderboards will work for everyone.
- Disruptors: are quite interesting. They are motivated by observing systemic change. They enjoy seeing the effect of their power on the system and other players. They are the rarest type in the Hexad, possibly because of a tendency to manipulate self-report measures to get the results they want.

Tondello and colleagues (2018) found support for the Hexad survey as a predictive instrument for user gameplay motivations. User Type categories were indicative of motivational preference, though strongly correlated with age and gender identity. Marczewski's player' and disruptor types are distinct from Bartle's (1996) and Yee's (2007) models as they are embodiments of reward focus (player) and change focus (disruptor). Those types are further elaborated into four subtypes that describe the motivations in more detail and are usable for anticipating problems in game-user interaction.

Orji et al. (2018) also tested the predictive power of the Marczewski User Type Hexad model using a structural equation modeling approach in a recent study. They report:

“Results reveal that an individual's User Type predicts their preference for and the persuasiveness of different persuasive strategies. For example, people scoring high for the player User Type tend to be motivated by competition, comparison, cooperation, and reward while disruptors can be demotivated by punishment, goal setting, simulation, and self-monitoring. Any persuasive strategies work for socializers, motivating them to adopt healthy behaviours, and thus they are generally the most responsive to persuasion. Our findings could guide designers in deciding on the best persuasive strategy to use and the ones to avoid when designing

persuasive gameful systems targeting people of different User Types.” (p. 2)

Most gamification research to date has adopted a one-size-fits-most approach to persuasive design, but research suggests adopting customization approach since different User Types are motivated by different needs-satisfaction interactions (Locke & Latham, 2013; Orji & Moffatt, 2018; Orji et al. 2018; Tondello et al. 2018; Yee, 2006). Gaming style preferences are important in determining whether certain game elements result in improved skill-learning outcomes, engagement, and motivation in real-life tasks (Van Roy & Zaman, 2018). Yet, there is currently a gap in gamification research regarding the best practices for creating customized and engaging gamified experience to individual users based on their personal preferences (Landers et al., 2018; Orji et al., 2018). There is also limited literature on implementation guidelines for gamified designs to improve learning (Mora et al., 2017; Mekler, Brühlmann, Tuch, & Opwis, 2017).

Below you will find the Periodic Table of Gamification (Figure 4) which neatly presents the six User Types explored within the Hexad and groups possible gamification mechanics that each of those types would likely be motivated by. It was presented by Marczewski to visually represent the interrelations of User Type and game (and/or gamification) elements similar to the way that real elements, such as the noble gasses, cluster together by traits and weights on the periodic table most of us grew up studying. I wanted to check if this was as useable of a design framework as it appears to be on first inspection. This table was largely responsible for inspiring me to study the User Type Hexad for the present thesis.

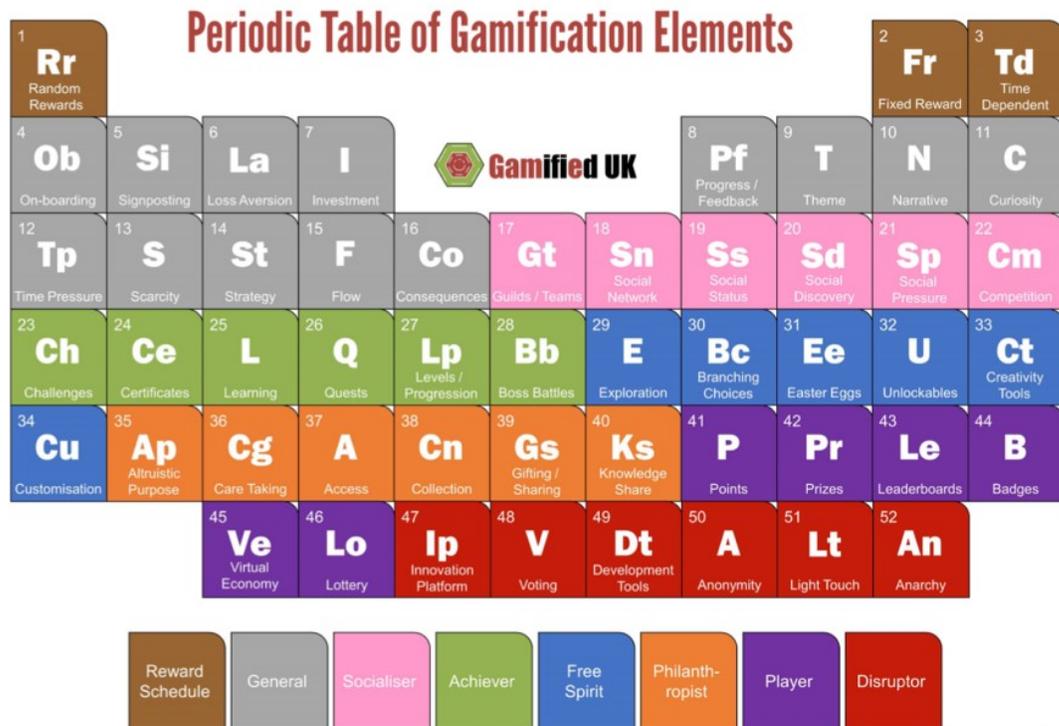


Figure 4. Periodic table of gamification elements (Marczewski, 2017).

One limitation of the User Type Hexad research has been a reliance on labeling participants with only one or two User Types based purely on their highest scores. The Hexad is made up of four 1-7-point Likert scale questions for each User Type, with 24 total questions. This thesis uncovers some learning preference trends that exist in the sub questions but are paradoxically cancelled out when you collapse the categories into User Type. Additionally, most participants tend to score high in several User Type categories at once, often being only a few percentage points away from their second highest type. Unlike the MBTI and the Big Five, the research involving User Type Hexad has not given people a hybridized score of all the latent variable subscales, it simply picks the highest scores and calls that a User Type. I would think that using a motivational fingerprint that gives a summary of the entire user's score would be a better way to conceptualize the difference between users. In future research, I would like to explore motivational fingerprinting for personalizing gamification design. Various game mechanics could be tested against several configurations of preference trends to see the lowest User Type score contributes to motivation (or lack of motivation) to engage with a gamified system.

In summary, this thesis contends that personalizing interactive game systems to persuade users towards taking real-world actions should be more likely to lead to those users taking actions they might have otherwise been resistant to taking. Research does show that attending to user preference is more effective than one-size-fits-all approaches (Orji et al., 2017). One potential direction for my future research will be to compare the effects of several gamification elements (customized vs randomized) as they relate to users' quest completion rates on real-life challenges to test if pairing user motivational preferences (motivational fingerprint) with game mechanics is more likely to inspire real-world actions or not.

Chapter 3. Methodology

3.1. Introduction

In this mixed methods study, a case study design was utilized. Case studies are characterized by the collection of multiple sources of evidence (Yin, 2014). In the present proposed study, multiple sources of evidence, using both qualitative and quantitative methods were utilized to explore the utility of the User Type hexad to aid a novice designer in the creation of storyboards for a gamified life skill learning application . The collection of data from surveys and focus groups helped to provide a multifaceted view of the case of interest, the User Type Hexad tool, to explore its instrumental value (Stake, 1995). Specifically, I chose to explore the User Type hexad as a means to understand what types of games could motivate and engage players to play a gamified life skill learning quest in the real world. I hoped the Hexad could assist me in identifying various motivational trends in young adults and suggest some game mechanics that would likely be optimally motivating to those people, and further what mechanics would be less motivating. My goal, therefore, was to begin creating personalized gamified learning quests for popular life skill learning targets using the Hexad as a tool in order to test its instrumental utility while getting some good design work accomplished.

In mixed methods studies, case study approaches allow for the collection of data through an exploratory sequential design (Creswell & Creswell, 2018). By collecting data from multiple sources of evidence, a comprehensive understanding the case of interest is established (Creswell & Creswell, 2018). In this proposed study, this comprehensive understanding of the case within this mixed methods case study design was developed through the triangulation of the sources of evidence (Yin, 2014). An exploratory sequential design involving the use of quantitative and qualitative data collected from surveys and focus groups was used to explore User Type hexad within this case study.

The purpose of this thesis was to explore whether the User Type Hexad was a usable tool for a novice designer (instructional-, research-, and gamification design). It is a case study in the use of a tool that has shown promise in recent research on gamification designed for educational purposes. In this methodology chapter, the research design, research questions, research sites, and participants will be presented, followed by a description of the instruments and consent process. With the background

of the participants and instrumentation for this study, the procedure and data collection process will be described. The data analysis process for each of the parts of the research will be explained.

3.2. Research Design

In this study, after considering the advantages and disadvantages of qualitative and quantitative methods, a mixed methods design was selected. To explore the research questions of interest, a two-part sequential mixed methods case study design was used. In Study 1, I first collected quantitative data in order to identify participants' User Types (using the Hexad) and life skill learning preferences (using LifeLeaps), then in Study 2 I grouped together participants by User Type and conducted mainly qualitative design-feedback focus group discussions about storyboards that represented uncovered overlaps between motivational preferences identified by the Hexad, and life skill learning targets identified by LifeLeaps in Study 1. The use of mixed methods allows for the researcher to collect both numerical data to explore the relationships between variables as well as qualitative data to explore a phenomenon in-depth (Creswell, 2010; Creswell & Poth, 2018). Mixed methods, therefore, allows the researcher to consider both numerical and non-numerical data to add in-depth meaning to the interpretation of the quantitative findings and to address considerations that may have been missed in the selection of only one methodology (Creswell, 2010; Caruth, 2013).

The aim of this study was to investigate how game-play preferences can motivate young adults to complete *quests* in real life and whether the User Type Hexad was a usable tool. Both qualitative and quantitative data was collected within each phase of this study. As an exploratory sequential mixed methods study, this research consisted of two aspects of the study – Study 1 (the collection of quantitative data to design storyboards that addressed popular life skill learning targets in ways that certain User types should enjoy- according to the Hexad) and Study 2 (the collection of qualitative design-feedback data to uncover what participants felt could be improved about those storyboards). Study 1 commenced by gathering two types of preliminary quantitative data, namely the participants' User Type by means of the User Type Hexad, and a ranked list of various life skill learning preferences by means of the LifeLeaps inventory. A digital questionnaire was used as a basis for collecting both the quantitative data in Study 1.

In the present two-part study, the use of mixed methods allowed for the collection of quantitative data to examine the relationship between User Type scores and life skill learning preferences in Study 1, and the in-depth exploration of responses by User Type in Study 2 through the use of hybrid focus groups.

The parts of the study are herein referred to as Study 1 and Study 2, which correspond with the quantitative and qualitative portions of this case study research, respectively.

Study 1: LifeLeaps and User Type Hexad Surveys

3.2.1. Research Questions

RQ1: Is the User Type Hexad a usable tool to assist a novice designer to create a gamified life skills education application for young adults?

RQ2: What are the best life skills learning targets for gamified instruction? Can I find, or design and validate, an instrument that quickly and effectively measures young adult life skill learning preferences for topics that show the potential for gamification?

3.2.2. Studies 1 and 2: Research Sites and Participants

Participants in Study 1 and the follow-on Study 2 of this research were canvassed and identified at Simon Fraser University and Kwantlen Polytechnic University in British Columbia during the 2019 summer session. I recruited participants by first obtaining a list of undergraduate classes that were running during the summer session, and emailing the instructors to ask permission to speak for 2 minutes before each class in order to discuss my research and hand out cards with QR code links to participate and a paid survey. Once things were scheduled with the instructors I went to individual classrooms and pitched the research idea to the students according to a script that was approved by the SFU research ethics office. Additionally, posters with links to the survey were placed around the SFU and KPU campuses in approved areas. The sample used in this study was therefore homogenous due to it being comprised of only students attending courses at Simon Fraser University and Kwantlen Polytechnic University in British Columbia during the summer session. As university students the population of the study was young adults aged 19 to 29 approximately.

Participants were invited to participate in a survey expected to take 15-minutes to complete via SurveyMonkey. Using money from a MITACS accelerate grant, I offered incentives to participants to complete the study. Those that completed the study were entered to win one of ten \$100 Amazon gift cards. Near the end of the recruitment phase, it was clear that the age distribution was skewed toward the higher range; for a stratified sample of approximately 100 first-year students in three classes, participants were also offered a \$5 Starbucks gift card if they completed the survey within the same day. Incentives were sent to participants via email.

Of the 272 participants who clicked the link to take the digital survey, 270 consented to participate in the research, 224 finished the survey, and 219 completed enough questions to be included within the analysis. In the subsection below, the demographic data for 224 participants who completed the full survey will be presented.

3.2.3. Study 1: Procedures and Data Collection

In Study 1, a survey was administered to study participants via SurveyMonkey. The survey included a demographic questionnaire to collect demographic data, the LifeLeaps instrument to explore the life skill learning preferences of participants, and the User Type Hexad instrument, which was used to determine the participants' motivational User Type score. As will be described in the instrumentation section, the survey included one open-ended question, with the remaining questions being multiple choice and Likert-scale questions.

The last question in the Study 1 survey asked participants if they were willing to participate in a paid focus group involving storyboards based on the data being collected. Study 2 participants were selected among participants that agreed in Study 1 to participate in further research. The demographic data and User Type trends found in Study 1 are described in the subsections below to provide an overview of the participants invited to participate in Study 2.

3.2.4. Study 1 Demographic Data

The mean age of respondents was 24.7 years with a median age of 24 and a standard deviation of 5.12 with only 10% (n=23) of the participants falling outside the

ages of 19-29 fitting with the definition of young adult used in this thesis. Outliers over the age of 31 were removed to test any hypotheses related specifically to young adult preferences (n=208). The average age of post-secondary students in Canada is 24 (Statista, 2020).

Study 1 participants were given the option to choose between four gender identity options or write their own. 138 (61.06%) were female while 85 (37.61%) were male, two identified as transgender (0.88%) and one identified as non-binary (0.44%). The vast majority, 209 (93%), of the Study 1 participants were from the Metro-Vancouver area. Only 10 participants were from outside of BC and of those, only three were from outside of Canada. Eighty-seven percent were straight, with a statistically large percentage of bisexual (8%) and gay/lesbian participants (4%). The 2014 Canadian Community Health Survey (StatsCan, 2015) indicated the national average to be only 1.7% gay/lesbian and 1.3% bisexual. The participant ethnicity mix of Study 1 participants was 42.67% Caucasian, 26.67% East Asian, 42% South Asian, 8% mixed ethnicity, 2.22% Hispanic, 1.78% Middle Eastern, 0.89% African, 0.89% Indigenous.

Sixty-eight percent were in the process of completing an undergraduate degree, and 18% were in school for a graduate degree, but there might be some overlap in those categories because there were education post-bachelor certification students who might have considered the certification to be a graduate program. Fifty-five percent of participants were working part-time or casual, 13% full time, 8% self-employed, 15% unemployed but not looking (likely due to being students), and 8% were looking for work. This 76% employment rate is much higher than the national average of working students in 2010 (45%). These numbers are significantly different after the pandemic; student unemployment in March 2020 was 40% at the start of lockdown and then fell to 19% by August 2020 (StatsCan, 2021).

The demographic limitations of this study should be considered when interpreting any results presented. This was a very limited sample of mostly education, computer science, and criminology students in first year university within British Columbia Canada during the summer semester. This is not a representative sample of Canada in general, much less could it be considered representative of global 19–29-year-old students. This is not to say that it is useless to draw conclusions from this research – it does reflect a real group of learners that are likely facing life scenarios that would put them face to face with life skill learning challenges as they transition from young adulthood to

independence in a highly expensive cost of living and extremely culturally diverse region of Canada at a time right before the global pandemic.

3.3. Study 2: Storyboards and Focus Groups

3.3.1. Study 2: Research Questions

RQ1.2: How can storyboards depicting quests and/or challenges that are intended to promote life skill learning targets be designed to appeal to certain User Types by following the recommendations of Marczewski's (2017) Periodic Table of Gamification Elements (Figure 4. Periodic table of gamification elements (Marczewski, 2017).)

RQ1.3: What design improvement feedback do specific User Types have regarding the storyboards that are trying to improve the types of mechanics that their User Type would predict they are most interested in?

3.3.2. Study 2: Research Sites and Participants

A subset of participants from Study 1 was invited to participate in focus groups in Study 2. Study 2 involved the collection of qualitative data using storyboards. Those invited to participate in Study 2 indicated in Study 1 that they would be willing to participate in additional research. The incentive provided to Study 2 participants was \$25 to each participant.

Participants from Study 1 were selected based on where they fell in the User Type Hexad and invited to participate in a focus group with other participants with the same User Type Hexad. All six primary user type hexads were represented in this study, though interestingly, many participants had very close top scores or even tied top scores so calling a participant simply one type seems highly problematic. I took into consideration the entire range of all six scores for each participant and picked those with the highest overall score in a certain Type in the data set whether or not it was their highest score. This was especially important for participants in the Disruptor group, since there were no primary Disruptors in the data set; those with the highest Disruptor score were considered the Disruptor group. To summarize, I identified Study 2 participants by

calculating the top ten scores for each User Type and invited those individuals to participate in focus group research either virtually or in-person.

3.3.3. Study 2: Procedures and Data Collection

The focus group structure was a one-hour timed and recorded group in which participants were able to participate either in-person at SFU or digitally via the Zoom videoconferencing platform. During the focus group sessions, participants were first asked to complete informed consent prior to the start of the storyboards. The focus groups were audio-recorded, and all data was transcribed for analysis. A total of six focus groups (one per primary User Type) were conducted. The minimum sample size to used in each focus group was three participants in each group, following suggestions by Creswell and Poth (2018). All but one of the focus groups had over 5 participants.

Participants were given 30 seconds to respond to each of the five quantitative questions in the focus group sessions. Each of the questions was based on the storyboard presented (Appendix E). In addition to the five quantitative questions, the qualitative question in the focus groups asked participants what they thought could be improved about the storyboard. The intent of presenting this open-ended qualitative question was to elicit critical feedback about the storyboard and to analyze participant responses based on different player types. In addition to answering the research questions of interest in this thesis, the qualitative data collected in Study 2 was also used to elicit design suggestions from participants based on their User Type Hexad. Participants were asked to respond to the open-ended questions both verbally and in a typed response.

Storyboards were facilitated and narrated by the researcher within focus groups to better understand the findings obtained in Study 1 specific to the User Type Hexad. In Study 2, six individual focus groups were developed based on User Type Hexad. Individual participants were assigned to a focus group based on their User Type Hexad as identified in the Study 1 results. The purpose of developing focus groups based on User Type Hexad was to better understand the player types based on in-depth discussion among focus group participants. As a follow-up study conducted among a subset of Study 1 participants, Study 2 provided additional details to the findings of Study 1 to better understand Study 1 responses.

3.3.4. Study 2: Data Analysis

As mentioned, in addition to asking five quantitative questions to elicit the feedback of participants regarding the storyboard, the purpose of Study 2 was to gather in-depth data using qualitative methodology to further understand the findings from Study 1. To analyze the qualitative data collected from the use of storyboards within the focus groups, the data were transcribed and coded using Braun and Clarke's (2006) six-step thematic analysis. Thematic analysis was used to code and identify themes in the over 500 pages of transcribed data obtained from each of the one-hour-long voice-recorded storyboard feedback focus groups.

For Study 2, I employed a thematic analysis to analyze the data obtained through focus groups. Braun and Clarke (2006) have furnished definite principles and working steps for their reflexive version of thematic analysis and regaled the method as *flexible yet methodologically sound* if it is applied thoughtfully (p. 78). Thematic analysis of the qualitative data was undertaken in six phases to attain an understanding of focus group participants' views and experiences (Braun & Clarke, 2006) in Study 2. Based on Braun and Clarke (2006, 2012), the six phases followed to analyze the qualitative data in this study are noted below:

- Phase 1: Familiarize Yourself with the Data
- Phase 2: Generate Initial Codes
- Phase 3: Search for Themes
- Phase 4: Review Themes
- Phase 5: Define Themes
- Phase 6: Write-up findings

3.4. Instrumentation and Consent Process

In this section so far, the participants, procedures, data collection, and analysis process for each of the three parts of this study have been described. In the subsections below, the instrumentation for this study, which consisted of the LifeLeaps – Life Skill Learning Preference Survey, and storyboards, will be presented. Following the

presentation of the instrumentation used in this study, Chapter 4: Results, will be introduced.

As noted previously, in this two-part mixed methods study, participants in Study 1 were presented the LifeLeaps – Life Skill Learning Preference Survey. The LifeLeaps – Life Skill Learning Preference Survey, as will be described, is a facilitated scale for assessing life skills. In Study 2, participants that completed the LifeLeaps – Life Skills Learning Preferences Survey were invited to complete storyboards, which were assessed in comparison with the User Type Hexad of the study participant.

3.4.1. Instrumentation: LifeLeaps – Life Skill Learning Preference Survey

RQ2: What are the best life skills learning targets for gamified instruction?

Can I find, or design and validate, an instrument that quickly and effectively measures young adult life skill learning preferences for topics that show the potential for gamification?

During Study 2 I explored two additional qualitative research questions that are designed to assist with providing rich description or user feedback which will assist in answering RQ1

To investigate RQ2, a learning preference scale for life skills was developed to assess the types of non-standard learning targets that might be gamified in a quest application. First, I summarized the key questions in the Life Skills Inventory Independent Living Skills Assessment Tool (LSI, Washington State Department of Social & Health Services, 2000). The LSI is a 315-item assessment completed by a parent or educator which addresses the domains of money management, health, independent living, transportation, employment, postsecondary education, and social/interpersonal skills. It is not suitable for self-report and takes up to an hour to complete. The LSI is primarily interested in finding existing life skills, and never asks the student what they would most enjoy learning more about. Since my intention with this study is to test if the User Type Hexad is a usable instrument to aid in the design thinking gamified life skill education, it made sense to create a new tool that asked students/players what they wanted to learn more about, rather than assume learner willingness by finding deficits in knowledge.

I designed the Life Skills Learning Preference Survey (LifeLeaps) to take less than 10 minutes to complete. Often these instruments are administered by a caregiver which is time-consuming and can introduce unwanted demand characteristics. LifeLeaps simply is a list of non-academic topics that young adults 18-30 years old might be likely to have not had enough direct instruction in. After several iterations of user experience testing with friends and family, the list was reduced from 110 items down to 79 items grouped into 8 categories. The average time taken to complete the version of LifeLeaps used in the present study (n=239) was under seven minutes, coming in well ahead of the target.

Each section only had one question: “I am interested in learning how to...” followed by a list of 9-11 questions per category in a 5-point Likert matrix from “Not at all interested”, to “Very interested” (Figure 9). The survey was given digitally on tablets before the User Type Hexad.

1. WORK & MISSION:

I am interested in learning how to...

	Not at all interested	Not very interested	Neutral	Somewhat interested	Very interested
Start my own small business	<input type="radio"/>				
Get a better job / Land my dream job	<input type="radio"/>				
Make money doing what I love	<input type="radio"/>				
Become a confident public speaker	<input type="radio"/>				
Identify my mission in life	<input type="radio"/>				
Do well in job interviews	<input type="radio"/>				
Learn leadership and coaching skills	<input type="radio"/>				
Be good at marketing and sales	<input type="radio"/>				
Identify my barriers to success	<input type="radio"/>				

Figure 5. LifeLeaps Survey Example.

In the next section, I analyze LifeLeaps, the learning preference instrument created for this study, for internal validity and contribution to my game design process.

LifeLeaps Validation

Table 1. Descriptive Statistics for Learning Preference Categories in the LifeLeaps survey

Learning Preference	M	SD	Sk	Ku	α
Lifelong Learning	3.76	.67	-.23	-.37	0.86
Mental & Emotional Health	3.71	.76	-.33	-.27	0.86
Money & Finance *	4.12	.65	-.66	.62	0.85
Physical Health & Body	3.74	.62	-.26	-.23	0.81
Purpose & Meaning *	4.00	.64	-.31	-.46	0.86
Relatedness & Social **	4.15	.65	-.43	-.60	0.90
Relationships	3.19	.78	-.24	-.12	0.82
Work & Mission *	4.08	.55	-.35	-.26	0.76

**= most popular learning preference category, *=mean score above 4.0 and standard deviation under 1

Appendix B contains the full survey, which is free to use for anyone reading this thesis. Alpha reliabilities were high, suggesting high internal consistency and reliability of items for each of the learning preferences subscales. Distributions of the scores were leaned on the positive side, which we can observe from higher means and negative skewness. Further discussing values of skewness and kurtosis, we see that distributions did not deviate much from the normal distributions. However, this deviation was somewhat higher for *the money & finance* subscale since both skewness and kurtosis were higher than .50 absolute values. Standards deviations were homogenous.

Appendix C also details the alpha coefficients for each question in the survey measures the raw and standardized alpha coefficients, then tests if deleting any of the questions would result in a higher alpha score. The rule of thumb is that a minimum acceptable level of Cronbach's alpha coefficient is 0.7 for a measurement tool to have a high internal consistency and reliability. A Cronbach's alpha value of 0.8 to 0.9 is preferred. Cronbach's alpha measures the internal consistency at which subjects answer survey questions related to some scale or construct. Higher levels of Cronbach's alpha show that all the questions in the survey are measuring the same scale or construct. Lower values of Alpha (values below .5) show the survey tool is not working well in measuring some scale. The Raw Cronbach's alpha is used when all questions are on the same scale as is the case in this study.

There would be a slight improvement in Cronbach's alpha if item 7 of Physical Health and Fitness [get over an addiction] is removed as the value of Alpha would

improve from .808 -.812 which would also bring down the total number of questions in that category to 10 from 11, which is preferable.

As we can see in the LifeLeaps validation table above (Table 1), the only category that falls below the preferred threshold of 0.8 is Work and Mission with a score of 0.76 but deleted variable testing (Appendix C) reveals that all 9 questions in the category hang together fairly well; only deleting question #1 “start my own small business” would result in any upward movement in the alpha from $\alpha=0.760$ to $\alpha=0.765$ so we can say that this subscale is working well, yet perhaps the items on this category are inherently less related than other categories.

Overall, based on the variable testing and examination of the alpha for use of each of the items of LifeLeaps (see Table 1), I can say that the LifeLeaps survey is an internally valid and reliable (i.e., internally consistent) instrument. The average time to complete LifeLeaps was under 7 minutes, surpassing the expediency requirement that I set out to pass. This instrument both worked, well, and generated very interesting data to a game designer interested in educational gamification by asking users of a potentially design learning game exactly what they would like to know. I plan to use the LifeLeaps again in future research and hope other researchers interested in educational gamification will try it.

3.4.2. Instrumentation: Story Boards

To maximize the quality of the rich descriptive feedback during this gamified instructional design process, the present study followed the general structure of Tondello et al. (2016). Tondello et al. (2016) validated the User Type Hexad in their 2017 paper and investigated the potential to customize game mechanics to match Hexad type predicted gameplay preferences in their follow up study in 2018. As in the present study, Tondello et al. (2016) used storyboards to illustrate various game mechanics in a hypothetical gamified smoking cessation training application and tested to what degree different groups of people, compared by their top User Type scores, had preferences that aligned with the predictions that Marczewski (2015; 2019) expounds upon in his User Type Hexad books.

Designers are not expected to have an encyclopedic grasp of all possible forms of digital gameplay interactions and game mechanics that modern game designers use

to improve the engagement of different types of players, nor should the research participants. Therefore, individuals that have played sports, board games, or digital games, may have experienced quite a few of these game mechanics but likely would not be able to articulate their preferences for them without seeing the mechanic in action. Storyboards can help show complex events as they unfold and give the participants a way to place themselves in the scene to imagine how a game might feel to play, without having to play it. The use of storyboards is helpful in exploring game mechanics (Tondello et al., 2016) and was foundational to the present study to understand preferences and gather insights from participants based on their user Hexad type. For brevity, the storyboards used within this study (Study 2 specifically) are noted below.

Each storyboard was intended to appeal to one specific user-type, but it was not limited to one gamification element because it was intended to represent a real-world quest that might be given in Facing Dragons.

The following is a list of the storyboards and their intended primary User Types, secondary types, and gamification elements included:

Storyboard 1: Explore Your World

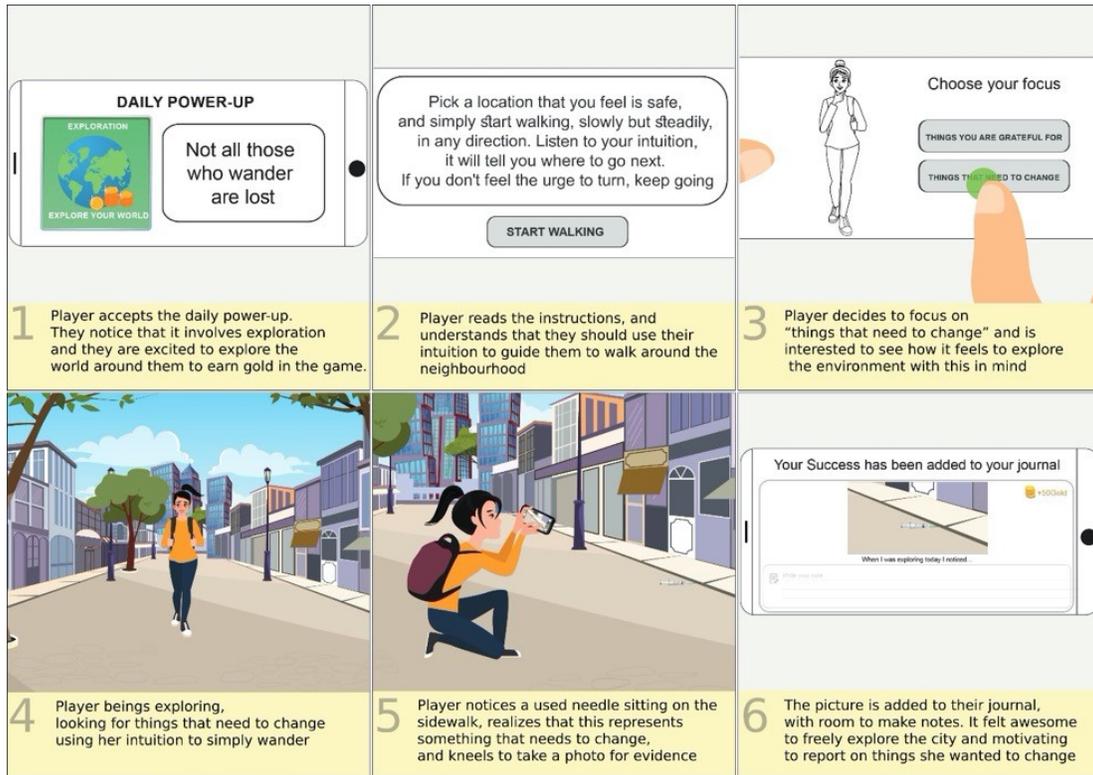


Figure D1. Storyboard 1

Game Mechanic Utilized	User Type Fit (hypothesized)
Exploration*	Free spirit*
Curiosity	General (Free spirit)
Using Intuition (self-exploration)	Untested (Free spirit)
Quests	Achiever

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
PURPOSE & MEANING	Make a positive impact
	Get out of the house more

Storyboard 2: Knowledge Sharing

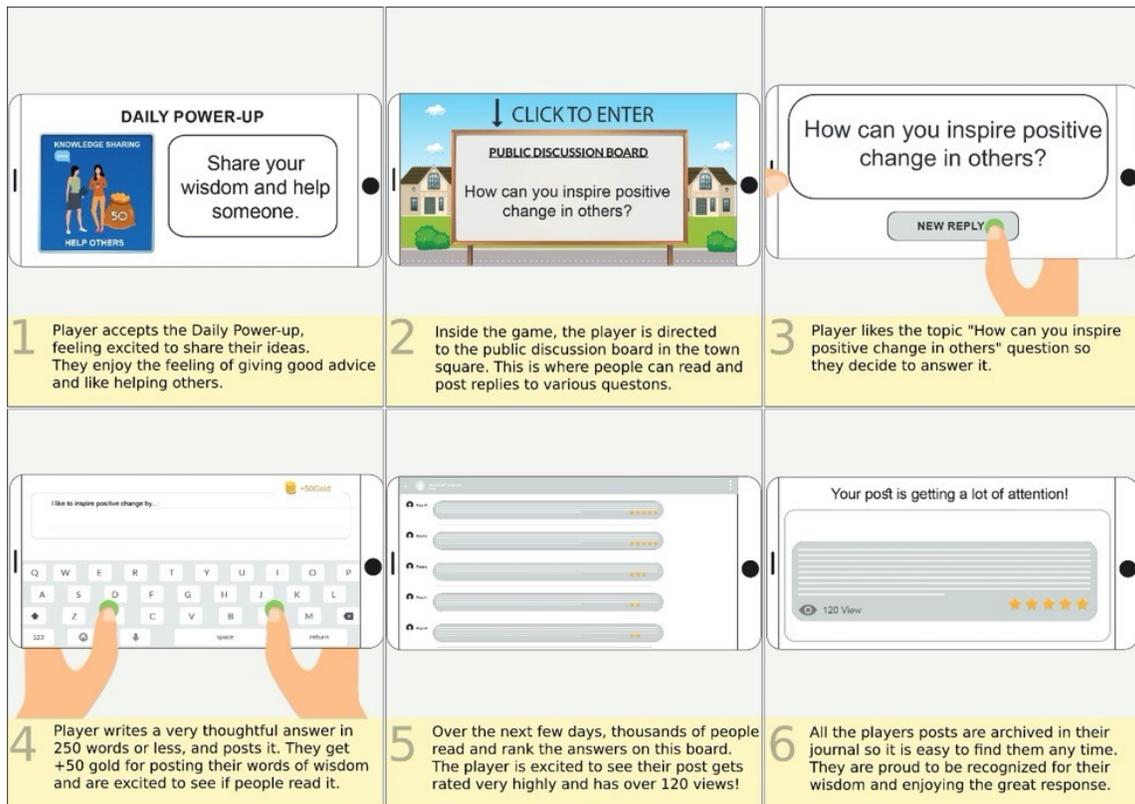


Figure D2. Storyboard 2

Game Mechanic Utilized	User Type Fit (hypothesized)
Knowledge Sharing*	Philanthropist*
Altruistic Actions	Philanthropist
Meaning/purpose	Philanthropist
Social Status	Socializer
Social Network	Socializer

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
RELATEDNESS & SOCIAL CONNECTION	Inspire positive change in others
	Motivate others
	Give good feedback

Storyboard 3: Voting

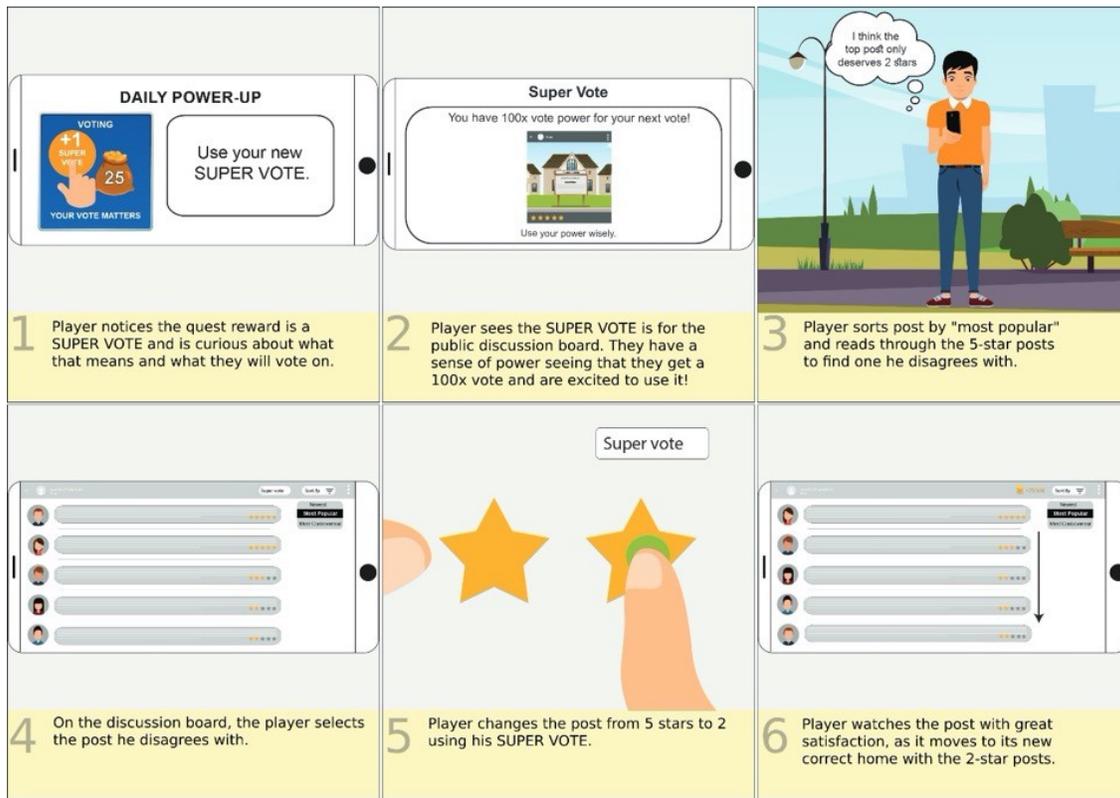


Figure D3. Storyboard 3

Game Mechanic Utilized	User Type Fit (hypothesized)
Voting/voice*	disruptor*
Anarchy	disruptor
Anonymity	disruptor
Social pressure	socializer
Social network	-socializer (reverse scored)

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
MENTAL & EMOTIONAL HEALTH	Not be so serious
	Be more confident
	Deal with anxiety

Storyboard 4: Learning Challenge

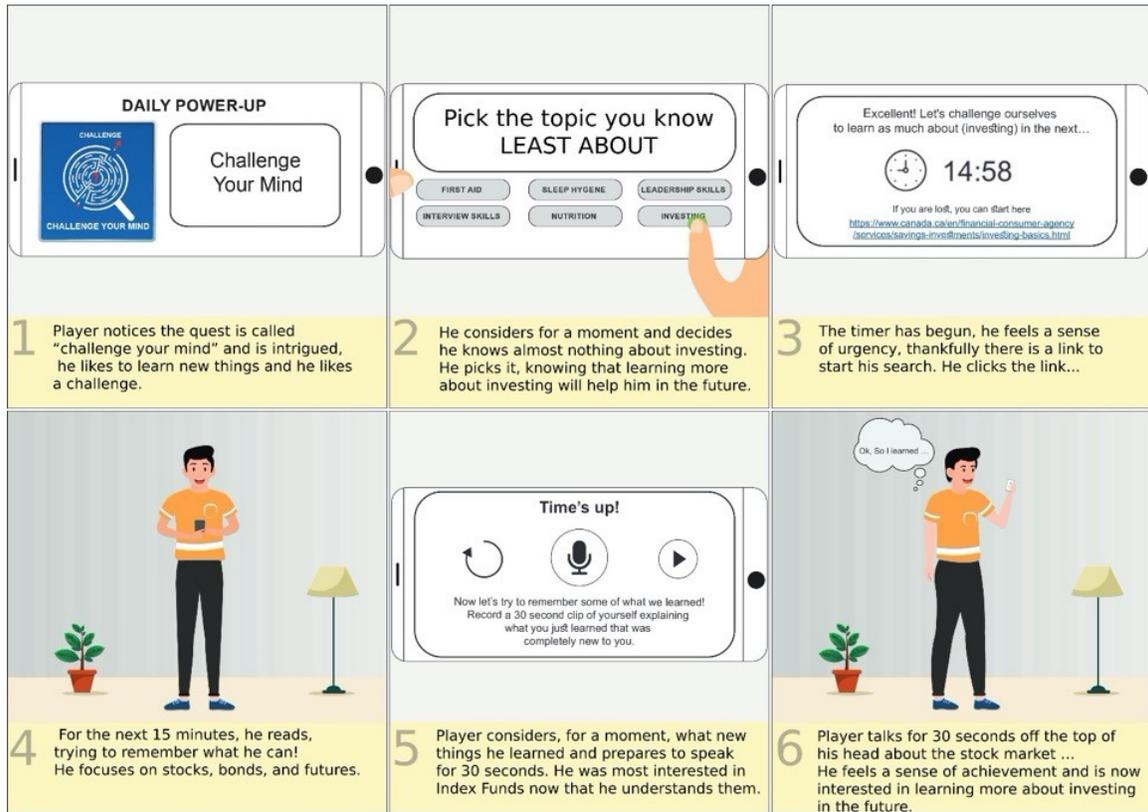


Figure D4. Storyboard 4

Game Mechanic Utilized	User Type Fit (hypothesized)
Learning / new skills*	achiever*
Challenges	achiever
Progression	achiever
Time pressure	General (player)

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
MONEY & FINANCES	Learn to invest
	Make more money
PURPOSE & MEANING	Set and achieve goals
LIFELONG LEARNING	Be a better researcher

Storyboard 5: Explore Self - Motivations

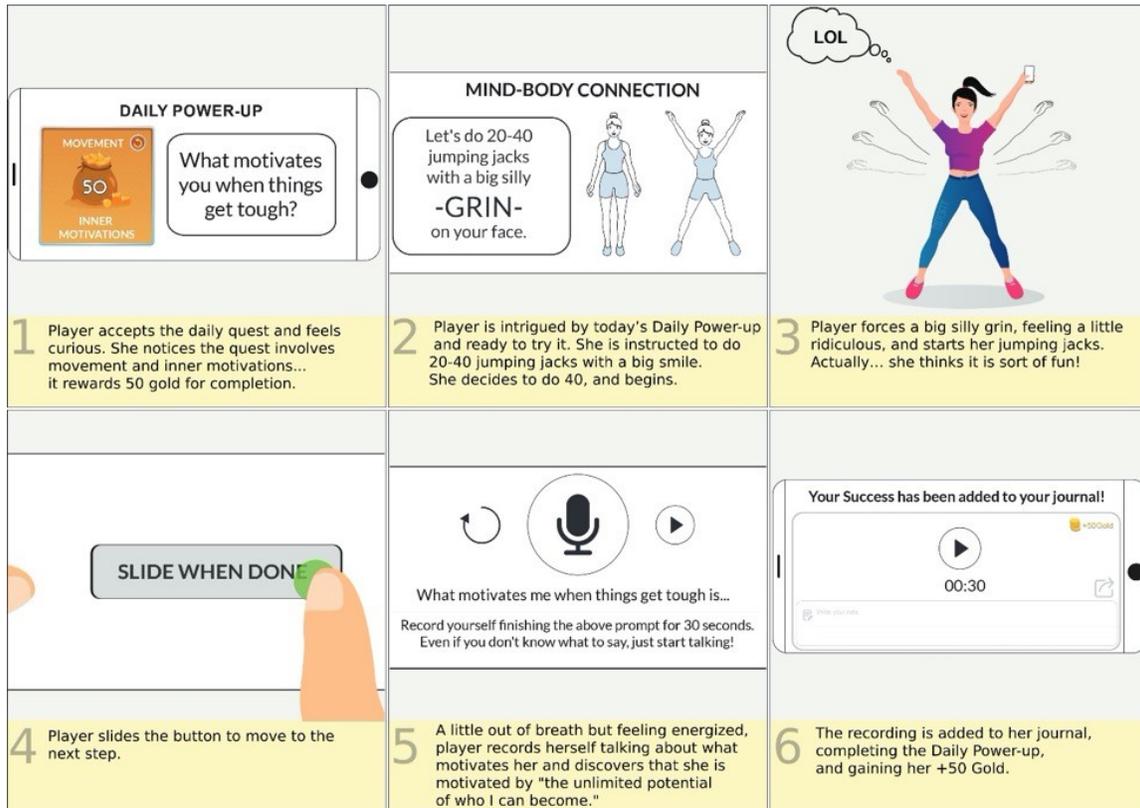


Figure D5. Storyboard 5

Game Mechanic Utilized	User Type Fit (hypothesized)
Exploration (self-discovery)*	Untested (Free spirit*)
Physical Movement	Untested (Free spirit)
Challenges	achiever
Points / Virtual economy	player

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
PURPOSE & MEANING:	Identify what motivates me / be more motivated
MENTAL & EMOTIONAL HEALTH	Not be so serious
	Feel happier / more optimistic

Storyboard 6: Meaning and Purpose

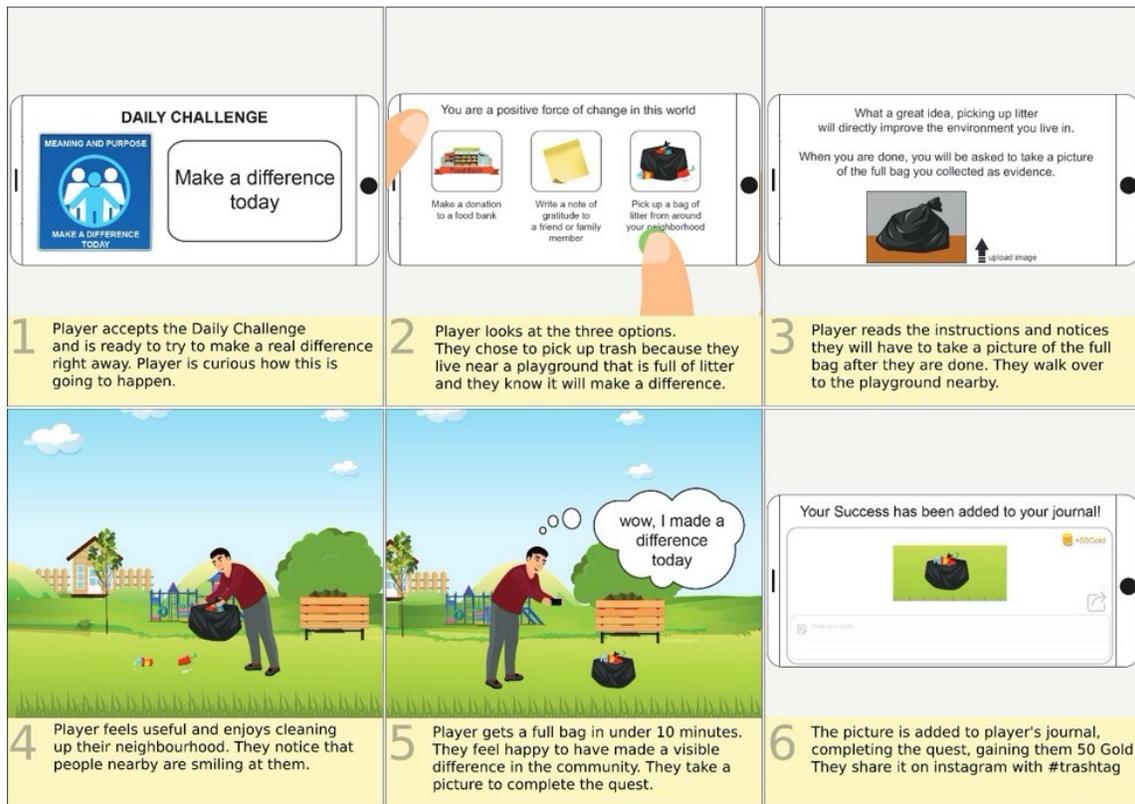


Figure D6. Storyboard 6

Game Mechanic Utilized	User Type Fit (hypothesized)
Meaning/purpose*	philanthropist*
Caretaking	philanthropist
Quests/Challenges	achiever
Social network	socializer
Points/Virtual economy	player

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
PURPOSE & MEANING	Get out of the house more
	Make a positive impact
	Set and achieve goals

Storyboard 7: Progression

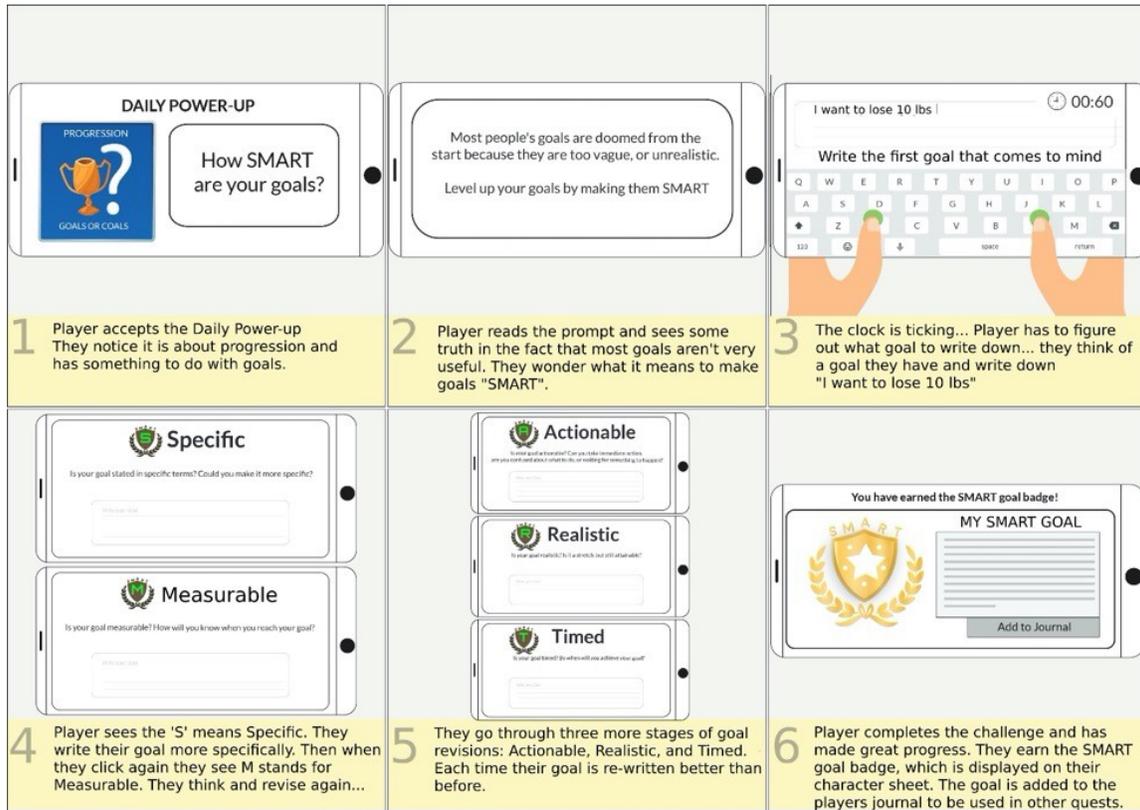


Figure D7. Storyboard 7

Game Mechanic Utilized	User Type Fit (hypothesized)
Badges/achievements*	player*
Levels/progression	achiever
Progress/feedback	General (player)
Time pressure	General

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
PURPOSE & MEANING	Set and achieve goals
	Identify what motivates me / be more motivated
	Waste less time

Storyboard 8: Social Connection

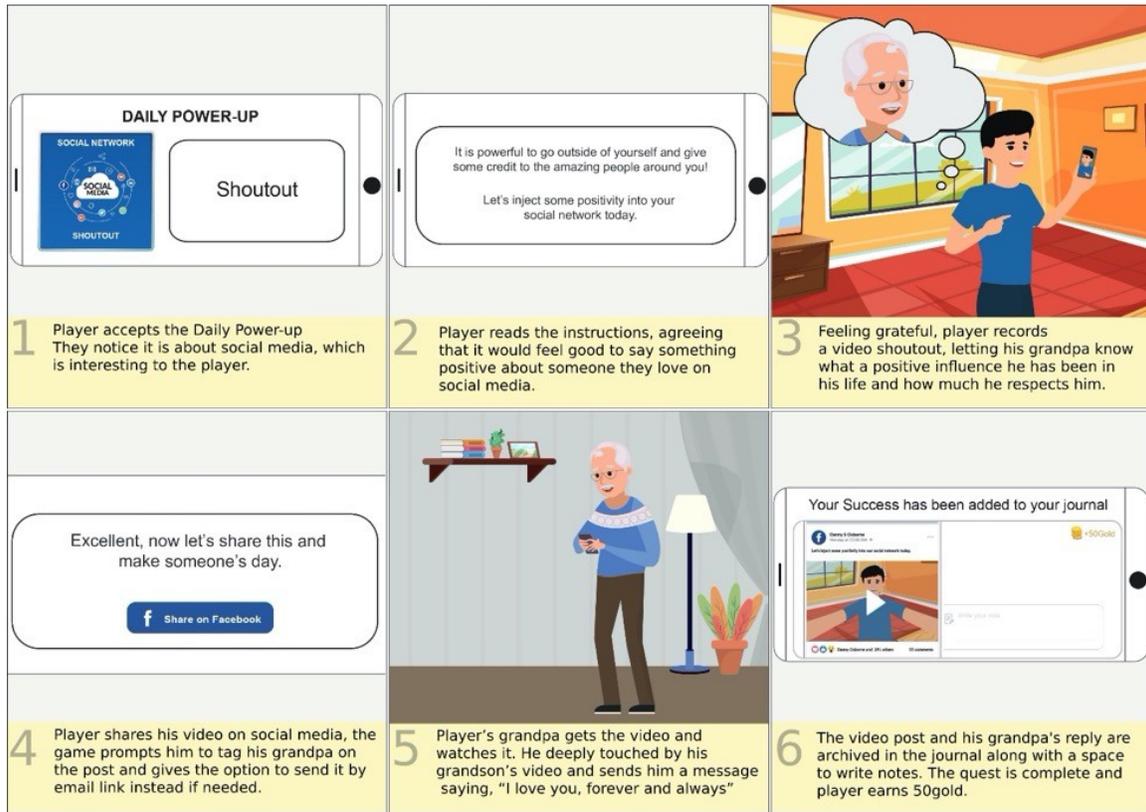


Figure D8. Storyboard 8

Game Mechanic Utilized	User Type Fit (hypothesized)
Social network*	socializer*
Altruistic Actions	philanthropist
Care-taking	philanthropist
Points / Virtual economy	player

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
RELATEDNESS & SOCIAL CONNECTION	Build strong friendships
	Give good feedback
MENTAL & EMOTIONAL HEALTH	Feel happier / more optimistic

Storyboard 10: Social Discovery

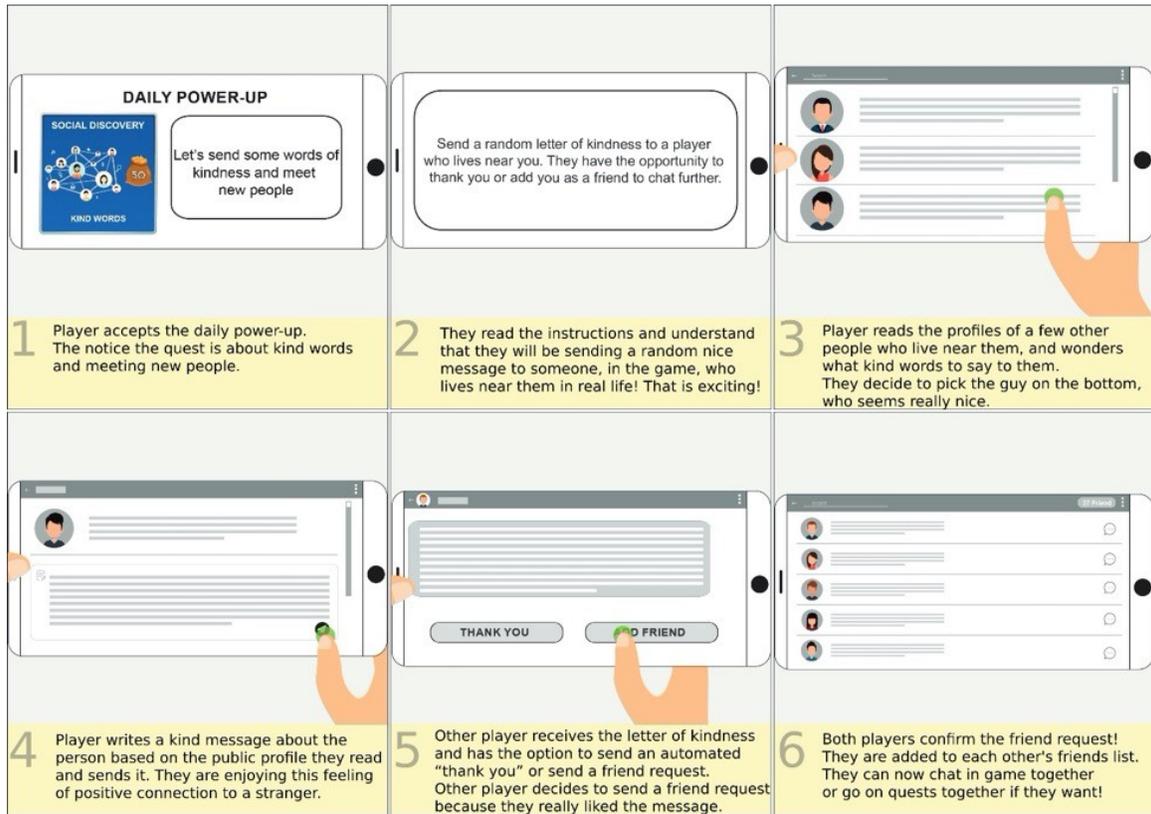


Figure D10. Storyboard 10

Game Mechanic Utilized	User Type Fit (hypothesized)
Social discovery*	socializer*
Social network	socializer
Guilds/teams	socializer
Care-taking	philanthropist
Anonymity	– disruptor (reverse scored)

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
RELATEDNESS & SOCIAL CONNECTION	Make friends
	Make a good first impression

PURPOSE & MEANING	Connect with people in my community
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Storyboard 11: Leader-board Challenge

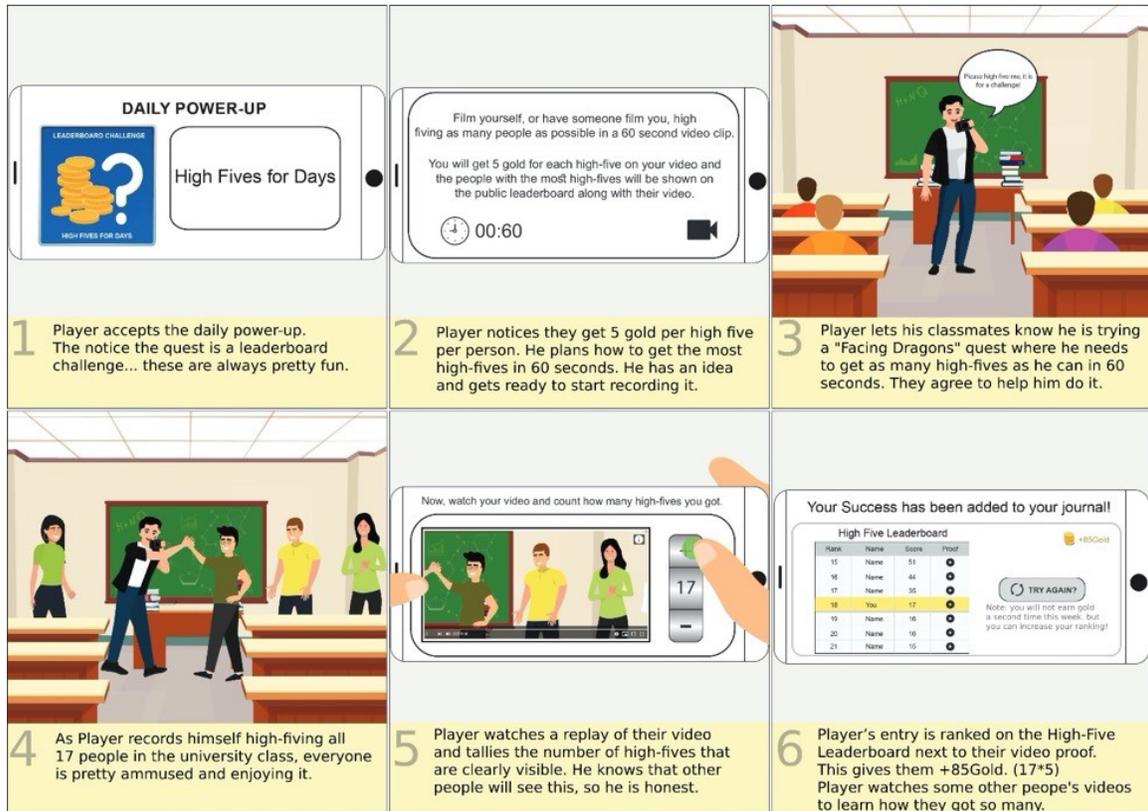


Figure D11. Storyboard 11

Game Mechanic Utilized	User Type Fit (hypothesized)
Leaderboards*	player*
Challenges	achiever
Points / virtual economy	player
Competition	socializer (player)

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
MENTAL & EMOTIONAL HEALTH	Be more confident

	Get over a fear or phobia
	Not be so serious

Storyboard 12: Agent of Change

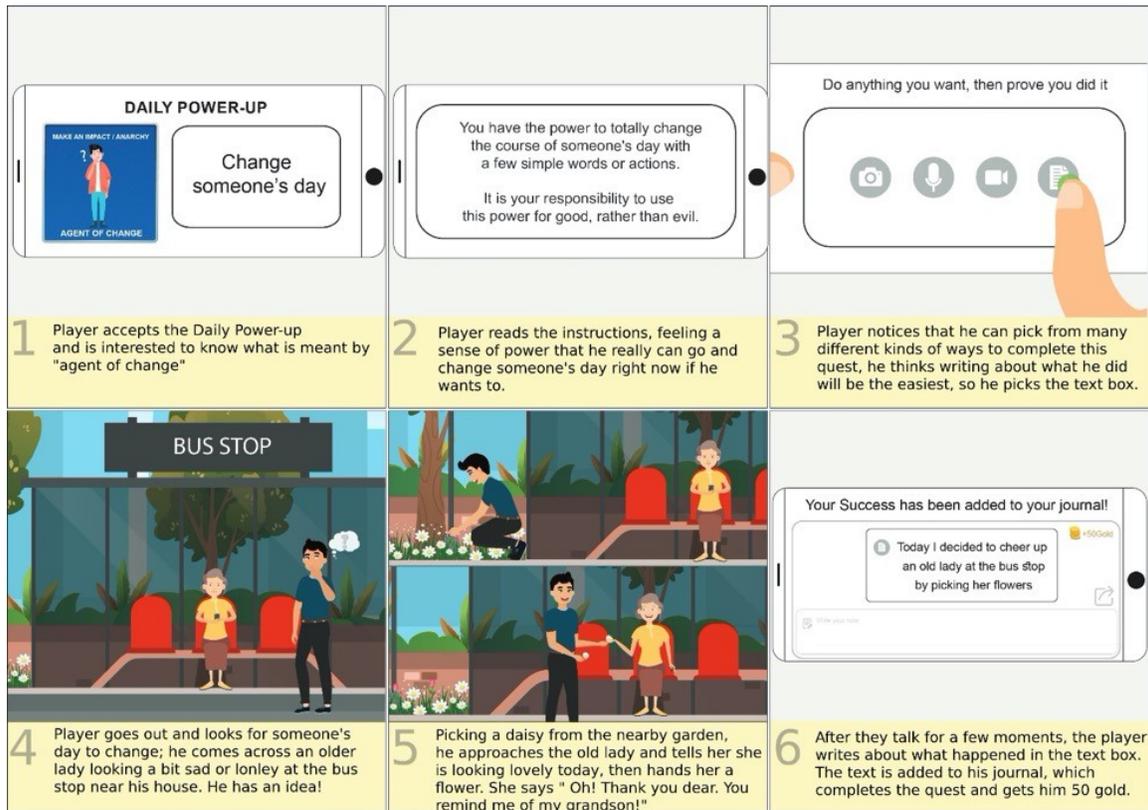


Figure D12. Storyboard 12

Game Mechanic Utilized	User Type Fit (hypothesized)
Light touch*	disruptor*
Altruistic Actions	philanthropist
Challenges	achiever
Creativity tools	Free spirit

*denotes primary design intention

Life Skill Learning Target Category	Individual Life Skill Target
PURPOSE & MEANING	Get out of the house more
	Make a positive impact

	Set and achieve goals
	Connect with people in my community

3.4.3. Consent Process

Ethical approval for the research conducted for this thesis was received from Simon Fraser University and Kwantlen Polytechnic University. For study in this two-part research, informed consent was received from each participant electronically via SurveyMonkey. Informed consent was received from each participant prior to their participation in the study. To anonymize the data, each participant that completed the survey data received an identifier number.

For the qualitative data collected in the in-person and virtual focus group sessions in Study 2, a transcription service was hired by the researcher to transcribe the recording to avoid bias in transcription. The Zoom video recordings from the focus group sessions were destroyed after transcription of the data was completed. All data associated with this study are stored on Microsoft OneDrive and a password-protected, encrypted folder on the researcher's computer. After five years, all raw data collected in this research will be destroyed.

3.4.4. Conclusion

As reflected in this chapter, a mixed methods approach was selected to develop a more in-depth understanding of the quantitative data obtained in this study. In the design of this research as a case study, quantitative data was collected in Study 1, and Study 2 involved an iterative process in which qualitative data was collected from a subset of Study 1 participants. The collection of qualitative data in Study 2 aimed to complement the data collected in Study 1 to develop a more comprehensive overview of the utility of the User Hexad Type as a tool and to gather data useful for educational gamification design. Surveys containing LifeLeaps and the User Type Hexad were utilized to collect quantitative data. As described, storyboards helped to further explore the quantitative findings by identifying themes from in-depth qualitative data findings identified from focus group discussions of storyboards depicting real-world quests in a proposed mobile game. In Chapter 4, both the qualitative and quantitative results will be presented in detail.

Chapter 4. Results

This chapter consists of the presentation of the qualitative and quantitative results of this mixed methods study. The chapter is organized into two major sections: Discussion of Qualitative Results and Discussion of Quantitative Results. In the Discussion of Qualitative Results, the findings are presented according to the six User Types (Socializer, Free Spirit, Achiever, Disruptor, Player, and Philanthropist) from which the themes are described accordingly. A summary of the qualitative results is provided prior to the Discussion of the Quantitative Results. Quantitative results consist of intercorrelations between User Type scores and life skill learning preferences, structural equation modeling, multiple regression, canonical covariance analysis, as well as the impact of demographics. A summary of the quantitative results is provided followed by a summary of the chapter.

4.1. Discussion of Qualitative Results

This section contains the presentation of the qualitative results of this mixed methods study. As presented in Chapter 3, the qualitative portion, Study 2, involved six focus group discussions. Each focus group consisted of participants from each User Type (Socializer, Free Spirit, Achiever, Disruptor, Player, and Philanthropist). User Types were determined using Hexad scores. However, some participants' scores did not reveal their dominant user type, as their scores for some user types varied only by one or two points. Nonetheless, for the purpose of the focus groups, the researcher considered the distribution of the participants into groups with at least three members.

For the Socializer group, Socializer2 scored higher in the User Type Philanthropist (26) but was grouped in Socializer with a score of 25, so as to meet the minimum number of participants per focus group ($n=3$). Achiever5 had equal high scores for Achiever and Philanthropist but was grouped in Achiever. Disruptor4 had equal high scores for Disruptor and Philanthropist but was grouped in Disruptor. Additionally, for the Disruptor group, none of the participants who agreed to partake in the focus group were disruptors as the dominant type, but many scored high in disruptor. This group all had some of the highest disruptor scores apart from Socializer1, but he was grouped in Socializer due the fact that he had the highest socializer score out of all the participants.

Moreover, all the highest disruptor scores happened to be Free Spirit as the dominant type. For the Free Spirit group, all participants scored the highest for this User Type. In the Player group, Player4 scored higher in Free Spirit and Player8 in Philanthropist respectively.

Table 2 shows the scores for each of the User Types and the top score for each participant.

Table 2. Study 2 Participants' User Type Hexad Scores

	Socializer	Free Spirit	Achiever	Disruptor	Player	Philanthropist
Socializer1	28**	23	24	23	14	19
Socializer2	25	22	22	15	20	26**
Socializer3	27**	21	15	18	23	21
Free Spirit1	20	27**	20	19	23	23
Free Spirit2	17	24**	23	17	23	23
Free Spirit3	23	28**	24	22	22	22
Free Spirit4	17	26**	24	21	25	18
Achiever1	24	24	26**	9	18	25
Achiever2	24	22	25**	17	22	23
Achiever3	22	23	26**	12	23	23
Achiever4	15	20	23**	11	15	22
Achiever5	23	22	27**	20	19	27**
Disruptor1	20	24**	23	23	23	22
Disruptor2	18	28**	26	24	23	22
Disruptor3	21	26**	20	23	21	25
Disruptor4	18	22**	19	20	19	22**
Player1	17	17	24	14	28**	18
Player2	19	26	24	18	28**	22
Player3	25	19	19	10	27**	18
Player4	16	27**	26	18	26	23
Player5	24	18	18	18	25**	22
Player6	20	24	21	20	25**	23
Player7	14	15	18	10	21**	19
Player8	18	19	16	11	21	22**
Philanthropist1	24	21	19	12	16	28**
Philanthropist2	14	25	21	15	22	27**
Philanthropist3	25	26	25	21	21	27**
Philanthropist4	23	23	18	20	20	25**
Philanthropist5	14	19	21	8	23**	23**
Philanthropist6	21	20	19	11	17	23**
Philanthropist7	24	24	25**	13	23	21

** Dominant User Type of the user

Each participant contributed their perceptions of the appeal of the quests and challenges shown in the 12 storyboards, as well as the areas of improvement to improve the types of mechanics in relation to their dominant User Type. Each focus group was facilitated by the researcher so that each participant was given a fair chance to share their perceptions. Each focus group consisted of at least three participants. The number of participants for each focus group is summarized in Table 2.

Table 3. Participants in the Focus Group.

Focus Group	Dominant User Type in Group	Number of Participants	Date of Focus Group Discussion
A	Socializer	3	July 28, 2019
B	Free Spirit	4	July 28, 2019
C	Achiever	5	August 7, 2019
D	Disruptor	4	July 28, 2019
E	Player	8	July 29, 2019
F	Philanthropist	7	July 29, 2019

The participants from study 2 were recruited from Study 1 and were 65% female. The average age of study 2 participants was 26 years old. Focus groups A, B, and D were the first sessions to be facilitated by the researcher. In groups A and B the researcher immediately started with narrating storyboard 1 and then proceeded with obtaining feedback. After conducting focus groups A and B, I realized the need to introduce the mechanics of the game (e.g. the concept of the dragon, in-game credits and currency) prior to obtaining feedback on the storyboard. I observed that the participants of focus group D had more relevant opinions about the concept of the game than participants of groups A and B. The subsequent sessions (E, F, and C) also included an introduction prior to presenting the storyboard and obtaining feedback.

In obtaining feedback, I used the interview protocol detailed in Appendix D. All the groups were asked the same sets of questions beginning with five timed (30 seconds) Likert-type questions and one open-ended question about what could be improved per storyboard, followed by open-ended questions about design suggestions for discussion. All discussions were voice recorded with the permission of the participants. The recordings were then transcribed for analysis.

The analysis entailed the use of Braun and Clarke's (2006) six-step thematic analysis. The six steps were: Phase 1: Familiarizing Yourself with the Data, Phase 2: Generate Initial Codes, Phase 3: Search for Themes, Phase 4: Review Themes, Phase 5: Define Themes, and Phase 6: Writing-up findings. The resulting themes are presented in the sub-sections below, organized by User Type in order to answer the following research questions that guided this study:

RQ1.2. How can storyboards depicting quests and/or challenges that are intended to promote life skill learning targets be designed to appeal to certain User Types by following the recommendations of Marczewski's (2017) Periodic Table of Gamification Elements (Figure 4)?

RQ1.3. What design improvement feedback do specific User Types have regarding the storyboards that are trying to improve the types of mechanics that their User Type would predict they are most interested in?

From the coding process, I was able to identify patterns in the data. The patterns depicted categories. An overview of the categories that emerged from each User Type per storyboard is shown in Table 4.

Table 4. Categories According to User Type and Storyboard

Storyboard	Socializer	Free Spirit	Achiever	Disruptor	Player	Philanthropist
01 and 05	Lacks accountability Lacks structure	More options Additional gameplay Lacks accountability Lacks structure Not fun	Additional gameplay	More options	Additional gameplay Lacks accessibility Lacks accountability	Additional gameplay
02 and 06	Serious gaming/anti-trolling	Not fun	Option to interact anti-trolling Reward options	Not fun	Serious gaming Lacks structure	Option to interact Serious gaming/anti-trolling
03 and 12	Voting can be negative	Voting can be negative	Voting can be negative anti-trolling	Voting can be negative Give hints	Voting can be negative Suggestions to uplift positivity	Voting can be negative Safety concerns/ Lacks accountability
04 and 07	Option to interact More options/audio recording options	Not fun Additional gameplay/storyline	Time pressure Not fun	More options/audio recording More options/review answers	Time pressure Safety concerns/Privacy Lacks accountability	Give hints/tutorial User's choice
08 and 10	Safety concerns/privacy	Safety concerns/strangers	Social media concern Option to interact/ Reward option	Safety concerns/privacy Option to interact/	Safety concerns/privacy Option to interact	Safety concerns/privacy Give prompts

09 and 11	Safety concerns/unethical Safety concerns/privacy	Safety concerns/privacy	Reward option Timing	Option to interact	Real world application Safety concerns/privacy	Safety concerns/unethical lacks structure/confusing Option to interact
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In reviewing the categories with the focus group transcripts, I contextualized the categories, and identified patterns in the data specific to the User Type. While some categories emerged in more than one User Type and in more than one storyboard, the patterns in the data revealed some differences. As such, themes emerged for each User Type. The themes are summarized in Table 5 and are presented in the sub-sections below.

Table 5. Themes per User Type

Socializer	Free Spirit	Achiever	Disruptor	Player	Philanthropist
Safety concerns	Safety concerns	Rewards	Suggestions for more options	Accessibility for all players	Option to interact while extending help
Positive interaction	Need for compelling storyline and exploration	Challenging gameplay		Challenging friends in gameplay Additional gameplay	Safety concerns
Authenticity of gaming experience					

4.1.1. Socializer

Safety concerns

While Socializers tend to be motivated by interaction, the participants of the focus group also expressed their concerns for safety of the interactions. Specifically, the participants were concerned about privacy. Socializer1, the participant with the highest socializer score, wrote in the open-ended question, “I’m a little worried that unsolicited engagement with certain individuals may go the wrong way, but I like the intent.”

Additionally, Socializer1 emphasized privacy concerns when sharing contents of the game on social media, as in the scenario in Storyboard 8. Socializer3 agreed with Socializer1, and stated, “My suggestion is you add a lot of options for more private ways to do this. It seems more meaningful to you to actually call on the phone rather than focus on social media.”

While all three participants expressed enjoying the socializing involved in Storyboard 10, all three participants also reiterated privacy concerns in the open-ended question. However, as I explained that users can only interact as avatars and that users have the choice about which parts of the journal to share publicly, all three participants agreed that the storyboard did not need any other improvement.

In Storyboard 9, however, Socializer2 expressed a different safety concern, which involved placing notes on car windows. The participant was worried whether “touching other people’s belongings” was ethical. Socializer1 then suggested:

If it was to leave letters of encouragement, I really love doing those things, but maybe not necessarily on -- oh, actually, if it's a family members car, sure. But if it's a random person, maybe not. But it probably wouldn't be saying specifically that.

Overall, while the Socializer group tend to enjoy interaction, the participants were also concerned over the safety of the interaction. Specifically, the participants were generally worried about the safety of interacting with strangers. The concerns involved sharing personal information and social media information. In relation of the game to the real world, the Socializer group were concerned about the safety of how ethical the quests were when involving strangers’ belongings.

Positive interaction

The Socializer group were generally attracted to positive interaction. Positive interaction entailed socializing to build friendships, avoiding negativity, and uplifting positivity with others. Socializer3 stated that one of the things that attracted him in Storyboard 3 was, “Encourages friendliness and interaction with others.” In terms of the voting mechanic, however, the participants perceived that voting may encourage negativity, particularly the Supervote mechanic. Socializer1 stated, “While this makes sense, intuitively, logically it makes little sense and will likely just sway certain valid discussions in the way of biased or maybe even salty responders.”

Socializer1 expressed concern about “trolls.” Socializer3 countered, “I think it will definitely happen, but as long as people can vote on things, then kind of filter the better things to top it shouldn’t be too much of an issue.” Socializer1 and Socializer2 then suggested for users to be able to foster two-way communication or have discussion boards on posts.

While the Socializer group expressed the appeal of interacting virtually or in real life, the group also expressed that the interaction should be positive. In the voting mechanic, the participants explicitly stated their concerns about “trolling.” The participants then suggested to allow an option to interact other than voting to encourage a discussion.

Authenticity of gaming experience

Another common perception among the participants from the Socializer group was the authenticity of the gaming experience. Specifically, the participants generally perceived that the game lacked an option to integrate user accountability in completing quests/challenges. In completing the task in Storyboard 5, Socializer1 and Socializer2 cited the need for accountability. Socializer2 state, “I wonder if there is a way to know if the person really did it or if they just slid when done.” The participant also suggested possibly placing a timer to track performance of the task. In Storyboard 7, Socializer1 had similar perceptions, stating, “Just accountability and maybe having an algorithm just track and adjust goals if it sees that someone's going too easy or too hard on themselves.” The lack of accountability also surfaced in the discussions of Storyboards 1 and 11. For Socializer3, the game lacked authenticity in terms of structure. The participant perceived that Storyboard 1 was “too open ended in terms of guides” and that, “You...look for things that meet some kind of arbitrary criteria you made up yourself that to me it kind of seems a little too over a minute where you're not really sure what you're supposed to do.” Authenticity of experience was not something that previous research had noted that Socializers would take notice of or be motivated by. Perhaps this has something to do with perceptions of fairness, which would make sense as a form of digital social justice that Socializers could recognize due to paying more attention to other people’s experiences of play.

Although not an anticipated finding based on Marczewski’s (2017) Periodic Table of Gamification Elements, the Socializers in this study were generally interested in

improving the authenticity of the gaming experience. The majority of the participants were concerned about the lack of user accountability when completing quests and suggested for ways to track one's progress to avoid cheating. The participants were also generally aware of the lack of structure in the game in terms of the clarity of goals and instructions to be able to complete the quests and challenges.

4.1.2. Free Spirit

Safety concerns

Similar to Socializers, Free Spirits also expressed their safety concerns in relation to the mechanics of the game. The participants generally reported their worries about potential lack of privacy, and in interacting with strangers in unknown neighborhoods. Free Spirit3 highlighted in the discussion of Storyboard 6:

Just the real-life interaction bit. Just it might be just like with the first panel, it might be dangerous just to interact with -- in the first panel [storyboard] like you you're going and taking a picture of a syringe. Right, like the kinds of neighborhoods you'd have to go -- you might be in or picking up trash on the street. Just there's a safety issue of that.

In discussing Storyboard 10, Free Spirit3 also expressed worry over interacting with strangers in the real world. However, in terms of gameplay, the participant stated, "I like it for the gameplay aspect just because you're connecting with actual people." Free Spirit1 shared similar perceptions, "If it's just like online chatting, that I don't really care about." The participant suggested that for user profiles to be verified "kind of like a background check-ish thing." Free Spirit2 and Free Spirit3 also expressed safety concerns over privacy, and wrote, "Privacy concerns. Some people would prefer not to be on film."

In this theme, the Free Spirits in this study were interested in improving the safety of users when playing the game. For the participants, safety entailed security when interacting with another user who will only be known to them through the gaming platform. The participants expressed their privacy concerns, especially in displaying information and videos of themselves which could be viewed by a stranger. Thus, the Free Spirits suggested to have the users' identities be verified as soon as the gaming account is created.

Need for compelling storyline and exploration

The Free Spirit group emphasized suggestions on improving the gameplay through creating a compelling storyline. Free Spirit2 recommended, "I guess revise it in a more of an interactive way. Not just like question and response, question/response. I'm not too sure how to improve it." Free Spirit3 agreed that a branching storyline with a choose-your-own-adventure interface would make the game more appealing. The participant also stressed that the game did not necessarily need additional graphics, as text-based game can also be "really fun." Free Spirit2 agreed, "Personally, I'm a huge fan of interactive fiction games. So, there's a few text fields and you can choose one of the options which really trigger branching storylines, but none of those require any images at all." Free Spirit4 also agreed with the suggestions. This finding is in line with predictions of the Hexad model. Those who score high in the Free Spirit questions of the Hexad generally should be more interested in compelling story and exploration so it makes sense that they would notice when that was lacking or present in a storyboard.

4.1.3. Achiever

Rewards

The Achiever group appeared to take the reward system seriously. Achiever1 stressed liking the concept of Storyboard 5 and expressed to anticipate a benefit to the mind-body connection game. Achiever3 agreed about the rewards, but also cited providing tasks and rewards based on a self-reported physical ability obtained prior to starting the quest. In another storyboard, Achiever4 felt the need to incentivize reading posts, explaining, "What incentives are there for people to read and like posts? I'd post for the gold and then walk away. Why wouldn't everyone?"

In discussing Storyboard 12, the participants deliberated on users potentially lying about the "random acts of kindness." The participants conversed about the value of the reward if users lied. Achiever4 then suggested to add a "what would you do" option so that users would not be forced to do the act nor to lie about completing the act. The participant recommended a "smaller reward" in exchange for choosing the "what would you do" option. On the contrary, Achiever2 perceived that the reward system might defeat the purpose of the game in that:

This one's nice! I feel like it would take a bit of motivation before the player actually did this, and again I worry about the extrinsic motivation making the gesture a little insincere, but I also think this would be a good way to strengthen those with fewer social skills.

Achiever2 also shared the same perceptions in discussing Storyboard 8, citing that users might be “forced or extrinsically motivated by gold.” In the Storyboard 10 discussion, Achiever3 perceived that, “People would just say whatever to earn the quest.” Several participants also expressed their concern over the time limit in that users tend to be “pressured” and rewards might be missed.

The Achiever group generally expressed their liking towards the reward system and earning gold; however, the participants also reported that rewards should not be given easily. The Achiever group emphasized that users needed to earn their rewards. Another takeaway was that users could also feel rewarded intrinsically. These findings are in line with anticipated Achiever motivational trends and support the Hexad as a design tool.

Challenging gameplay

The Achiever group generally described the need for additional, more challenging gameplay integrated in the storyboards. Overall, Achiever2 perceived that while the game seemed “interesting,” the gameplay might not be “fun for gamers.” The participants generally expressed their enthusiasm over the leaderboard in Storyboard 11. Achiever2 shared, “I like the idea of a leaderboard challenge, I think this would appeal to lots of competitive gamers out there!” However, Achiever4 thought the game was “really easy.” The participant stated, “This feels really easy to game/optimize. 60 seconds is a looooooong time for getting high fives. This could be an economy breaking challenge.”

Achiever1, Achiever2 and Achiever3 all agreed that they were interested in seeing their own “highest number” even without the leaderboard. Achiever1 and Achiever2 then claimed that they would want to be able to “beat” their own limits.

We can say that the Achiever group, although comprised of people with many scores close to tied, had a strong tendency toward noticing things about the storyboards that were in line with predictions that we might make about Achievers’ motivation preferences in games.

4.1.4. Disruptor

Suggestions for more options

The Disruptor group was very interesting to me. They offered suggestions that no other groups did. The group generally centered their discussions on suggestions about improving the game and their suggestions were impactful to me as an interviewer because they seemed like they all had great suggestions to improve gameplay. They were thinking like game designers; they were imagining the system and trying to improve it. From the quest mechanics, gaming options, tracking progress, interacting options to reward options, the Disruptor group tended to have innovative suggestions to improve the game. In the quest, Disruptor2 recommended:

I was kind of trying to understand the implication of the story board. If it's something viewable by public, I'm thinking maybe an example like a noticing a needle might be a little bit too scary for some. Maybe another example of change. Something that would be less dramatic than a needle like factories polluting or dead animals or something.

Disruptor3 agreed with Disruptor2 in that the game could improve if the scenes catered to a broader audience, which included, "I think the story board [is] open to interpretation of what sort of thing in the world they might want to change. Or whether it's something like it could be in their family, or it could be in society." Disruptor3 also shared in the quest mechanic, an option could be included wherein users "could pick out of a selection of categories or topics of the type of things that motivates them, and then after doing exercise they can actually answer themselves."

Disruptor4 perceived that introducing options to prompt goals would improve the game, stating:

I think I like it being left up to allowing them to choose the goal because then if you're going through a list, and you're like 'well, none of these goals really speak to me,' then it kind of throws away the activity. I mean, maybe if you could do it for like prompt. It's like write your goal here or underneath if you're having trouble, if you need help, give me some ideas.

In interaction, the Disruptor group generally recommended an option to be able to chat with another user without being required to add them as a friend. Disruptor2 suggested an option to send a one-time message, while Disruptor3 recommended, "I think it would be a good idea to have more of an option or a place for them to

communicate before doing [a quest] potentially,” which meant that users should have the option to chat without being forced into a quest. Among all the focus groups, only Disruptor group suggested the option for a report button to report negative behavior in chat. These findings were mostly in line with research on the motivational trends of disruptors, who tend to focus on systems and rules.

Interestingly, there were no pure Disruptors in the group, so the participants invited to the Disruptor focus group were those who had the top 10 highest scores on the four Disruptor subscale questions. Half of the disruptors had a primary score of Free Spirit, yet their answers were not very similar to the Free Spirit group. I would be interested in finding a group of primary Disruptors to study in future research.

4.1.5. Player

Accessibility for all players

The Player group was generally concerned about accessibility settings for all kinds of users. This is not an anticipated finding based on previous Hexad research; it could be rationalized that, since players seek extrinsic rewards from the game, they would be concerned that the game system itself was accessible and scoring people fairly. Player7 was specific about including accessibility settings for physically disabled users. The participant shared:

This might be too specific, but let's say some people might have more mobility maybe with their arms but not with their legs for example. Or certain types of exercises are okay, but certain aren't okay. So, people could have back issues and maybe they can take a walk, but they aren't able to do maybe anything that's high intensity that could injure their back.

Player4 also shared the same perception during the discussion of Storyboard 5. In the same discussion, Player3 reported the limitations that users who spent their time indoors. Player3 stated, “Providing sitting options for students to do at their desk, at work etc.” Player5 then suggested, “We could have breathing exercise maybe,” to which Player7 agreed.

Perhaps this focus on the accessibility of the system has nothing to do with the Player group's desire to see the game administered fairly. It would be hard to say that

this finding has anything to do with User Type scores and is likely due to differences in personal experience and education.

Challenging friends in gameplay

The Player group shared several suggestions of introducing challenges that they might play within the game with either friends or other users. Furthermore, the Player group generally shared the idea of improving the gameplay through adding options within the quests to make the tasks more challenging. Some participants suggested adding an option to invite users to either complete tasks together or to compete for certain tasks. Player2 suggested a “more challenging” scenario, in which the participant elaborated “Expand on the quest for example to go outside and do it. Maybe too easy and not challenging enough to just get up in your bedroom and do it.”

Player4 had experiences from another mobile application that he found applicable to improving the game. The participant suggested:

It was basically if you reach X amount of steps, you get a certain amount of scene points, and you can challenge friends. There's a scoreboard and stuff, and you can show like achievements. So, thinking about that, I think that would be really cool if it was implemented.

Player1 stated, “I kind of like the idea of having someone other than yourself rank your response in this regard.” When discussing the leaderboard mechanics in Storyboard 11, the Player group raised questions about the authenticity of users doing the quests, expressing their concerns about possible cheating. The discussion concluded with the suggestion of a report button for game administrators to intervene.

This topic seems to mesh well with a Player’s desire for recognition and rewards. Challenging one’s friends is the best way to be recognized for one’s successes since you are assured to interact with the other players in the game outside of the game setting and therefore could anticipate discussing the past success within the game at a later time – this is exactly what a Player should be motivated by, according to the Hexad.

Additional gameplay

The Player group cited possible changes to improve gameplay, building on what was already presented in the storyboards. Player8 suggested additional actions to make the game “more fulfilling.” The participant stated:

When it comes to finding things that have to change should the player take action for fixing it if it is something they can do such as throwing out trash on the ground? (Not saying they should pick up used needles, better to report it). Might be more fulfilling for the player and help improve the area.

Among all the participants from the six focus groups, only Player3 commented on improving the user interface by adding more graphics. Some participants perceived that the game lacked structure and could be improved by making the goal of the game clear, or by introducing hints to narrow the scope of exploration. The Player group were also generally concerned about being serious in playing the game and were worried about negative interaction or lack of positive interaction. The participants suggested highlighting votes or posts that promote positive interaction.

4.1.6. Philanthropist

Option to interact while extending help

The Philanthropist group generally had suggestions about improving the benefits of the proposed game and minimizing risks. This is in line with predictions about Philanthropists being concerned with the wellbeing of others. We might note that some previous research failed to find central motivation gameplay trends for Philanthropists (Tondello et al. 2018). It is possible that Philanthropists are motivated by gameplay events that reflect positively on them as people, rather than being purely interested in helping others. It seems as if people who score highly in Philanthropist want to be perceived to be helpful to others.

Some Philanthropist participants were interested in deepening learning during gameplay interactions, in that interactivity was perceived to create a higher chance of information absorption. In discussing Storyboard 5, the Philanthropist group spoke about liking the idea of having “facts” pop up while doing the activity. Philanthropist3 shared, “Just maybe some sort of scientific fact about what smiling and exercising the same time will do. The impacts on the hormones rushing through your body and development of the correlation between the smile and exercise.” Several participants also expressed their ideas of providing hints or prompts to help users who had little to no idea about completing the quest. Philanthropist4 stated, “Even some prompts of areas of life that somebody might want to actually set some goals might be helpful. Like if it’s financial, relationship, and maybe some examples. Some people have a zero goal-setting skill.”

Other than assisting others with learning, the Philanthropist group was also generally interested in interacting with other players to various types of help. Philanthropist6 suggested the possibility of being able to extend help through donating the in-game currency, "I feel like we should be able to do something in-game too. I know the whole point is to get gold, but maybe donating gold or something like that would be an idea."

In discussing Storyboard 6, the Philanthropist group shared ideas about helping others with minimal finances and resources. Philanthropist5 entertained the idea of volunteering and adding options that would be easy to do with minimal to no materials (e.g. garbage bags, post it notes). Philanthropist5 shared:

I feel like for some people, from these three options, picking up litter, if you don't have anything with you to pick it up with it's kind of hard to do spontaneously and for other people, perhaps making a donation out of like your own resources and finances. It's kind of like, would you really want to do that for a game? People have different opinions about that.

Philanthropist5 also cited adding "connections to organizations and groups to continue doing these acts, or be more informed of different groups with those missions."

The majority of the Philanthropist group emphasized their interest over being able to extend help through the game. The group was generally interested in interacting with other users in terms of sharing information ranging from hints in-game to connections with organizations. The participants were also interested in extending help without spending much.

These findings are very much in line with what the Hexad predicted that Philanthropists might have been interested in doing within gameplay interactions and support the Hexad as a tool to help design games for users who score high in the Philanthropist subscale questions.

Safety concerns

The Philanthropist group were generally noticing things that might represent safety hazards to other players in the proposed game. Furthermore, several Philanthropist participants were concerned about privacy. The group generally liked the idea of interacting with other users due to the quests, as Philanthropist1 reported, "I think

this type of quest would be good to build friendships around similar preferences.” Philanthropist4 stated that being able to share some information on one’s profile was also an enticing way to “connect” with another user. However, some participants were not comfortable with the idea of sharing information with strangers and perceived that users should be able to message each other without being required to be friends. Additionally, Philanthropist1 was not comfortable with the idea of strangers seeing his activities in the game:

A group of people that usually play with that might know you better. The act or whatever you do, might not mean much to some people, but to the people that might be closer you or know you better, might be like, oh, wow. That’s something I never would have seen you do. Congratulations. But to someone else like oh wow, you picked something off the floor. That’s nothing.

One participant was worried about the safety of the chat feature. Philanthropist5 suggested, “I’m thinking that there probably needs to be some kind of way to moderate the messages sent to each other because there’s a lot of opportunity for inappropriate messages to possibly be sent.”

Generally, the Philanthropist group appeared to be interested in interacting with other users of the game. However, Philanthropists also expressed caution in the implementation of the game to reduce potential negative impacts on other players. They were also wary of privacy concerns when displaying personal information on the gaming profiles. Overall, the Philanthropist group seemed to offer design suggestions that were in line with research predictions, but not always in obvious ways. It would be anticipated that Philanthropists would simply want more opportunities to assist others, or be recognized as being a good person, but this research suggests that Philanthropists anticipate possible dangers to others during the design process. It would be interesting to study high Philanthropists scoring professional game designers in workplace settings to see if this trend pops up.

Summary of Qualitative Results

The qualitative findings of the study revealed mixed results regarding the influence of their User Type Hexad scores when providing feedback on what appealed to them and what the areas of improvement in the game were when compared with the predictions of Marczewski (2017). Some themes that emerged from specific User Type

groups matched the hypothesized results based on the Periodic Table of Gamification Elements model, while some themes emerged unexpectedly. The findings further showed that the Hexad scale supports the design process and that certain User Types did have similar feedback as suggested by their motivational fingerprinting.

Specifically, both Philanthropists and Socializers were drawn to the socializing aspect within the gameplay. The former as predicted by the model, were more inclined to recommend changes in the game mechanics that had to do with extending help and were attracted to the mechanics of cooperation, altruistic purpose, and a random act of kindness. They were also motivated to interact with other players, but their interaction was altruistically driven. Socializers were attracted by the mechanics of open engagement, feedback, and socializing; however, the participants were generally specific to positive interaction. The findings of this study also revealed that both groups of participants seemed cautious about the safety of the users especially in terms of maintaining privacy. An unexpected theme that emerged from the Socializer focus group was that the users seemed to be serious about maintaining the authenticity of the game. The participants generally emphasized suggestions to maintain accountability, improve the structure, and prevent trolling or cheating.

In the case of Players and Achievers, although each driven by different motives in the model, both groups appeared motivated by the mechanics of achievement in the study. Players fancied giving suggestions required to improve the gaming experience such as incorporate a colorful UI, partnering and challenging friends, quests for physically disabled players, and player's accountability. The Player group also shared their interest in more rewards leaderboards, competition, and earning points in the gameplay. Achievers, on the other hand, provided feedback related to enhancing their ability and expertise in the gameplay, provision of more incentives, and preferred quests that helped them escape the real world and which were not school-esque.

In the case of Free Spirits and Disruptors, the common denominators for them were creativity and freedom mechanics in the gameplay. Free spirits recommended changes that dealt with a compelling storyline, engaging content, and exploration within the gameplay, but were also unexpectedly concerned about safety, as they applied the game mechanics in a real-world setting. Disruptors, on the other hand, came up with suggestions that tried to disrupt and challenge the system. They often tested the

limitations of the system and tried to push it further like the introduction of new categories and topics within the quests, suggestions to slip in more options.

Ultimately the User Type Hexad proved to be a convenient way to group people together for focus groups in order to discuss storyboards and provide design feedback, even if that feedback was not always in line with what might be predicted to be the most motivating aspects of play that each storyboard presented. This was likely due to the messiness of my storyboards – they had multiple mechanics and interactions because they were trying to represent a real-world quest that could be completed within a theoretical game. It would have been more interesting data if I could have neatly summarized what each User Type should have noticed and not noticed about storyboards and then checked against those predictions after coding.

I have learned a lot about how difficult it is to make good storyboards for game design during this research process. Some of the participants' reactions to the storyboards could have been predicted based on previous research because those participants would have noticed something they were motivated by within games and saw a deficit in the storyboard, or saw something done well in the storyboard, and made a comment about it. The idea is that people discuss the things they notice, and they tend to notice things that they wanted to see in a hypothetical game. I can see now that there are some problems with this assumption, people may be motivated by exploration, and see that a certain exploration storyboard is not interesting to them regardless because it was not designed well enough to convey the concept of exploration. In this case they might not mention anything about a lack of exploration because it was clear that exploration was a feature of the storyboard, but they may instead just feel that the storyboard was not interesting to them and try to find other reasons for that. Design is complex, and asking participants to give feedback on a design is quite hard to interpret. It is even harder to predict the types of feedback you may receive.

4.2. Discussion of Quantitative Results

4.2.1. Relationships between Hexad User Types and Learning Preferences

Table 6. Intercorrelations between User Type Scores and Life Skill Learning Preferences

	Achiever	Disruptor	FreeSpirit	Philanth.	Player	Socializer
Lifelong learning	.289**	.268**	.204*	.206**	.090	.183**
Mental/Emotional Health	.276**	.157*	.153*	.298**	.150*	.184**
Money & Finance	.240**	.217**	.188*	.234**	.210**	.220**
Physical Health	.319**	.217**	.190*	.337**	.162**	.308**
Purpose & Meaning	.260**	.215**	.177*	.331**	.220*	.431**
Social Connection	.339**	.242**	.165*	.399**	.301**	.377**
Relationships	.201**	.247**	.172*	.154*	.196**	.174*
Work & Mission	.299**	.344**	.306**	.317**	.340**	.304**

p<.01, *p<.05, **bold= r> 0.3, (n=217)

I wanted to find the biggest overlaps between player motivations (User Type) and the life skill learning preferences in order to uncover if there might be a game mechanic and learning target that went well together. The overlap between User Type and LifeLeaps uncovers game design suggestions. Table 6 shows that most of the correlations are statistically significant and of low intensity and positive direction. To inspect in more detail the relationship between Hexad User Types scores and learning preferences, canonical correlation analysis would be an appropriate choice. However, since our sample size did not fit the suggested rule of thumb that for each variable (subscale) I would have needed at least 20 respondents, and applied the canonical covariance analysis which is less sensitive in case of small samples (Momirović, Radaković, & Dobrić, 1988). The difference is that the latter analysis maximizes covariance while the former maximizes correlation. Thus, I conducted a canonical covariance analysis between User Types of Hexad questionnaire from one side, and subscales of learning preferences questionnaire from the other side.

In the conclusions section, I continue exploring this data by breaking it down by individual question, rather than User Type, and learning preference category to generate game design ideas. It does seem like this quantitative life skill learning preference scale, and its relationship to the User Type Hexad questions (if not the types themselves) are an interesting finding that speaks towards the potential instrumental utility of the Hexad because here the Hexad is used to directly reveal potential game designs by matching learning targets with game mechanics that should be motivating to those players. It certainly seems as if this is a point for the Hexad as a tool for design ideas, but without being able to actually design one of these games and test how motivating it truly is, we can only point towards the general tendency of the Hexad to spark interesting game design ideas and take up the challenging work of forging those ideas into fully realized educational gamification designs in future work.

Multiple Regression Analysis Between User Type and Learning Preferences

To examine the relationships between all learning preferences on User Type, multiple regression analyses were performed for each User Type separately. This jointly examines the effects of each of the learning preferences, adjusting or accounting for the effects of all other learning preferences in the model.

The analysis showed that work & mission ($p\text{-value}<0.01$) and relationships ($p\text{-value}=0.05$) are the only statistically significant predictors of the User Type disruptor. The positive slopes for work & mission and relationships were found to be 2.45. This is the strongest relationship in the data, although disruptor is also the Hexad category with the lowest average scores.

Next, the analysis also showed that all learning preferences other than relationships are statistically significant predictors of the socializer user type. The strongest predictor was found to be purpose & meaning. The positive slope for purpose & meaning was 2.39, so for every unit increase in mean socializer total scores, purpose & meaning scores will increase by 2.39 units. This was the second strongest relationship found in the data.

The analysis for free spirit showed that work & mission was the only statistically significant predictor of the User Type at the 99% confidence interval. The positive slope for work & mission was 1.68. free spirit had the messiest life skill learning preferences due to one (I often let my curiosity guide me) of the four free spirit questions being

negatively correlated with nearly every learning preference. This relationship is investigated in further detail in chapter 6.

Social connection (p-value=0.03) and physical health (p-value=0.04) are the only statistically significant predictors of the User Type achiever. No other learning preferences were found to be statistically significant at the alpha = 0.05 level of significance. The positive slopes for social connection and physical health were found to be 1.01 and 0.91 respectively.

Physical Health (p-value=0.03, slope=0.93), Social Connection (p-value <0.01, slope=1.31), and Purpose (p-value=0.02, slope=1.07), are statistically significant predictors of the User Type philanthropist.

Lastly, the analysis showed that work & mission, (p-value=0.0019, slope=1.69), Lifelong Learning (p-value=0.02, slope=-1.05) and Social Connection (p-value=0.0048, slope = 1.54) are all statistically significant predictors of the User Type player. There is a positive relationship between work & mission and social connection with player scores but a negative relationship between lifelong learning. That means that people who score high on player questions will likely score lower on learning targets in lifelong learning.

Demographic Relationship Between Hexad User Types and Learning Preferences

In order to test if Hexad User Types explain learning preferences over and above demographic variables or not, I used hierarchical linear regression. In linear regression, you have variables considered as predictors and one variable considered as a criterion. The goal is to see to what extent the predictor variables predict the criterion variable. Hierarchical regression logic is the same, the difference is that one first puts several variables into the model as predictors (e.g. demographics), and in a subsequent step, then adds an additional set of predictors (e.g. Hexad User Types). In this way, it is possible to see if these additional predictors (e.g., Hexad User Types) predict the criterion variable (e.g., learning preferences) over and above the first set of predictors (e.g., demographics).

Firstly, I introduced demographic variables, and in the second I added Hexad User Types. The primary goal was to see if the Hexad User Types contribute to a statistically significant change in explained variance. While the differences between Hexad User Types in their partial contribution were of secondary importance.

Table 7. Results of Hierarchical Regression Analysis for Learning Preferences

	Work & Mission	Physic. Health	Mental Health	Relationships	Money	Social	Purpose	Lifelong Learning
Step 1								
Gender	-.099	-.158*	-.189*	.007	-.163*	-.055	-.203**	-.154*
Education	-.134	.028	-.103	-.226*	-.033	-.003	-.066	-.176*
Age	.007	.033	.072	.174*	-.098	.018	.050	.021
Ethnicity1								
Caucasian	.014	-.020	.048	-.034	-.169	-.010	-.073	-.113
Asian	.106	-.033	.031	.109	-.041	.084	.059	.091
R2	.040	.029	.038	.057	.072	.013	.063	.103
F	1.61	1.15	1.50	2.30*	2.93*	.49	2.61*	4.35**
Step 2								
Socializer	.025	.186*	-.027	.069	.036	.094	.205**	.097
Free Spirit	.055	-.022	-.042	-.017	.035	-.176*	-.075	.017
Achiever	.097+	.147+	.210**	.087	.120	.181*	.055	.170*
Disruptor	.088*	.178*	.089	.138+	.088	.136+	.133+	.231**
Player	.155**	.094	.114	.099	.111	.185**	.131*	.024
Philanthropist	.069	.136	.213*	.043	.078	.280**	.260**	.074
R2	.243	.210	.181	.117	.149	.245	.276	.248
ΔR2	.202	.181	.143	.060	.077	.232	.213	.145
ΔF	8.29**	7.04**	5.40*	2.09+	2.76**	9.64*	9.27**	5.91**

**p<.01, *p<.05, +p<.10; All regression coefficients are standardized

As we can see from Table 7, the regression model that only includes demographic variables does not predict work & mission learning preference, $R^2 = .04$, $F(5, 192) = 1.61$, $p = .16$. While the model that besides demographic variables includes Hexad User Types significantly predicts work & mission learning preference, $R^2 = .24$, $F(11, 186) = 5.42$, $p < .01$ with a significant contribution in the explained variance, $\Delta R^2 = .20$, $F(6, 186) = 8.26$, $p < .01$. Thus, one could conclude that Hexad User Types predict variability in work & mission learning preference regardless of demographic variables. Additionally, Table 7 shows that the relationship between Hexad User Types and work & mission learning preference goes via disruptor and player since

they are the only significant predictors². For example, if the score on player subscale changes for 1 standard deviation score on work & mission learning preference changes for 0.16 standard deviations. However, one should be careful when dismissing certain User Types as irrelevant for prediction of work & mission learning preference since regression coefficients are context-bound. That means that they depend not just on the correlation with the criterium variable, but on correlations with other predictors used in the model as well. In this case, both free spirit and disruptor correlate with work & mission learning preference similarly, but there is also a correlation between the two User Types ($r = .38$). This may explain why the Free spirit User Type remained insignificant despite significant correlation with work & mission learning preference.

Furthermore, the regression model that only includes demographic variables does not predict physical health learning preference, $R^2 = .03$, $F(5, 190) = 1.15$, $p = .34$. Although, the regression coefficient for gender is statistically significant. From the other side, Hexad User Types significantly predicts physical health learning preference, $R^2 = .21$, $F(11, 184) = 4.46$, $p < .01$. Thus, I can conclude that Hexad User Types predict variability in physical health learning preference regardless of demographic variables.

Regarding mental health learning preference, regression model that only includes demographic variables is not statistically significant, $R^2 = .04$, $F(5, 191) = 1.50$, $p = .19$. While the model that besides demographic variables include Hexad User Types significantly predicts mental health learning preference, $R^2 = .18$, $F(11, 185) = 3.72$, $p < .01$. Thus, we conclude that Hexad User Types predict variability in mental health learning preference regardless of demographic variables.

Demographic variables significantly predicted the money & finance learning preference, $R^2 = .07$, $F(5, 189) = 2.93$, $p < .05$. Gender identity was the most important demographic variable behind this relationship since males were more interested in Money and Finance than Females. When we include also Hexad User Types, we identify a significant contribution in explained variance, $\Delta R^2 = .08$, $F(6, 183) = 2.76$, $p = < .05$. However, none of the regression coefficients of User Types was even close to statistical significance. Thus, even though we identified a significant contribution when we put Hexad User Types in the model in addition to demographic variables, we advise caution

² It is worth mentioning that achiever User Type is near the margin of statistical significance ($p = .07$).

since none of the User Types is a significant predictor of the money & finance learning preference.

Regarding the relatedness learning preference, the regression model that only includes demographic variables is not statistically significant, $R^2 = .01$, $F(5, 194) = .49$, $p = .78$. However, the model that besides demographic variables includes Hexad User Types significantly predicts the relatedness learning preference, $R^2 = .25$, $F(11, 188) = 5.54$, $p < .01$. Additionally, all User Types except socializer are significant predictors considering regression coefficients³. Thus, we conclude that Hexad User Types predict variability in the relatedness learning preference regardless of demographic variables.

Demographic variables significantly predicted the Purpose & Meaning learning preference, $R^2 = .06$, $F(5, 195) = 2.61$, $p < .05$. Gender was the most important demographic variable behind this relationship; males scored significantly higher on this category than females. When we include also Hexad User Types, we identify a significant contribution in explained variance, $\Delta R^2 = .21$, $F(6, 189) = 9.27$, $p < .01$. Philanthropist, socializer, player, and disruptor ($p = .06$) were the most important User Types for the obtained relationship. Therefore, we conclude that Hexad User Types explain the variability in purpose & meaning learning preference over and above demographic variables.

Demographic variables predicted significantly Lifelong learning preference, $R^2 = .10$, $F(5, 190) = 4.35$, $p < .01$. Gender identity and education were the most important demographic variables behind this relationship. When we include also Hexad User Types, we identify a significant contribution in explained variance, $\Delta R^2 = .15$, $F(6, 184) = 5.91$, $p < .01$. Additionally, the effect of Hexad User Types on Lifelong learning preference goes via disruptor and achiever. Therefore, we conclude that Hexad User Types explain variability in Lifelong learning preference over and above demographic variables at the category level.

³ The disruptor User Type was of marginal significance ($p = .06$)

Visualization of Hexad and Learning Preference Scores

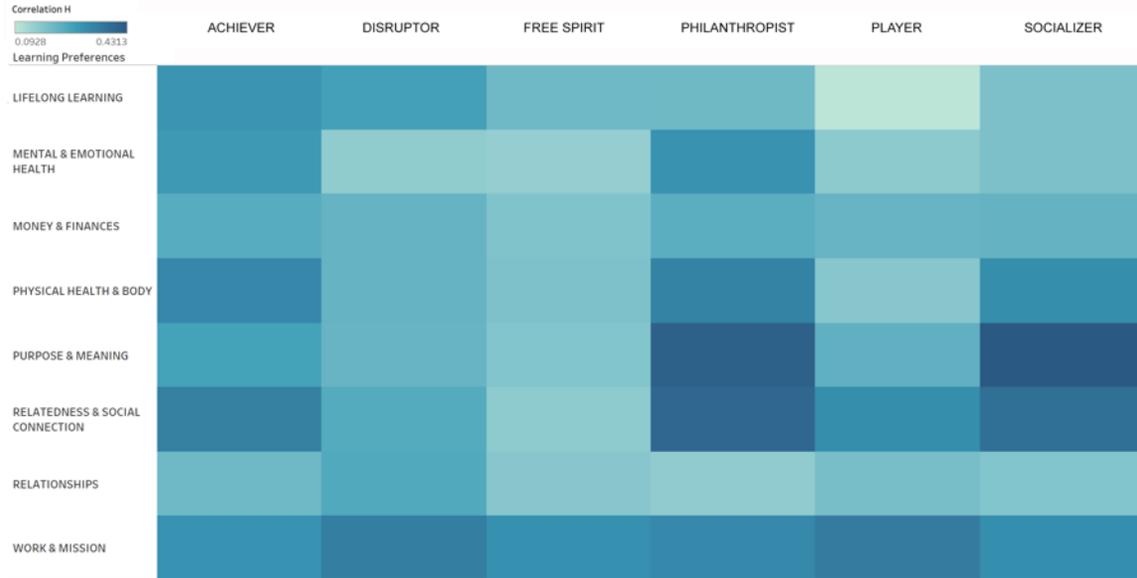


Figure 6. Visual Correlation Matrix Between User Type and Learning Preference.

Figure 9 shows us that most of the correlations are significant, of low to moderate intensity and positive quality. I go into further detail with the relationships between User Type scores on the individual subscales and each life skill learning preference subscale item to generate design suggestions for life skill learning gamification in Chapter 6.

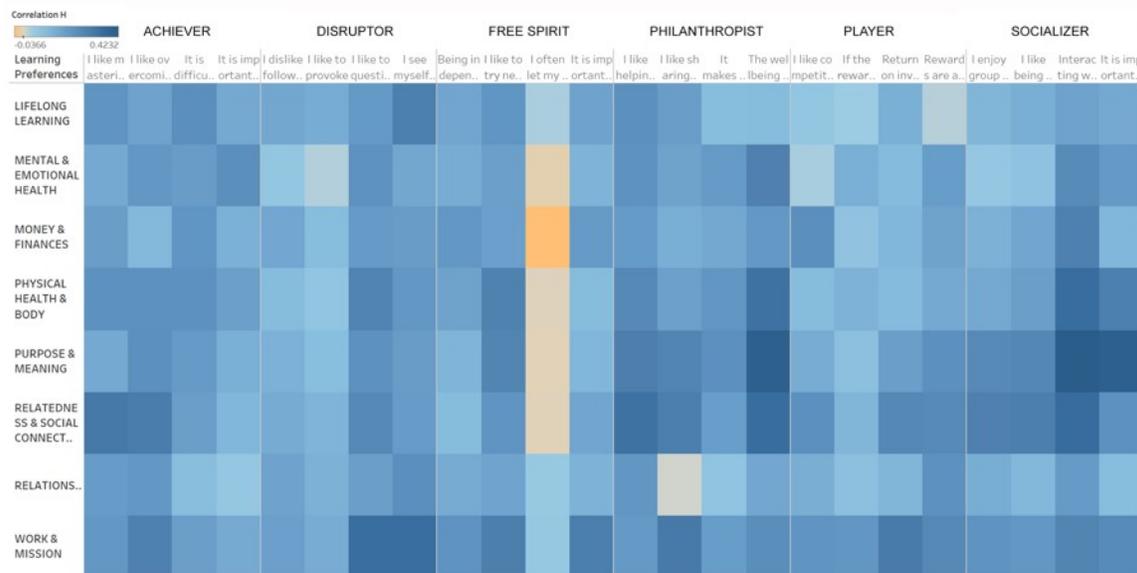


Figure 7. Subscales of the User Type Hexad compared to learning preferences.

Visualizing Free Spirits

When we look at the relationship between subscale items we can see a more complicated relationship emerges. It points toward the potential for User Type to demonstrate paradoxical effects that would reduce the overall correlation strength by having some subscale items that are far more or less correlated than the average between them. This effect leads to free spirits showing lower scores based solely on one question in the subscale, “I often let my curiosity guide me” which is somehow negatively correlated with nearly every learning preference, while “I like to try new things” is positively correlated with many.

The difference between individual User Type subquestions not meshing well into a cohesive single score becomes more obvious when we visualize the intercorrelations between the four Hexad questions and the subscale questions of LifeLeaps as demonstrated in the free spirit correlation heat map below (Figure 8). The dark orange areas represent the most negative correlations. The most negative scores come in the question “I often let my curiosity guide me”, which are all significant at the $p \Rightarrow 0.01$ level. We can see from the visualization that the other questions in the Hexad scale relating to free spirit do not mesh up well with this question. This might be due to people reporting to be guided by their curiosity having a low reported interest in “learning more about” things when asked in written form. It would be interesting to see a study follow up on this trend and unpack what is going on with this subscale item by testing real-world learning interests without self-report through some method that tracks engagement with self-directed learning.

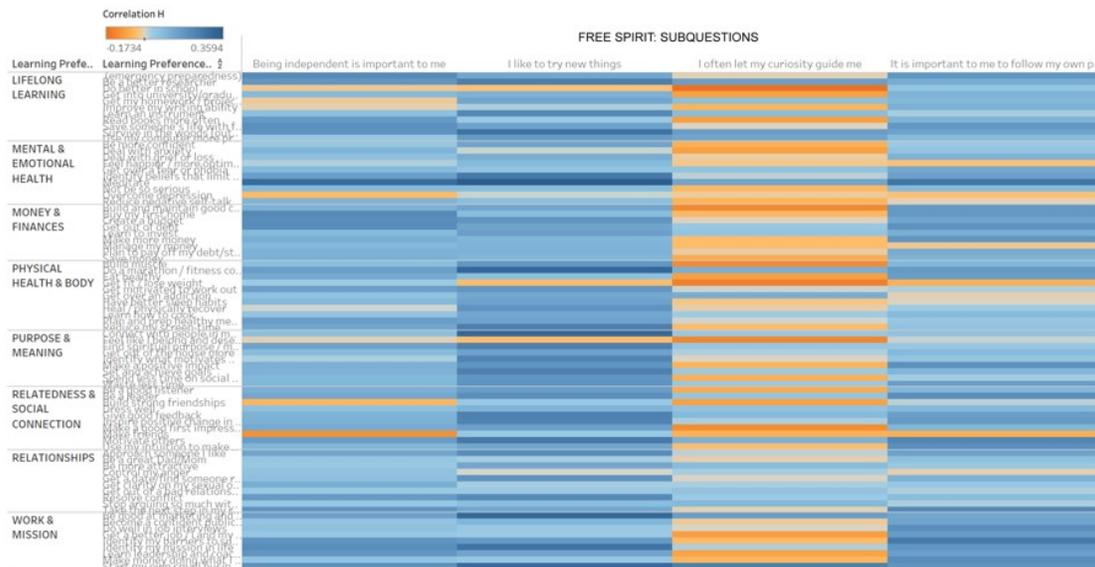


Figure 8. Relationship between subscale items: Free spirit learning preferences.

Other User Types sub question items were significantly more positively correlated with learning preferences than the other three items in their User Type score. Below we can see an example of philanthropist’s female vs. male differences that we discussed earlier, but this time explored at the sub question level and visualized in the same way as above to make the differences more evident.

Immediately evident is the difference between males’ and females’ notions of being independent colouring their desire to learn more about specific life skill topics. Males who rate independence as important to them are much more likely to report wanting to know more about various life skill topics, in general, than women who do. Further, women who report letting their curiosity guide them tend to be less interested in learning about any of the life skill learning targets in the survey – especially about doing better in school.

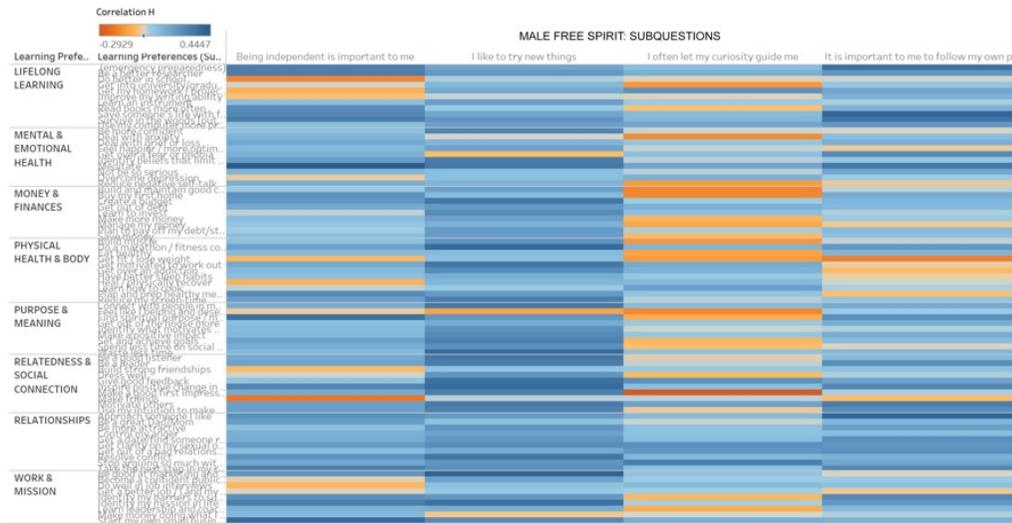


Figure 9. Male free spirit learning preferences.

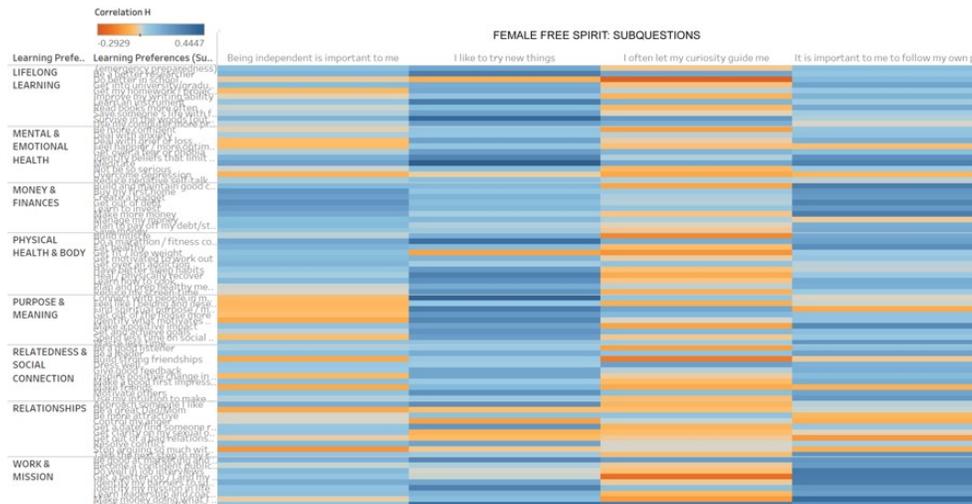


Figure 10. Female free spirit learning preferences.

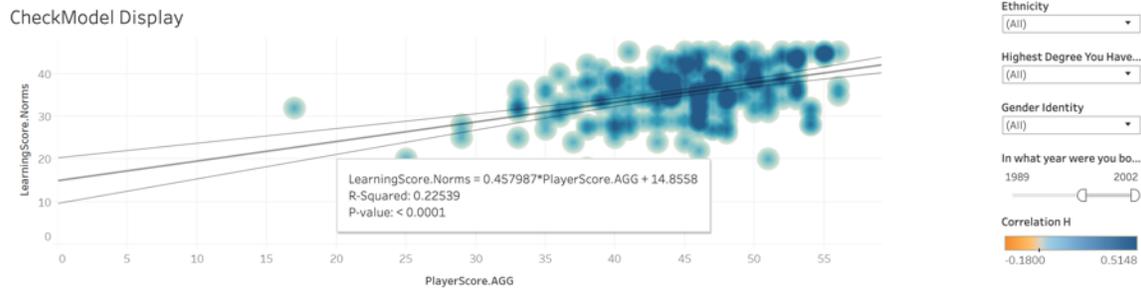
When comparing both side-by-side we can see some trends emerge that would indicate the gender identity effects on individual subscale questions are stronger for some User Types than others. Females who scored high on “I often let my curiosity guide me” were uninterested in learning how to “do better in school” ($r=-0.22$, $p=0.009$) while males showed no significant correlation whatsoever between those subscale items ($r=0.008$, $p=.94$).



Figure 11. Male vs female free spirit subquestion: Do better in school.

This is the strongest gender identity difference between subscale items on the LifeLeaps when compared to User Type, but others do emerge on the subscale level. It is worth considering these differences if one’s goal is to create a game that is intended to appeal to only one specific gender identity or to avoid creating a game that accidentally only appeals to one group at the expense of another. This data suggests that while females report higher interest in learning about life skills than males, they are less interested in certain life skills depending on how they answer specific subscale questions on the Hexad. Though this effect is statistically significant, the disappears when you take the average scores across all learning preference subscale items, or User Type Hexad subscale items.

Overall, the visualization is a good tool for exploring relationships that are not immediately obvious when one looks at the data. Upon a quick visual scan, one can spot the big blue clusters representing higher correlations between specific subscale items on the Hexad and LifeLeaps. Below is one such an example that could prove useful in the design of a gamified life skill learning application involving connecting with others in the community, making a positive change, spending less time indoors, and goal setting.



Correlation Matrix Detail



Figure 12. Philanthropist and Socializer Preference for Purpose and Meaning

As we can see in Figure 10, the two strongest blue boxes in Figure 9 unpack into many subscale items that are investigated further below. This mosaic indicates areas where there is a strong match between learning preference and player type score. The high correlation boxes are indicative of possible educational game design ideas. Darker blue boxes mean games that would teach a learning target to a group of people motivated by specific types of games. That means if you picked a highly correlated area you are likely to design a game that a certain type of player would be interested in, motivated to play, and contain learning targets they were most interested in. Similarly, you would want to avoid light blue, or orange areas, because those would likely not be motivating learning games.

Visualizations of Subscale Questions: User Type vs. Learning Preferences

Figure 11 shows the aggregate view of male vs female socializer scores compared to the learning preference category of "relatedness and social connection". The males are more weakly correlated than females, but overall, the relationship is positive, indicating that socializers, as predicted, should be interested in games that teach people more about social connection. This is not the full story. We can drill down into the data one level deeper. I have unpacked the learning preferences into their subscale items to see what it is that might be causing this seemingly small gender identity difference.



Figure 13. Gender identity in preferences for relatedness and social connection.

We can notice here (Figure 14. “Positive change in others” gender identity correlation.) that all the female answers are only moderately positive except "inspire positive change in others" which is slightly stronger $r=0.4683$ $p>0.0001$ while the male group is split between high correlations, low positive, and even two weak negative correlations.

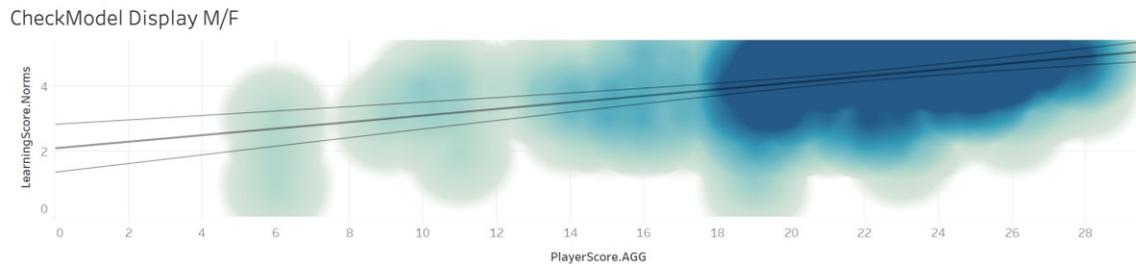
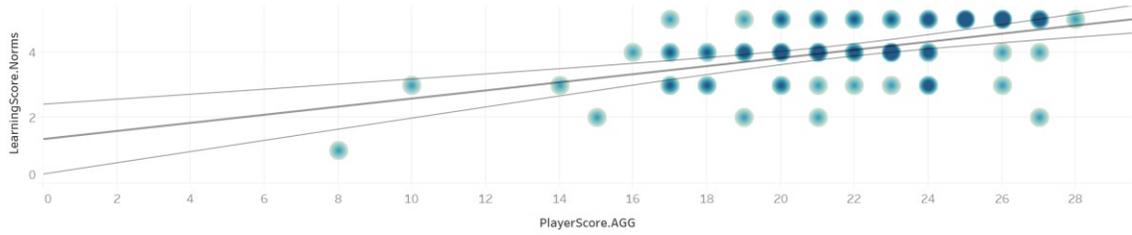


Figure 14. “Positive change in others” gender identity correlation.

The males who score high on *socializer* have a strong correlation to people who want to learn more about being a leader $r=.507$ $p>0.001$ accounting for 26% of the variability in that score (Figure 15).

CheckModel Display M/F



Correlation Matrix Detail M/F



Figure 15. Male Socializer Desire to Learn More About Being a Leader

While high socializer scores for males have no statistically significant correlation with wanting to learn more about "build strong friendships" ($p=.89$) or "make friends" ($p=.83$), females of the same socializer scores were significantly correlated with both: $r=.2755$, $p=0.0016$ for build strong friendships, and $r=.2523$ $p=.004$ for "make friends". This prompted me to dig even deeper into the data to see if there were clear trends at the subscale level.

Correlation Matrix Detail M/F

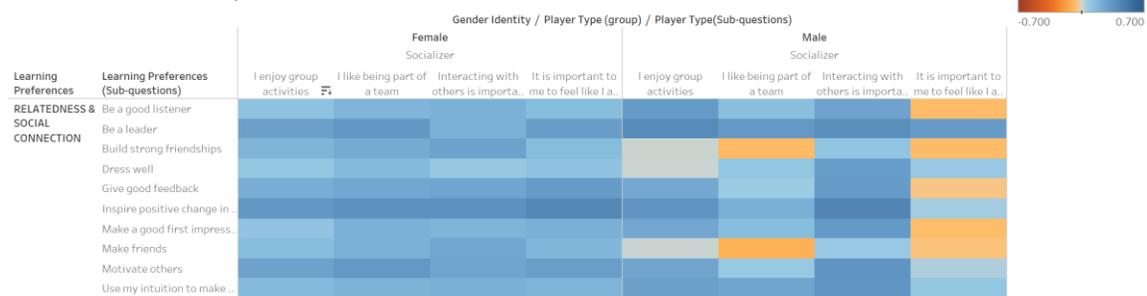


Figure 16. Gender identity in preference for socializer subquestions.

We can see in the above image that all "social connection" learning preferences are positively correlated with all socializer Hexad subscales for females, but those specifically answering high on the Hexad subscale item, "It is important for me to feel like

I am part of a community" drags down the learning preferences and scatters the range of answers which reduces the significance of the correlation below acceptable levels.

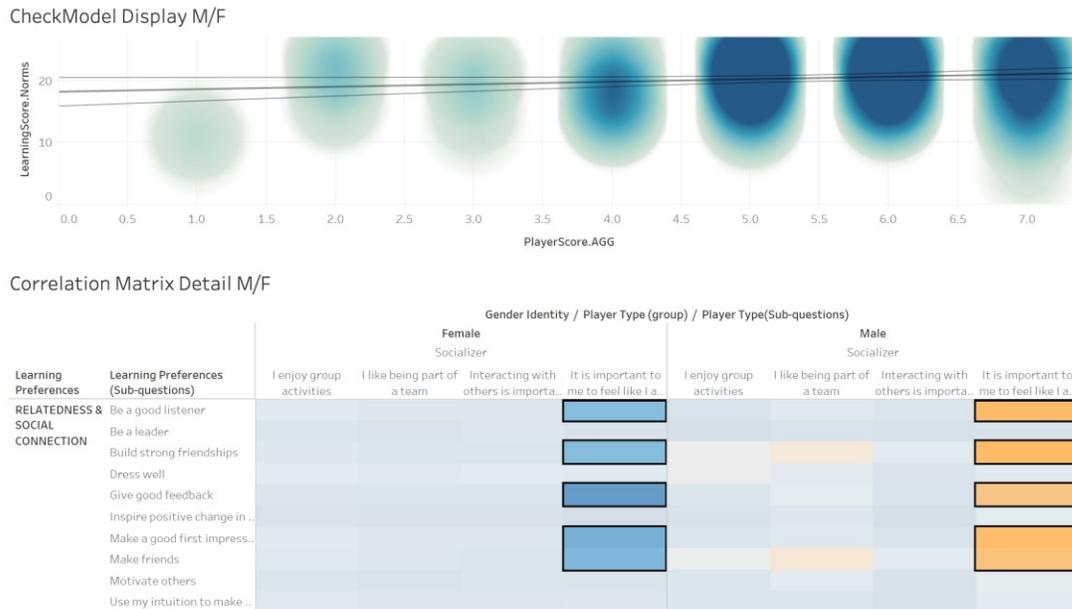


Figure 17. Socializers' sender-based inversion on desire to Learn about relatedness

If we treated Male and Female participants the same, this data would be lost. Going deeper into the sub questions reveals how the aggregate data can show weaker correlations that are occurring at the macro level due to the differences between preference patterns being related to gender identity, creating a paradoxical cancellation of p values in the aggregate, and cancelling out the strength of some correlations within learning preferences due to the differences between Hexad sub scores.

In this specific example, we can see that a theoretical game intended to teach listening skills and giving good feedback, while “making a good first impression” that was designed around game mechanics a socializer tend to be interested in (social connection, team play, collaborative missions) would appeal to female socializers more than male ones – especially if they felt like being part of a community was important to them. This type of understanding could lead to a complete game design project.

This type of insight into potential user preferences is excellent to have because it can shape the design of a potential learning game, leading to significant aesthetic or level design considerations, as well as pedagogical implications.

4.3. Summary of Quantitative Results

I identified two independent patterns of relationship between Hexad User Types and storyboard preferences. Firstly, people that are low on achiever, free spirit, and philanthropist User Types dislike all the storyboards created in Facing Dragons (especially agent of change storyboard), meaning that people with higher scores on achiever, free spirit, and philanthropist User Types prefer the storyboards. However, this relationship is weak and as such of questionable practical value. Secondly, people that have high scores on disruptor and free spirit, while low on achiever User Type, like voting and social discovery while disliking explore self, meaning & purpose, progression, and learning challenge storyboards. In other words, people that have low scores on disruptor and free spirit, while high on achiever User Type, dislike voting and social discovery while preferring explore self, meaning & purpose, progression, and learning challenge storyboards. Although higher than the first quasi-canonical correlation, this correlation cannot be labelled as strong, having in mind that storyboards were based on Hexad User Types.

4.4. Summary of the Chapter Findings

The qualitative findings of the study indicated that Marczewski's (2017) Periodic Table of Gamification Elements model can predict users' preferences based on their User Type Hexad scores. The feedback on what was appealing and what needed to be improved tended to match the characteristics of each User Type shown in the Hexad scale model. The rich data provided by the focus groups gave a lot of great feedback suggestions for the design of a potential game. Ultimately the feedback from the qualitative focus groups changed the entire direction of the design project that resulted from this research. User Types seemed to play a role in the type of feedback that each group gave. They tended to notice the things that the Hexad says they are motivated by in games and make good suggestions about how to improve those things.

Similarly, quantitative findings showed that scores determining dominant User Types in an individual can predict likes and dislikes in the storyboards. Users who scored low on Achiever, Free Spirit, and Philanthropist User Types dislike all the storyboards, particularly the agent of change storyboard. Moreover, users with low scores on Disruptor and Free Spirit User Types, while having high scores on Achiever

User Type tend to prefer exploring self, meaning & purpose, progression, and learning challenge storyboards while disliking voting and social discovery.

The results of the quantitative analysis demonstrate that the participants had a positive response to the storyboards of Facing Dragons, which ultimately supports the concept of gamification of learning targets related to motivational preferences identified in the User Type Hexad. Unfortunately, these quantitative results were very challenging to make use of and interpret, which supports the null hypothesis of RQ1.

In summary, these quantitative User Type Hexad results were not very useful to the me, a novice game designer, when it came to discovering what types of learning games people may enjoy before designing them based on the storyboards that I designed. The results were not easy to understand because there are too many other possible variables to consider when it comes to player preferences for potential learning game ideas presented on these 12 storyboards. In the future I would like to ask more specific quantitative questions that supported the qualitative discussion of the storyboards in order to compare what the participant mentioned understanding about the storyboard to their quantitative ranking of the storyboard so I could see better what those numbers represented.

Additionally, storyboards should be simpler and represent only a single gamification element at a time, rather than attempting to capture a gameplay moment in a proposed application. This would allow for cleaner storyboard feedback that could possibly be better linked to Hexad scores.

Chapter 5. Interpretations, Conclusions, and Recommendations

The purpose of this thesis was to explore whether the User Type Hexad was a useful tool for a novice designer (instructional-, research-, and gamification design). This mixed methods study consisted of two concurrent phases. The quantitative phase was Study 1: LifeLeaps and User Type Hexad Surveys. The qualitative phase was Study 2: Storyboards and Focus Groups. In Study 1, 224 students from Simon Fraser University and Kwantlen Polytechnic University in British Columbia during the 2019 summer session completed the LifeLeaps instrument and User Type Hexad instrument. From the 224 respondents, 31 joined the focus groups in Study 2. Six focus groups were conducted – one for each User Type Hexad (Socializer n=3; Free Spirit n=4; Achiever n=5; Disruptor n=4; Player n=8; Philanthropist n=7). The sub-sections below contain the discussion and interpretation of the results, as well as the conclusion of the study.5.1. Discussion and Interpretation

5.1. Conclusions

5.1.1. Quantitative Conclusions

A self-report psychometric instrument like the User Type Hexad is only a helpful tool if it does not get in the way of the design process, and opens new ways of thinking about the users or the design itself, or helps the designer create a better design than they would have otherwise. The main question answered with the quantitative data was whether the Hexad User Type questionnaire is a useful framework to assist a novice instructional designer in creating gamified life skill learning challenges. Quantitative data showed Hexad User Types did not significantly predict the kinds of challenges that would appeal to players. The construct reliability and validity of Hexad User Types were rather poor, implying caution if User Types were assessed as distinct constructs. Also, Hexad User Types were poorly related both to storyboard preferences (which were designed according to them) and to game mechanics preferences (that should be their underlying components). More precisely, most of the correlations were statistically non-significant, including theoretically expected correlations, unlike in Tondello et al.'s (2016) study. There was even an insufficient alignment between storyboard preferences and

game mechanics preferences, which is telling since the storyboards were designed according to Hexad User Type preferences found in previous studies.

As discussed at length in the methodology and results section covering the intended design goals of each storyboard, this may be because the storyboards themselves were not focused on solely one game mechanic, but instead attempted to show an entire life skill learning challenge in the form that a user would encounter it within a proposed game. This made measuring storyboard preferences in such a way to control for outside preference variables or confounding preference effects to other game mechanics, completely untenable. This is one major weakness in the design of the study as far as quantitative analysis goes, and is a big reason why I would conclude the User Type Hexad is not useful for predicting storyboard preferences under normal situations. It is difficult to create storyboards that focus solely on one mechanic if a designer is trying to test potential users' reactions to a real game's design, rather than simply trying to isolate the effect of the independent variable in a lab setting.

However, I need to point out the constraints that may have influenced the results before simply rejecting Hexad User Types as a useful framework. First, the samples in most of the analyses (except life skill learning preferences) were too small for stable statistical results. For example, small samples can make correlations that otherwise exist in the population seem statistically insignificant. Second, Hexad User Types had poor metric quality indices, which puts an initial constraint on their relations with other constructs. For example, if a construct has low reliability it cannot have high correlations with relevant constructs by definition - reliability is an upper bound of construct validity (Nájera Catalán & Gordon, 2020). Third, the way of measuring game mechanics preferences puts a severe restriction on sample sizes and analyses used. As a result of this, I had to exclude a lot of reasons for game enjoyment/game mechanics from analyses. Fourth, each storyboard was based on heterogenous game mechanics/User Types, which may have lowered correlations. For example, a storyboard can be comprised of two game mechanics and a respondent can like one game mechanic, but dislike the other, giving lower storyboard preference score than he initially would. Fifth, the respondents displayed high scores with little heterogeneity on Hexad User Types, Storyboard, and Learning preferences. Restriction of the range of variability in phenomena of interest is a recognised predictor of correlation attenuation.

That being said, there were some statistically robust results as well. People that name problem-solving as the most important reason for game enjoyment tended to dislike several of our storyboards. This is an important finding, since problem-solving was the most popular reason for game enjoyment among participants. The analyses revealed the relationship between Hexad User Types and learning preferences, a relationship that stays stable even when we have taken into account demographic variables. Furthermore, some of the Hexad User Types were related in an expected manner to storyboard preferences. For example, one of the robust findings is that people whose game motivation can be described as a Free Spirit preferred the Agent of Change storyboard, which via creativity tools and customization game mechanics is precisely designed to correspond to the preferences of these people. Similarly, the findings revealed some expected relations between some Hexad User Types and their corresponding game mechanics. For example, between Achiever User Type and progression and loot game mechanics, or between Disruptor User Type and creativity tools as a game mechanic. These findings, however, do not indicate that Hexad User Types should be used as the sole basis of game design. As shown in the previous chapter, a user could score high in more than one User Type; in addition, a user may also have no dominant User Type. Thus, the Hexad User Types may not be very useful to a designer when attempting to predict user preferences. The User Type Hexad appears to be a useful tool to conceptualize possible design ideas for games, yet not reliable enough to predict, with any degree of certainty, if a specific user will be interested in a game based on knowing their type scores alone – especially if only the top score is considered

Many visualizations were presented in Chapter 4 which assisted me in understanding what was going on between User Type and LifeLeaps answers to learning preference questions. The visualizations begin to reveal some useful design ideas for a potential gamified learning application based on the intersection between learning preference and User Type, but I contend that these findings speak to a weakness in the User Type Hexad tool itself. It is not a clean way to begin predicting specific learning preferences based on User Type, since there is simply too much variability and too much noise in the data. It is very challenging to isolate a specific learning preference and say for certain that User Type accounts for more than 15-19% of the variability in the score, even for the strongest pairs. The most useful design application of the LifeLeaps was a simple comparison of averages and standard

deviations without taking into account User Type. Looking at the most popular learning preferences and comparing them against demographic variables was a clear and simple indication of potential learning targets. The injection of User Types did not make things easier to understand – in fact, it made this entire analysis more complex. So, is the User Type Hexad a useful design tool for a novice designer? My opinion is that it simply helps one conceptualize the vast spectrum of gamification design possibilities. When asking if the LifeLeaps data are a useful design tool for deciding the learning targets for gamified instruction, my answer is certainly yes.

Thus, the picture is more complex than simply rejecting the Hexad questionnaire. Acknowledging the shortcomings of this study can help readers decide on a valid statement with regard to the usefulness of this framework for designing educational games. In the future, the utmost importance would be in obtaining larger samples. In that sense, power analysis would be useful to estimate the needed sample size to replicate previous effects (Tondello et al, 2016; Orji et al., 2018). Moreover, the Hexad questionnaire is a relatively new instrument (Tondello et al, 2016). Hence, additional validation studies that would refine the Hexad questionnaire are needed, since the study pointed out poor metric properties of the scale. Also, future research should assess game mechanics in a way to obtain a measure for each game mechanic by every respondent, preferably on an interval scale. The samples should be more heterogenous to tackle the restriction of range, that is to include more respondents who have lower scores on our scales. Lastly, the correlation between User Types and game mechanics may be explored determine the relationship between Hexad User Type and the user preferences for educational game design ideas based on storyboards.

5.1.2. Qualitative Conclusions

Qualitative data can be challenging to collect, analyze and interpret, but feedback is often heuristic. Qualitative data can spark the imagination into creating things in new ways (Lewin, 2013). Qualitative methodology allowed me to capture the meaning of the participants' perceptions about the gamification of Facing Dragons, with data collected from over seven hours of discussion with potential players of the game. These discussions shifted the course of this project.

Empirical research on gamification is mostly conducted in a single specific context such as health, education, or the workplace (Hallifax et al., 2019). This study,

however, covered more than one context, which encompassed quests in real life as experienced by young adults. The storyboards were not confined to a single setting (i.e. school, home, workplace), but community settings in general. The game is essentially a quest delivery system that gives users challenges to complete in the real world based on what areas of their life they feel least fulfilled in; there is currently only one quest (the introduction quest) designed within the game itself because the entire six-month development cycle was spent creating a world, characters, and software architecture to support this quest delivery system. Yet, during this development process, individual users (including friends and family, and the entire development team) have been giving unofficial qualitative feedback about the initial moments of gameplay and helping to shape the course of an iterative development cycle.

In study 2, all six User Types were represented in the focus groups. Categorizing the participants according to their Hexad scores might be promoting bias. There is in fact a strong likelihood of bias affecting the interpretation of qualitative feedback (Azungah, 2018; Johnson, Adkins, & Chauvin, 2020). Particularly, participants of the focus group were selected according to their User Type scores, which could be easily associated with certain player motivation factors based on the RAMP model of intrinsic motivation. When one sees that a player who is giving feedback is an Achiever, for example, it is second nature to immediately draw inferences about their feedback regarding points systems and scoring mechanics that put too much significance on their User Type. Such inferences can be considered a form of confirmation bias (Fairfield & Charman, 2019). This confirmation bias may have showed up for Disruptor more than any other group. I noticed that I was excited to see the feedback from Disruptors and may have treated their responses with more weight than the other groups. I realized during the qualitative coding that Disruptor feedback felt more important to me, perhaps because it was feeling like really “good” feedback, but also perhaps because I knew how rare disruptor types were in previous research. True Disruptors (those with the highest score being Disruptor) are very rare in research (less than 1% of the population). The one true Disruptor that was uncovered during the storyboard feedback provided feedback that was unusable for this thesis. The response was full of racist conspiracy theories and generally seemed like the angry manifesto of an unstable mind; additionally, they stopped answering questions halfway through the storyboard feedback after they determined that the game was for “social justice warriors.”

Nonetheless, I was introduced to qualitative studies throughout my doctoral degree and had some practice before this thesis. From the purposive selection of the participants to the application of thematic analysis, I did my utmost to ensure the rigor of this study, yet I do question whether I did everything correctly or not. In using purposive sampling, I grouped the participants based on a set of criteria that increased the collection of rich and relevant information (Lewin, 2013). In using the User Types, I categorized the participants together by highest scores in order to yield heterogeneous results (Hallifax et al., 2019). Heterogeneity contributes to the rigor of qualitative research (Lewin, 2013). Therefore, by grouping together participants who had the highest in each User Type score for the focus groups I was attempting to increase the chance to observe the target behaviors and skew discussion towards User Type trends within the group. If we were to have used a mixed group, it would have been quite difficult to interpret group discussions to parse for trends related to User Type scores. I feel as if having some people that scored very high in multiple User Types makes this classification potentially problematic and ignores the whole picture. People are not easily summarized by a single motivational pattern.

I propose that taking the entire User Type score spread (all six subscales) would be a better way to conduct interviews (rather than focus groups) with individual participants in the future, rather than grouping together participants by the higher scores. Perhaps interviews with individual participants, followed by an analysis of all the participants User Type scores (motivational fingerprint) would have given better design feedback data.

From the qualitative categorical differences, the findings of Study 2 revealed some expected results from the pre-determined themes based on the Marczewski's (2017) Periodic Table of Gamification Elements framework (Figure 3). However, some unexpected results also emerged from the data. The discussion and interpretation of the findings per User Type are presented in the following sub-sections.

Socializer

As pre-determined from the Periodic Table of Gamification Elements framework (Marczewski, 2017) and the mechanics that might appeal to specific User Types (Tondello et al., 2018), Socializers were generally attracted to relatedness. Socializers in the focus group expressed wanting to interact with other users. However, the Socializers

also appeared to be cautious in the way users might interact with each other. The focus group data revealed themes indicating Safety Concerns, Positive Interaction and Authenticity of Gaming Experience.

As Facing Dragons involves learning ‘real’ world life skills, Safety Concerns particular to the privacy of the users tend to be emphasized as a potential issue. Safety and Privacy concerns emerged as a theme for Socializers, as well as Free Spirits and Philanthropists, and have been cited by several participants across all six User Type Hexad. Similar to privacy concerns in social media, users tend to raise privacy concerns when the game prompts for permission to access personal data, or when users are notified to share their gaming progress (Zhao et al., 2020).

Positive Interaction as a theme confirmed that Socializers are generally motivated by relatedness, as indicated in the SDT (Deci & Ryan, 2000). The Socializers in this study were interested in improving elements of the game related to building friendships, avoiding negativity, and uplifting positivity with others. This finding indicates that Socializers may place value on collaborative and cooperative gaming interaction rather than competition (Fischer, Heinz, & Breitenstein, 2018).

On the other hand, the theme Authenticity of Gaming Experience revealed that Socializers also tend to thrive on social status and competition (Marczewski, 2015). The Socializers in this study tended to reiterate player accountability and were serious about preventing cheating. The findings may be comparable to that of Orji et al.’s (2018) social comparison, in which Socializers thrive on matching their own in-game performance to that of their peers.

Free Spirit

Free Spirits were expected to be motivated by autonomy and self-expression, and thrive in being able to create and customize (Marczewski, 2015). In this study, Free Spirits were generally interested in safety and in a compelling storyline. Several Free Spirits in this study commented that the gameplay could be significantly improved. The participants generally cited that the question and answer format was not compelling enough, and that a branching storyline would be more appealing, as it can promote a choose-your-own-adventure interface. Atmaja and Mandyartha (2020) concluded that a multiple-path mechanic can satisfy a user’s need for autonomy. Based on Atmaja and Mandyartha’s (2020) work, Free Spirits may be more motivated to engage in gamified

learning when they feel a sense of control over game elements (e.g. difficulty selection path, limited hint system).

Achiever

Achievers tend to be motivated by feelings of mastery and enjoy challenging themselves even without extrinsic rewards (Marczewski, 2015). Achievers in the focus group tended to emphasize receiving gold as rewards, but only if users deserved to be rewarded. Several Achievers expressed their worry that the reward system might indicate users are “forced or extrinsically motivated by gold.” This finding aligned with the Hexad classification in which Achievers tend to be motivated by mastery (Hallifax et al., 2019). Achievers were also generally interested in a challenging gameplay. The Achievers expressed that they liked the idea of the leaderboard mechanism, but unlike Players, the Achiever group generally liked seeing their own high scores and “beating” their own limits. This finding was also aligned with the Hexad classification (Hallifax et al., 2019).

Disruptor

Disruptors are motivated by systemic change (Marczewski, 2015). The Disruptor group in this study generally centered their discussions on suggestions about improving the game. Nonetheless, the suggestions cannot be directly attributed to their motivation toward innovation, as none of the participants were dominantly Disruptors. Having no true Disruptors is prevalent in empirical studies (Fischer et al., 2018; Zhao & Guo, 2019). However, the Disruptor group all scored high in Disruptor as their User Type. The participants shared several suggestions indicating improvement of the storyline, customization, and interaction, which could be mistaken as motivating factors for Free Spirits; however, the difference between the two groups was that Disruptors tend to provide suggestions beyond the scope of the current game, and that they tend to initiate change. Free Spirits generally tend to add to the game, while Disruptors tend to want to change the game (Zilinskaite & Spanellis, 2020), for instance, questioning the user of needle in the storyboard.

Player

Players tend to be motivated by extrinsic rewards and winning (Marczewski, 2015). The participants of this study appeared to be motivated by social competition, which is also aligned with the Player User Type Hexad profile (Spyridonis & Daylamani-Zad, 2019). While earning gold may be seen as extrinsic motivation, Deci and Ryan

(2000) suggested that external rewards may also be internalized when such rewards can intrinsically motivate users when seen as acknowledgement. Furthermore, the Players in this study tend to be motivated by their interest in the leaderboard mechanism, in which social competition was incorporated. The participants generally enjoyed challenging their friends. Social competition and point systems were considered highly effective in gamification, as such mechanisms tend to help impart knowledge among Players (Iria et al., 2020).

An unexpected finding, however, was that the Player group in this study emphasized making the game more accessible to all sorts of players, reiterating accessibility for persons with disabilities. Usually, such altruistic motivations emerge in Philanthropists. Chan et al. (2018) suggested that more research on the types of rewards are needed, as motivation in gamification tend to be influenced by individual and contextual factors.

Philanthropist

Philanthropists thrive on seeing their positive impacts (Marczewski, 2015). Philanthropists tend to have similarities with Socializers (Bovermann & Bastiaens, 2020; Orji et al., 2018). However, similar to findings by Bovermann and Bastiaens and Orji et al., the Philanthropists in this study also appeared to thrive in interaction with the purpose of extending help. Specifically, the participants of this study were interested in sharing knowledge such that they generally suggested having “facts” pop up in-game. Moreover, the Philanthropist group discussed the possibility of using the game to be able to donate or at least volunteer with a partner organization.

Summary of Qualitative Conclusions

After the focus groups, all the storyboards became jumping-off points for the design of the prototype of Facing Dragons. The qualitative feedback heavily influenced the direction of the prototype. More narrative and character development were a priority, so the challenge was to design a world that narrative would flow naturally from. This is not an easy task and went through countless iterative cycles until it is in the state you can see now within the prototype application, though the app is in a pre-alpha state and needs to be further developed. Qualitative feedback has been useful during the prototyping phase. User experience testing has shaped the look and feel of the game substantially.

Overall, the value of qualitative feedback during gamification development should not be understated. It is a powerful, though complex tool to bring to bear upon an iterative design process. The focus group structure employed in the present thesis may have been a bit too elaborate for game development alone, and perhaps produced more data than was necessary without more effect than simple individual user experience testing would have. This is mostly the fault of the research design itself. This project intended to generate substantial data about the relationship between player preferences (learning preferences, motivational preferences, and storyboard preferences) in the design of a real game – yet ended up creating very noisy data that proved less useful than optimistic imaginings would have predicted.

Despite common themes, the participants' feedback pointed in conflicting directions. These conflicts may be rooted from individual differences (Hallifax et al., 2019) but what was not clear was that individual preference differences within User Types are not delineated, and User Types themselves are not discrete categories. User Types tend to be overlapping and complex interrelated systems of preferences that are shaped even further by aesthetic preferences, gender identity, life experience, and other variables. It would be highly useful in the future to focus feedback on individual moments of gameplay and assess them qualitatively for specific design and user-experience improvements, rather than presenting so many storyboards involving complex interactions between design choices, mechanics and learning targets.

5.1.3. Conclusions of the Mixed Methods Study

The findings of this mixed methods case study must be taken in perspective with the fact that this was a trial by a single designer to use a design framework and tool, the User Type Hexad and LifeLeaps, to generate design ideas for a gamified learning application. Since there was only one designer using the tools, we must take that into considerations when drawing conclusions about the usefulness of the tools that were studied. My experience with the Hexad revealed that User Type scores alone do not predict or sufficiently explain the storyboard preferences and design feedback of a gamified life skills education application for young adults. While predicting preferences was not the main goal of the Hexad tool, it should be noted that creating a game with a certain User Type profile in mind and matching gamification mechanics to that profile would likely lead to problems. It may be better to use the Hexad as an idea generation

tool rather than a predictive tool. While the quantitative findings showed some positive correlation between Hexad User Types and learning preferences, further investigation through qualitative inquiry showed that several factors including safety and privacy, intrinsic versus extrinsic reward options, accessibility, authenticity of gaming experience, and positive interaction also tended to impact the types of mechanics that certain User Types were interested in.

First, quantitative findings were most useful to this novice designer when it came to a visualization of multiple regression analysis comparing the self-reported life skill learning targets posed by LifeLeaps, and the sub questions of the User Type Hexad to generate gamification ideas. Furthermore, those quantitatively generated gameplay preference and life skill preference overlaps can be references against the periodic table of gamification elements that the storyboards in this thesis were testing. The LifeLeaps was revealed to be a main contribution of this thesis as it was both quick to administer, provided data that led directly to game design ideas, and asked potential students and users of a game what they were most interested in learning about.

Quantitative storyboard feedback questions revealed that users with higher scores on Achiever, Free Spirit, and Philanthropist types preferred the all the storyboards discussed in the focus groups; however the Achiever, Player and Disruptor groups tended to dislike the storyboards. Qualitative design feedback shed some light on to why certain User Type patterns preferred more storyboards than others; users, regardless of their User Type, might have safety and privacy concerns when confronted with real-world quests. Additionally, the effectiveness of tailored gamification can be influenced by task attributes and context of use, as suggested by Klock et al. (2020). For instance, the quantitative portion of the study showed that users with high scores in Philanthropist tend to like the Facing Dragons storyboards but qualitative findings further showed that in the Philanthropist focus group, the participants were generally interested in tasks that included sharing knowledge as a way to extend help while interacting with other users. The Philanthropist focus group participants were also immersed in the context of social media-like interfaces in terms of sharing contents (e.g. progress, achievements) of the game, which may have led to their safety and privacy concerns. Therefore, the picture is more complex than a simple attribution of User Type score to to storyboard preference. We can use the User Type scores to think about the range of possible gamification elements that many be used to create quests in the real world, as

the storyboards depict, but we should not do that at the exclusion of other forms of iterative feedback from users. It seems that User Type was a good design start-point, rather than a good design endpoint for me specifically. In other words, the User Type Hexad was good at making me think about new design strategies to appeal to people other than myself, but I could not quantitatively prove that it was correct with what it contents different types of users will enjoy about games.

Throughout this thesis it became clear that both quantitative and qualitative data showed that users tended to be impacted by their dominant and less dominant User Types. The findings were in line with the recommendations of Orji et al. (2018) in that examining the effectiveness of instructional gamification needed to include a user's entire profile rather than only the dominant User Type. However, a recent analysis by Klock et al. (2020) raised the question of how to investigate a user's entire profile. The researchers inquired whether to set a cut-off score for the less dominant type to be included in the study or to simply include all scores regardless of dominance. Conceiving the User Type as a six-item score might ultimately be a better way to use the Hexad to generate customized gamified education that would have the best chance motivate and engage a specific individual, though it might be very difficult to use without some sort of artificial intelligence selecting possible game paths based on user score. This is an interesting direction for future research.

This study used the User Type Hexad, a tool based on SDT, to evaluate the possibility of designing games that motivate people to learn. SDT posits that individuals may either be intrinsically or extrinsically motivated with the aim to achieve autonomy, competence, and relatedness (Deci & Ryan, 1985). The User Type Hexad scores with supporting gamification User Type suggestions (Figure 3) indicated that certain User Types tend to have certain motivations, such as Socializers tending to be motivated by relatedness and Free Spirits tending to be motivated by autonomy and self-expression (Marczewski, 2017). A recent review by Tyack and Mekler (2020) revealed that SDT can be considered a macro theory which consists of "mini theories" which may be categorized into need satisfaction and motivation. The theories revealed similar findings with Klock et al.'s (2020) review, such that user's preferences were impacted by the value of the task at hand and the context of use. However, the conflicting findings of this study showed that was not easy to replicate with storyboards. It may be a design problem with the storyboards attempting to show too many gamification elements

simultaneously to capture a real gameplay moment. In future research I would like to use more simplified storyboards that are an abstraction of a single gamification element. .

5.2. Implications

How Could the Hexad and LifeLeaps Help a Novice Designer?

This mixed methods study revealed conflicting findings regarding the usefulness of the Hexad User Type framework in assisting one novice designer in creating gamified life skill learning challenges. However, the quantitative and qualitative conclusions point to the direction of highly tailored gamification to address the motivational needs of individuals, as well as to avoid the one-size-fits-all design. Highly tailored gamification is aligned with SDT in that individuals tend to value design features supportive of autonomy such as choosing, rather than being assigned, goals and activities from a set of options (Nurmi et al., 2020). While a gamified instructional design which offers complete freedom of choice has not yet been developed (and may be impossible), the results of this study offer some implications to help a novice designer create a tailored gamified educational system based on users' Hexad scores.

First, a novice designer can apply inclusive thinking when developing a gamified system in order to meet the needs of different groups of people. Contrary to providing more options for users to choose from to enhance a tailored design, Cheng et al. (2021) recommended focusing on the basic design principles aligned with the three psychological needs postulated by the SDT. In their study of developing a gamified educational technology for a sample of 105 culturally diverse individuals, the researchers found that autonomy can be addressed through the principles control, competence through usability, and relatedness through affirmation.

In that study, control entailed allowing users to customize their experience (e.g. selecting avatar features, background colors) and game data. Accessibility features such as text-to-speech, language selection, and adjustable font size were also associated with autonomy (Cheng et al., 2021). Applying the game principle of control also helps the designer avoid a one-size-fits-all approach (Orji et al., 2017). In this study, the participants were not specific with their interest in control features, but the theme of *accessibility for all players* emerged from focus group data generated with the Player group. The participants were generally concerned about the inclusion of physically

disabled players or players with busy schedules in completing certain goals that require mobility. Free Spirits and Disruptors also appeared to reiterate the game design principle of control. Feedback from Free Spirits indicated that this group of participants were generally interested in mechanics that promote their freedom to explore. The Disruptor group generally sought for more options to customize the game.

Next, usability referred to the ease of using the gamified instruction (Cheng et al., 2021). The researchers suggested that the gamified system can only be successful if users integrate its use into their daily lives. Thus, usability entailed user-friendliness in navigating and understanding the game, eliminating game mechanic lexicon that may be unfamiliar with non-gamers. Usability also included meaningful guidance in that users should be able to follow a set of steps not just to achieve the goal they chose, but also to help users understand why each step is significant in achieving the desired outcome. Findings of this study revealed that users, particularly ones in the Free Spirit and Philanthropist groups, were concerned about their safety when attempting to achieve their in-game goals that require them to share private information or to perform tasks outside their homes.

Lastly, the design principle of affirmation can address relatedness needs when users feel represented and valued (Cheng et al., 2021). In this study, several User Type groups expressed feedback on increased socialization in the gameplay whether through chat features, sharing to social media accounts, or interaction from challenging friends. Several participants in all the User Type groups expressed various ways to make users feel represented. The most common way was to introduce additional options based on each User Type's motivational fingerprints (e.g. Achievers typically wanted more options to challenge friends and post about leaderboard scores). Addressing such feedback can incorporate affirmation in a game design such that users would have the option to display their strengths (Cheng et al., 2021).

LifeLeaps could help the novice designer by providing a brief snapshot of potentially popular gamification or educational design learning targets.

How Could the Hexad and LifeLeaps Get in the Way?

Focusing on “type” is extremely problematic because there is no such thing as a real “User Type,” only clusters of preference traits which sometimes explain preference

and other times do not. I would argue that hexad scores are better thought of as a constellation, or fingerprint, of player need satisfaction. Traditionally, User Type is defined as the highest score on 4 subscale items. However, there are tied scores, 2nd highest scores, which may be more important, and of course, lowest scores which could be more important still.

Knowing that someone has a very low disruptor score would mean they scored the following 4 questions very low: I dislike following rules, I like to provoke, I like to question the status quo, I see myself as a rebel. It stands to reason that a person who scores 1 of 7 on all those questions, but very similarly on all the other 20 sub-questions of the Hexad to another participant who scored in 4/7 on those questions would be very different kinds of people. The players' types of those two hypothetical participants may be the same (philanthropist/free spirit for example) but one would have a 4/28 disruptor score while the other would have 16/28. Their aversion to certain game situations involving breaking the status quo, going against the rules, or speaking out when they felt uncomfortable, might vary drastically. It stands to reason that those two hypothetical players could enjoy entirely different sorts of gamification experience – one may be comfortable with a social challenge that seemed embarrassing or mean-spirited to the other. One might crave a bit of unrest in a social situation, while the other may be completely turned off by it.

Although it is easy to administer the Hexad, it does not appear, from my experience, that the results help predict what kinds of games people are going to like, because there are so many more reasons for game preferences than we can measure with a motivation test. Past gaming experience, aesthetic preferences, current mood, age, and gender identity are all likely to be huge contributors to gameplay preferences. Knowing User Type may help a designer determine what sorts of game mechanics would have the potential to be motivating, but they will not help predict if the actual designed outcome will be well, or poorly received. There is simply too much that goes on with design that can obfuscate the underlying motivational needs satisfaction and lead to zero engagement. In a similar study, Atmaja and Mandyartha (2020) also employed several mechanics into their game but did not classify the users according to any typology except according to experimental and control group. The experimental group received the gamified test, while the control group received a regular test. The differences in self-reported sense of autonomy were significant between the two groups.

The Hexad is therefore not predictive, yet it remains a good way to discuss different reasons why games may be more satisfying to some people than others when we look at it through the frame of SDT.

Psychological traits vary over time, as seen in well-established the Big 5 (Goldberg, 1993) and MBTI (Myers, 1962), as well as in the Hexad. The test-retest reliability of the Hexad was relatively strong in the Orji et al. (2018) validation of the instrument on one retest measurement after two weeks, and to be fair I did not do any test-retest reliability measures in this thesis since that was not a research focus of mine. Limitations of this study notwithstanding, I took the test several times over the last year, and have often gotten different results depending on the mood I was in. I tried my best to forget what my previous responses had been and to answer with gut instinct when taking the test again a few months after the first. I found that my scores for each sub-component varied as much as 14% (2 points) between tests. This would be enough, in some cases, to change what my “primary User Type” would be listed as, and could skew the design-thinking of someone only looking at the top score to determine what gamification mechanic to assign me to improve my engagement. While I am aware this is merely anecdotal evidence (n=1), it is suggestive as to why using psychometric data to inform the design customization of instructional resources may be ill-advised if it happens at the exclusion of some mechanic to a certain user.

Main Contributions of This Thesis

Throughout this thesis I have explored how the User Type Hexad and LifeLeaps instruments have helped one novice designer to create a gamified life skill quest application. The main contribution to my field is the creation of the LifeLeaps instrument to quickly and easily measure learning preferences that are not traditionally captured by traditional schooling but are highly important skills that young adults are more interested in learning more about. The crossover between LifeLeaps and the User Type Hexad revealed many potential popular gamified life skill learning targets that can be explored in future research. For example, a game designed to teach leadership skills and making a good first impression could be designed to appeal to female Socializers and Philanthropists. Such a game would likely be very motivating and engaging to those students.

Another contribution of this thesis is the understanding that motivational customization cannot rely simply on the highest scores of a User Type Hexad survey. This is because all six scores are important to determine the motivational patterns of a user. Therefore it is not useful to predict what mechanics will be motivating to a player in an educational context and instead a game designer should look towards giving the user multiple pathways of play and tracking those choices over time to create an evolving motivational profile in order to offer better suggestions during subsequent gameplay.

LifeLeaps could get in the way by making the gamification designer focus too much on the popular learning targets as reported by the learners and potentially ignoring difficult and unpopular learning targets that are very beneficial to learn yet not desirable to self-report. For example, the relationship questions were the most unpopular learning targets, but if you look at the questions you can see that many of them would be beneficial for a lot of people to know more about. For example; learning more about how to communicate with one's partner and avoid conflict might be very useful, but many people do not want to think about learning more about that topic in the sample of 19-29 aged students that I studied in this research. This is perhaps a limit of self-reported learning preferences in general since people seem to want to learn things that are highly satisfying and least difficult or controversial. To overcome this shortcoming it is recommended to create a healthy mix of popular learning targets, as well as challenging ones.

5.3. Directions for Future Research

Research has shown that it is theoretically possible to customize individual gamification elements to match player preferences, to some degree (Cheng et al., 2021; Hallifax et al., 2019; Orji et al., 2018); however, the present thesis uncovered that it might be best to present players with the type of mechanic they wish to see rather than try to predict what they might like. The Hexad types can be used to generate a list of a few possible choices for that individuals can pick from, rather than presenting them with endless options. One can imagine an intelligent system that first asks a player what life skills they want to learn about using the LifeLeaps instrument that was created and validated within this thesis, then present them with a series of quests of increasing complexity that lead to that learning targets, with each task being differentiated into several different game mechanics. Using each players' User Type scores, and their

previous post-quest measurements of enjoyment for the type of quest they just had completed, the system could learn preferences to narrow down the options to two quests using different mechanics (for example, one social activity, one competitive challenge, and one solo task). Players have gameplay preferences, but even the strongest correlations only accounted for approximately 18% of the variance between preferences on storyboards. By presenting players with several choices, and then simply asking them after the quest how much they felt engaged, or motivated to complete that quest, the game could provide ongoing data on the customization of gamification elements to match User Type scores.

Since the amount of design work involved with creating gamified quests for each possible mechanic combination and each life skill learning preference would be insurmountable, rapid prototyping (pen and paper) would be ideal for this type of testing in the future. Another interesting direction for future design-research on customizing gamification to improve life skill learning could be the development of a modular quest-design-toolkit within a gamified structure, so that users could drag and drop challenges into different quest stages and submit their custom quests for other players to attempt. In such a crowdsourced design it would be possible to test, on an ongoing basis, a massive number of design iterations. The meta-game (emergent gameplay) could become a challenge between players to create real-world quests that had high post-test engagement scores – it would be a game about making quests for other players, that they feel motivated to complete. Players should be able to issue life skill learning-focused real-world challenges to their social networks and assign rewards to those quests based on the relative challenge level of the modular mechanics they selected for those quests.

The idea of creating crowdsourced quest designs with modular game mechanics that could be tested against theory and implemented on a massive scale is a direction that future gamification customization research should explore. This could be extremely useful for teachers who wish to use real-world quests and gamification structures within distance learning courses since they could have their students create quests for each other based on the curriculum.

In the future I plan to address some of the shortcomings of this study by implementing an iterative user experience testing model instead of a storyboard feedback focus group design. Instead of trying to get groups of participants to discuss

twelve complex storyboards in three minutes each, it would be more useful to test a working quest prototype with each specific user, gather their demographic data and ask qualitative feedback questions about the experience of playing the quest, and then compare that to their evolving User Type score over the course of many iterations of those quests. This would result in a playable prototype that was tested against many different User Types and improved by their suggestions. It would also offer me a way to track what sorts of design changes were beneficial to other User Type groups and which were likely due to some other variable such as demographics (gender, age, race) or gameplay experience, aesthetics, and life history.

Future research is needed on the educational benefits of motivationally customized gamification. A follow up study whereby hundreds of game design students attempted to use the User Type Hexad and LifeLeaps to create game prototypes and documented their design journey would be very interesting indeed. If given the opportunity I would like to explore this line of research. Giving the next generation of game designers some experience creating educational content would almost certainly lead to a treasure trove of great new ideas while simultaneously investigating the usability the User Type Hexad.

5.4. Final Thoughts

This thesis explored whether the User Type Hexad (Marczewski, 2015) was a usable tool for a novice designer developing a gamified life skills quest application. This purpose was explored using a sequential mixed methods case study design. Mixed methods findings revealed that an individual's full User Type score has some impact on what people notice about game storyboards and quantitatively predicts some liked or disliked game elements in a storyboard. However, the qualitative portion of the study showed that users might not be confined to be motivated by mechanisms specific to their User Type. Novice designers can integrate tailored gamification when creating life skills education application for young adults; however, the designer need not focus on mechanisms based on User Types. Instead, novice designers are recommended to follow game design principles that address the psychological needs of autonomy, competence, and relatedness. Overall the Hexad was most useful to this designer by showing the wealth of possible motivating and persuasive gamification elements that

may be brought to bear upon a task, rather than trying to predict what might be optimally motivating to each user.

The LifeLeaps survey, which was created for this thesis, emerged as the key contribution to the field of educational design in this thesis. It is a very quick, easy, and useful educational design instrument when assessing non traditional and non academic learning targets of a group you intend to create a lesson plan or game design for. It asks participants what life skills they are most interested in learning more about and thereby creates a handy snapshot of popular learning targets quickly and efficiently. This is an improvement over other life skills learning inventories I found during my research process in both the speed of administration and ease of use. I hope to see other researchers use and improve upon LifeLeaps over time.

Overall, the User Type Hexad was a very useful tool to understand the elements of gamification in general, but not very useful for assisting with the design of a gamified learning application, due largely to the fact that a learner's motivational itches are more difficult to scratch than simply predicting game elements based on single User Type label, and automatically knowing what type of game mechanic they will be most interested in. After this study, I will start referring to the gamers' User Type by their entire score on all 6 subscale items rather than simply labeling them by their highest score – this is an approach I call *Motivational Fingerprint* rather than User Type score when explaining the concept to potential investors during the development of Facing Dragons.

I am excited to continue studying the area of educational gamification and anticipate that the future of technologically mediated learning will be shaped by the lessons of game design to motivate and deeply engage learners.

In future work I hope to create and iterative prototype to test with users rather than testing on storyboards to get a better sense of motivation and engagement. I also plan to have more/other designers create these quest prototypes in order to add to the robustness of the findings and improve the output of this design-research process.

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Appendix A. Facing Dragons Materials

A.1 Facing Dragons: Lessons Learned and the Story of My Little (Failed) Tech Startup

The app was an overly complex concept from the start. It was intended to be a quest and challenge game that motivated young adults to frame their biggest challenges in life as games that they could play. The app was supposed to gamify your life in such a way that you were able to face the problems head-on and make some progress. Unfortunately, the only way to get money for the project development was through IRAP grant funding (Industrial Research Assistance Program) and they are chiefly interested in assisting with assisting tech companies to cover their payroll costs during product research and development. During the meeting with our IRAP representative, it became clear that his interests lay in the field of medical data visualization and public health initiatives. Thus, the Facing Dragons Support Hub was born in an improvisational agreement with one of his assumptions about how the proposed Facing Dragons quest game would work and look like.

I had created a visual mock-up of the central data tracking system I wanted to use as the character sheet within the game. It would split real-world challenges that players could face into 8 distinct areas. This is based on a life-coaching tool called “the wheel of life” that is used widely as a pre-assessment instrument. This wheel combined with some digital character art and virtual badges formed my vision of what character progression might look like within the gamified life skill learning app. The IRAP representative seemed interested and I was quite excited to keep his interest building. He mentioned that the data from the gameplay could act as a public health instrument. I immediately agreed, riffing on the idea with him in saying, “Yes, you could show the aggregate gameplay data from all the clients that a particular mental health professional has”. He was very intrigued by the idea. For the first time in the whole meeting, he seemed like he was interested in the idea! I kept improvising towards the mental health visualization side of things; “we could even have a subscription model for hospitals and institutions that want to use Facing Dragons as a mental health visualization tool by having the app gamify regular mental health check-ins and assessment, then chart the quests that players are attempting over time”

At the end of the meeting, we shook hands on this new game concept; I began the process of applying for a \$120,000 grant to cover the development of a prototype of a game I had never even considered making before. A mixed-reality mental health improving quest game with a big-data backend that fed player data to support workers through a graphical user interface designed to anticipate the need for intervention and stay connected to their at-risk youth clients who weren't being reached through traditional therapy models. Wow...ok. Well, anything seemed possible, so I might as well apply for this grant and hire great people to make it happen!

This was not a great idea. It was a big leap to assume we could start developing the thing that IRAP wanted to see – a mental health game for professional caregivers and support workers to be able to visualize the progress of their clients and patients. The research I had done to date (and that this thesis reports) was focused on motivating users to participate in real-world challenges and had nothing to do with mental health benefits or even the measurement of possible benefits. It was solely focused on testing if player-type was a decent tool to help the design of storyboards about gamifying real-world quests. It would be unethical and potentially dangerous to start creating a mental health intervention without first getting foundational research in place and prototyping, with ethical approval, some initial version of the proposed application.

After writing up the grant application, without any promises about mental health, or creating any sort of intervention – but while explicitly framing the need for such an app about the current state of the mental health crisis – we were eventually approved to develop a prototype of a game over 6 months. This game would only need to be about having players face their challenges in life, but it would need to have a Support Hub that showed coaches, counsellors, and clinicians some useful data about the gameplay activities and possible emotional/mental health status of the players.

The \$120k grant came in the form of an 80% payroll reimbursement to Canadians hired to work on the prototype from Dec 2019 to June 2020 to be refunded the month after payroll and reporting. That means the company would need to cover 100% of the salary of enough workers to cost \$150k in 6 months.

This necessitated several high-interest tech start-up loans that the company would need to secure to pay for the salary of employees until the payroll was submitted to the government and mostly reimbursed. That would mean we needed to borrow \$78,000 to run the project for 6 months, even though we had such a large grant. The

reality was that we would need to secure an investor with the prototype that resulted from this IRAP grant or else we would be stuck with a loan we could not pay back. If I had to do it all over again I would keep the company very lean, possibly three employees at a maximum, and have those employees work for equity rather than cash until a prototype was tested on pen and paper until it was as good as it could get. This would be a much better position to jump into for the IRAP grant since I would hire an industry expert to oversee development, and I could focus on growing the company, attending game design conferences, and pitching the game to investors (which turned out to be a full-time job all by itself).

Speaking of conferences, that is another area I wish would have played out differently. My entire development plan hinged on two massive conferences that were scheduled for March 17th, 2019 (Games Developers Conference: GDC), and August 15th, 2019 (Games for Change; G4C). As you are aware, the COVID19 pandemic changed the world as we know it in early March. GDC 2020 in San Francisco was canceled at the last minute after we had spent \$6000 on a booth, \$2000 in promotional materials, \$4000 on hotels, \$3000 on flights, arranged for three of the team to attend and spent weeks developing a live-quest (with prizes) that tied into the gameplay of the prototype. We got a bunch of celebrities on board to be “Heroes” in the game (you can read all about the Hall of Heroes and our celebrity partnerships in the archived Kickstarter project linked in A.2) and started spending \$2000 per month on social media marketing during February and March leading up to GDC. We also spent two months developing the pitch deck and a business model to be ready for the show.

There is a pitch competition at GDC where a panel of expert judges from the tech industry and venture capitalists pick three young tech start-ups to pitch in front of a live audience. This is a game-show type panel called “GDC Best in Pitch” where they showcase the most promising young game design studios and offer a stage for them to pitch (similar to a thesis presentation, but with a monetary ask at the end) to the world. I submitted *Facing Dragons* to be considered and was selected! We would be featured third on day one (a coveted position). I was both nervous and excited, this was our big chance to share the idea with the world. Facing Dragons: the first mixed reality game that helps young adults overcome life’s challenges! We would ask for \$500,000 for 30% equity with a development timeline of 12 months and a team of 10 people. We got all the legalities in order and established a corporate share structure in anticipation of the

funding round. Then the world's economy collapsed, the conference was cancelled, and we all had to start working from home with no investors in sight until the end of the IRAP grant period. We would stay optimistic and continue development while working from home during the pandemic, but we knew it was the beginning of the end. There would be no way to pay back the bank loans without an investor.

We also had a crowdsourcing campaign on the website Kickstarter (Appendix A.2) scheduled to run concurrently with GDC. The campaigns on Kickstarter feature a pitch video and a detailed description of the game concepts and are aimed directly at potential consumers rather than investors. We intended to promote the game at GDC and tell people to check us out on Kickstarter if they liked the concept. The goal of a Kickstarter is to raise enough money to help develop a product by selling discounted versions of the product long before development is complete. Kickstarter entrepreneurs create reward tiers that generally include early access to the alpha version of the game, and often bonuses like t-shirts and in-game rewards.

The Facing Dragons Kickstarter went live March 10th, three days before the travel advisory in Canada, and five days before the quarantine. We did not get the type of support we had anticipated. Over 130 people were following the project before it launched (which is quite good), yet few people ended up bidding and we never got enough traction to make it on the front page. The algorithm that determines who is featured is based on momentum; the number of bids you get in the first 48 hours is extremely important. With all the celebrity endorsements we had I hoped we would get the momentum the project needed to appease the algorithm, but alas our biggest celebrity Hero never even posted our Kickstarter to their six million Instagram followers. People were just too distracted to care about Facing Dragons. We were asking for \$15,000 and only managed to raise \$4500 before I cancelled it in the final few days before the campaign ended.

The following is the pitch deck which we showed investors and won a spot at the GDC best in pitch competition, which was ultimately canceled. After the pitch deck you can see links to the Kickstarter and download links for the game prototype we began developing.

Pitch Deck Slide #1



Pitch Deck Slide #2

ONLY 1-IN-5 PEOPLE
WHO NEED MENTAL HEALTH
SUPPORT GET THE
HELP THEY NEED



**YOUNG ADULTS
ARE LACKING THE
MENTAL HEALTH
AND CAREER
SUPPORT
THEY NEED**

MAJOR DEPRESSION

↑ 63%

SUICIDE

↑ 54% since 2000



1-IN-5

who need care, receive it



**FACING DRAGONS IS A
QUEST & SUPPORT HUB
TO IMPROVE
YOUR MENTAL HEALTH,
YOUR OUTLOOK ON LIFE
AND HELP YOU UNLOCK
YOUR PURPOSE**

Pitch Deck Slide #5



FACE YOUR DRAGONS
COMPLETE A SELF-ASSESSMENT TO
DISCOVER YOUR STRENGTHS AND CHALLENGES
IN THE 8 KEY AREAS OF YOUR LIFE

Pitch Deck Slide #6



BE YOUR OWN HERO
SET OUT ON YOUR HERO'S JOURNEY
TO DISCOVER WHO YOU REALLY ARE

Pitch Deck Slide #6

VISIT THE HALL OF HEROES
MEET AND GET QUESTS FROM
REAL WORLD HEROES
WHO HAVE FACED AND
CONQUERED THEIR DRAGONS

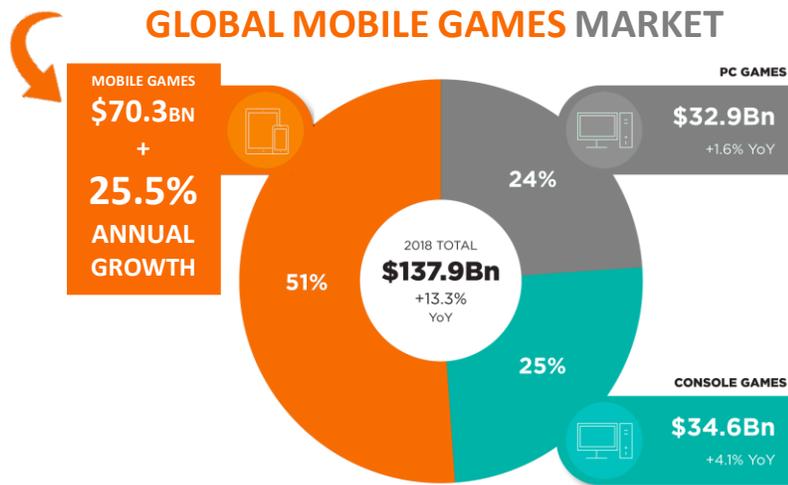


Pitch Deck Slide #7

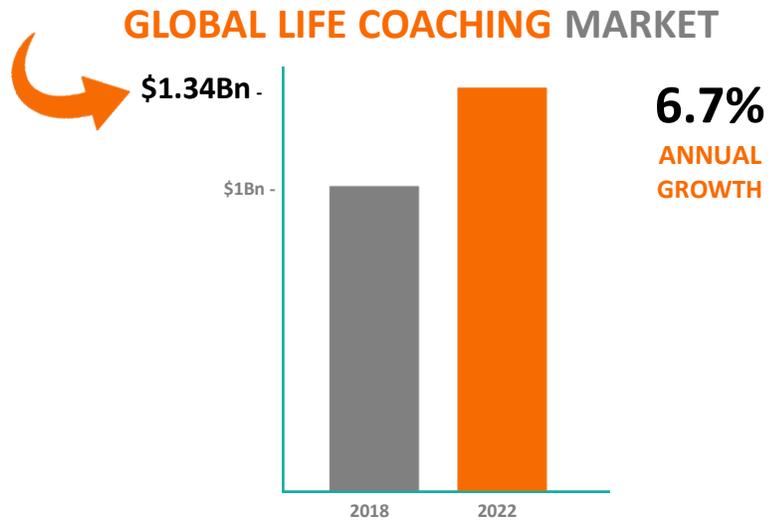


**UNLOCK THE SUPPORT HUB FOR
EXTRA HELP ACHIEVING YOUR GOALS**
ALSO A USEFUL TOOL FOR COACHES AND
COUNSELORS TO CONNECT WITH CLIENTS

Pitch Deck Slide #8



Pitch Deck Slide #9



Pitch Deck Slide #10

SELF CARE APPS WE ARE MODELING



Pitch Deck Slide #11

REVENUE	2020	2021	2022	2023	2024
Kickstarter	--	\$50k	--	--	--
Federal Gov. Grant	\$120k	\$240k			
Single-user Memberships (\$50/year)	--	3600 subs. \$15k/mth \$180k/yr	9600 subs. \$40k/mth \$480k/yr	30,000 subs. \$125k/mth \$1.5MM/yr	100,000 subs. \$415k/mth \$5MM/yr
Support Hub Licenses	--	\$12.5k	\$20k	\$35k	\$50k
Virtual Counseling	--	\$25k	\$45k	\$90k	\$150k
TOTAL	\$120,000	\$507,500	\$545,000	\$1,625,000	\$5,200,00

Pitch Deck Slide #12



Pitch Deck Slide #13

WE BELIEVE GAMES
WILL EMPOWER THE
NEXT GENERATION
OF LEADERS



A.2 Kickstarter Campaign

Kickstarter archived project link

<https://www.kickstarter.com/projects/facingdragons/facing-dragons-a-mixed-reality-game-to-unlock-your-purpose?fbclid=IwAR2zPkUeTvkl-nXwYYJOKQEsPJfoXtp7XcgJOVZIEMu4ANKV9zQ1eNdfLkc>

A.3 Prototype Game

Android Game download link

<https://1drv.ms/u/s!Ai2OEGY-IXhkrkwMLdc3SaKavxZQ?e=g5tOsH>

Windows download link

https://1drv.ms/u/s!Ai2OEGY-IXhkrk2HE82sk_wvaloB?e=BTvGG4

Appendix B. LifeLeaps Questions

Each section only has one question: “I am interested in learning how to...” followed by a list of 9-11 questions per category in a 5-point Likert matrix from “Not at all interested”, to “Very interested”.

1. WORK & MISSION:

I am interested in learning how to...

	Not at all interested	Not very interested	Neutral	Somewhat interested	Very interested
Start my own small business	<input type="radio"/>				
Get a better job / Land my dream job	<input type="radio"/>				
Make money doing what I love	<input type="radio"/>				
Become a confident public speaker	<input type="radio"/>				
Identify my mission in life	<input type="radio"/>				
Do well in job interviews	<input type="radio"/>				
Learn leadership and coaching skills	<input type="radio"/>				
Be good at marketing and sales	<input type="radio"/>				
Identify my barriers to success	<input type="radio"/>				

Figure B.1. LifeLeaps survey example.

1. WORK & MISSION:

I am interested in learning how to...

1. Start my own small business
2. Get a better job/land my dream job
3. Make money doing what I love
4. Become a confident public speaker
5. Identify my mission in life
6. Do well in job interviews
7. Learn leadership and coaching skills
8. Be good at marketing and sales
9. Identify my barriers to success

2. PHYSICAL HEALTH & BODY:

I am interested in learning how to...

10. Get fit/lose weight/build muscle
Reduce my screen-time Eat healthy
11. Learn how to cook
12. Heal/physically recover
~~Get over an addiction~~
13. Plan and prep healthy meals for the week
14. Do a marathon/fitness competition
15. Get motivated to work out
16. Have better sleep habits

3. MENTAL & EMOTIONAL HEALTH:

I am interested in learning how to...

17. Be more confident
18. Reduce negative self- talk
19. Feel happier/more optimistic
20. Not be so serious
21. Identify beliefs that limit my potential
22. Meditate
23. Deal with grief or loss
24. Deal with anxiety
25. Get over a fear or phobia
26. Overcome depression

4. RELATIONSHIPS:

I am interested in learning how to...

27. Get a date/find someone right for me
28. Be more attractive
29. Approach someone I like
30. Resolve conflict
31. Take the next step in my relationship
32. Be a great Dad/Mom Control my anger
33. Get out of a bad relationship
34. Get clarity on my sexual orientation

35. Stop arguing so much with my partner

5. MONEY & FINANCES:

I am interested in learning how to...

36. Create a budget Manage my money Make more money Save money

37. Learn to invest

38. Get out of debt

39. Buy my first home

40. Build and maintain good credit

41. Plan to pay off my debt/student loans

6. RELATEDNESS & SOCIAL CONNECTION:

I am interested in learning how to...

42. Make friends

43. Build strong friendships

44. Make a good first impression

45. Dress well

46. Be a leader

47. Motivate others

48. Give good feedback

49. Be a good listener

50. Use my intuition to make good decisions

51. Inspire positive change in others

7. PURPOSE & MEANING:

I am interested in learning how to...

52. Waste less time

53. Spend less time on social media

54. Identify what motivates me/be more motivated

55. Set and achieve goals

56. Connect with people in my community

57. Find spiritual purpose/meaning in life

58. Get out of the house more

59. Feel like I belong and deserve success

60. Make a positive impact

**8. LIFELONG LEARNING:
I am interested in learning how to...**

61. Do better in school
62. Get into university/graduate school
63. Learn an instrument
64. Survive in the woods (outdoor skills)
65. Save someone's life with first aid
66. Survive natural disasters (emergency preparedness)
67. Be a better researcher
68. Use my computer more productively
69. Get my homework/projects done on time
70. Improve my writing ability
71. Read books more often

9. Are there any skills you would be interested in learning that are not listed in this survey?

For the data presented in this thesis, question 9 generated many suggestions were about topics already contained in the survey such as the ones below:

- Learning more about dealing with anxiety and stress
- Time management
- Creating a strong family relationship
- Dealing with loss/grief
- Develop networking skills related to my career aspirations
- Digital learning means.
- Learning to manage time during exams
- Using the internet efficiently
- Maintaining energy/motivation
- Time management
- Writing skills
- Making friends with adults!
- Maintain/Improving athletic ability
- Improve mental health

The following is a list the most popular additional categories that participants wrote about wanting to see in the survey:

- Additional language / improve my language skills (n=14)
- Computer skills / programming / code (n=9)
- Art skills: painting, photography, design, etc (n=6)
- Music related / learning instrument / singing (n=6)
- Time Management (n=5)
- Self defense / fighting (n=5)
- Car related: buying, maintaining, repairing, insurance (n=5)
- Sexual topics (n=3)

Appendix C. LifeLeaps Validation and Discussion

Table C.1 Work and Mission: Cronbach Coefficient Alpha with Deleted Variable

Work and Mission: Question	With Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	Standard Deviation
1. Start my own small business	0.355157	0.765170	3.24	1.36
2. Get a better job/dream job*	0.450538	0.744306	4.54	0.74
3. Make money doing what I love**	0.471353	0.744699	4.68	0.65
4. Become a confident public speaker	0.498434	0.733272	3.94	1.07
5. Identify my mission in life*	0.428732	0.744447	4.22	0.95
6. Do well in job interviews*	0.467036	0.738859	4.23	0.96
7. Learn leadership/coaching skills*	0.490551	0.734797	4.07	1.03
8. Be good at marketing and sales	0.483060	0.737677	3.07	1.29
9. Identify my barriers to success*	0.489030	0.736207	4.22	0.92

**= most popular learning preference, *=mean score above 4.0 and standard deviation under 1

The analysis of work and mission learning preferences revealed a raw Cronbach's alpha of 0.76, meaning the questions to measure work and mission have a high measure of internal consistency and reliability. The tool works well. The table above also shows that removing any of the nine questions will not improve the value of the Cronbach's alpha level.

The most popular learning preference was "make money doing what I love" which 74% of all respondents scored at 5 of 5. Nobody scored this question under 3 and it has the lowest standard deviation of the data set indicating that it is easily one of the best potential gamification targets. "Identify my mission in life" and "Do well in job interviews" were also extremely popular among young adults in this study, both leading towards a potential career pathfinder game that focused on mission and purpose.

There were no significant gender identity differences under the significance threshold of $p \Rightarrow 0.01$, though question 7 "learn leadership/coaching skills" met the threshold ($p=0.01$, $f=6.7$) with females scoring a mean difference of 0.38 higher than males. If only females were in the data set, this learning preference would have passed the popularity threshold with an average score of 4.23 and a standard deviation of .88 therefore I have made an exception to the popularity threshold in the case of this question and added it anyways.

Physical Health & Fitness Questions

Table C.2 Physical Health & Fitness: Cronbach Coefficient Alpha with Deleted Variable

Physical Health & Fitness: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	Standard Deviation
1. Get fit / lose weight**	0.500652	0.791429	4.27	0.89
2. Build muscle	0.512249	0.789112	3.95	1.03
3. Reduce my screen-time	0.495642	0.790291	3.41	1.15
4. Eat healthy*	0.536576	0.788585	4.20	0.89
5. Learn how to cook*	0.374897	0.801573	4.03	0.98
6. Heal / physically recover	0.464761	0.793512	3.68	1.15
7. Get over an addiction	0.317838	0.812874	2.56	1.36
8. Plan/prep healthy meals for the week	0.541552	0.785738	3.84	1.1
9. Do a marathon/fitness competition	0.488644	0.792141	2.81	1.35
10. Get motivated to work out	0.530636	0.786781	4.02	1.11
11. Have better sleep habits*	0.497702	0.790691	4.12	0.99

**= most popular learning preference, *=mean score above 4.0 and standard deviation under 1

The analysis for physical health and body revealed a raw Cronbach's alpha of 0.81, meaning the questions to measure physical health and body have a high measure of internal consistency and reliability. The tool works well here. The table above also shows that removing any of the 11 questions will not greatly improve the value of the Cronbach's alpha level. There would be a slight improvement in Cronbach's alpha if question 7 is removed as the value of Alpha would improve from .808 -.812 which would also bring the total number of questions to 10, which is preferable.

The most popular learning preference in the physical health category was "get fit/lose weight" followed closely by "eat healthy" and "have better sleep habits".

Gender identity differences at the $p > .01$ level were questions 8, 10, which had females providing slightly interest higher scores than the males. Question 10, "get motivated to work out", showed the highest with a mean difference of -0.5 for males ($p=0.071$), the fourth highest gender identity difference found in the whole survey with females scoring this at 4.2 while males score it 3.7. This gender identity difference was most pronounced for the philanthropist type as will be discussed in Chapter 6.

Mental & Emotional Health Questions

Table C.3 Mental & Emotional Health: Cronbach Coefficient Alpha with Deleted Variable

Mental & Emotional Health: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Be more confident*	0.567408	0.853523	4.18	0.91
2. Reduce negative self-talk	0.717259	0.840108	3.94	1.13
3. Feel happier / more optimistic**	0.637791	0.848985	4.23	0.91
4. Not be so serious	0.534637	0.854999	3.38	1.13
5. Identify beliefs that limit my potential	0.571892	0.852058	3.80	1.10
6. Meditate	0.37303	0.870124	3.36	1.29
7. Deal with grief or loss	0.689246	0.841609	3.21	1.26
8. Deal with anxiety	0.635994	0.846633	3.83	1.18
9. Get over a fear or phobia	0.535532	0.855462	3.24	1.25
10. Overcome depression	0.585039	0.851381	3.38	1.31

**= most popular learning preference, *=mean score above 4.0 and standard deviation under 1

The analysis for mental and emotional health revealed a raw Cronbach's alpha of 0.86, we can say that the questions to measure mental and emotional health have a high measure of internal consistency and reliability. The tool is working very well here. The table above also shows that removing any of the 10 questions will not substantially improve the value of the Cronbach's alpha level, though question 6, "meditate", would provide a minor improvement ($\alpha = 0.870$). It is advisable to keep this question since it hangs well together with the rest and keeps the number of responses to 10, which is ideal for this inventory.

Question 1 and 3 ("feel happier/more optimistic" and "be more confident") are both the most popular and lowest standard deviation responses in this set, but all the learning preferences were relatively well-received yet could not meet the popularity

threshold of 4.0 mean score with a standard deviation below 1.0. This indicates the category is universally acceptable but slightly uninteresting to certain players who report not wanting to learn more about mental health topics.

Independent samples *t*-test revealed a small but somewhat significant gender identity difference on question 2 “reduce negative self-talk” with -0.37 mean difference ($p=0.087$, $f=2.96$) and a more significant difference on question 8 “deal with anxiety” at -0.55 mean difference ($p<0.0001$, $f=15.8$) with females answering higher than males on both. Question 8 is the third most pronounced difference between males and females on the whole survey; the male mean score was 3.49 while the female mean score was 4.04.

Relationships Questions

Table 9

Relationships: Cronbach Coefficient Alpha with Deleted Variable

Relationship: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Get a date/find someone right for me	0.526694	0.807001	3.25	1.40
2. Be more attractive	0.551596	0.804785	3.55	1.18
3. Approach someone I like	0.639005	0.794524	3.29	1.33
4. Resolve conflict**	0.523426	0.808343	3.95	1.06
5. Take the next step in my relationship	0.552098	0.804297	3.32	1.26
6. Be a great Dad/Mom	0.311572	0.83093	3.54	1.42
7. Control my anger	0.469383	0.812703	3.26	1.27
8. Get out of a bad relationship	0.613746	0.797415	2.54	1.32
9. Get clarity on my sexual orientation	0.431705	0.816236	2.10	1.22
10. Stop arguing so much with my partner	0.510469	0.80855	2.63	1.25

**= most popular learning preference, *=mean score above 4.0 and standard deviation under 1

The analysis for relationships revealed a raw Cronbach's alpha of 0.82. Questions to measure relationships have a high measure of internal consistency and reliability. The tool works well here. The table above also shows that removing any of the 10 questions will not improve the value of the Cronbach's alpha level.

The most popular category to learn about was resolving conflict, and the least popular were questions 8-10; these were the least popular learning targets on the whole survey, none of them met the popularity threshold, though "resolve conflict" came close, and did pass the popularity threshold for and all had high standard deviations.

There were no significant gender identity differences in this set. The only marginally significant difference found was on question 9 ($p=0.221$, $f=1.507$) with females rating it slightly higher than males but both having significantly lower scores than most questions on the survey.

As discussed previously, this category should likely be excluded from design considering if one's intention is to create the most popular life skill learning game that appeals to young adults.

Money & Finances Questions

Table 10

Money & Finances: Cronbach Coefficient Alpha with Deleted Variable

Money & Finances: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Create a budget	0.650852	0.824761	4.03	0.93
2. Manage my money	0.663124	0.825100	4.24	0.86
3. Make more money	0.565443	0.834956	4.52	0.76
4. Save money	0.685145	0.824020	4.38	0.83
5. Learn to invest	0.499414	0.838775	4.25	0.91
6. Get out of debt	0.549817	0.838021	3.33	1.37
7. Buy my first home	0.474545	0.843724	4.00	1.20
8. Build and maintain good credit	0.626546	0.826208	4.13	1.01
9. Plan to pay off my debt/student loans	0.564905	0.836145	3.62	1.37

The analysis for money and finances revealed a raw Cronbach's alpha of 0.84, we can say that the questions to measure money and finances have a high measure of internal consistency and reliability. The tool works well here. The table above also shows that removing any of the 9 questions will not improve the value of the Cronbach's alpha level.

Overall, these were popular learning preferences, with "make more money" taking first place, a while "manage my money" and "save money" came in a close behind. None of these questions scored poorly, but question 6, "get out of debt" was the least popular with a mean score of 3.33 and relatively high standard deviation.

There are four gender identity differences at the $p < 0.1$ level but all effects are small, with females scoring on average 0.34 higher on questions 1, 4, 6, and 9.

Relatedness & Social Connection Questions

Table 11

Relatedness & Social: Cronbach Coefficient Alpha with Deleted Variable

Relatedness & Social: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Make friends	0.536991	0.892317	3.80	1.045
2. Build strong friendships	0.528103	0.892266	4.16	0.971
3. Make a good first impression	0.660529	0.883499	4.10	1.009
4. Dress well	0.531506	0.893936	3.77	1.137
5. Be a leader	0.610655	0.88685	3.99	0.965
6. Motivate others	0.668182	0.883261	4.17	0.913
7. Give good feedback	0.728668	0.878963	4.17	0.965
8. Be a good listener	0.677988	0.88235	4.19	0.974
9. Use my intuition to make decisions	0.748545	0.878309	4.20	0.898
10. Inspire positive change in others	0.762819	0.87751	4.26	0.891

The analysis for relatedness and social connection revealed a raw Cronbach's alpha of 0.895, meaning that the questions to measure relatedness and social connection have a very high measure of internal consistency and reliability. The tool works well here. The table above also shows that removing any of the 10 questions will not improve the value of the Cronbach's alpha level.

The answers to these questions were quite high overall, the most popular being "inspire positive change in others" which also was highly correlated with some User Type subquestions discussed in Chapter 7.

Gender identity differences in questions 1 and 9 were statistically significant at the $p > .1$ level but nearly zero in terms of effect – the mean difference was less than - 0.2 with females scoring slightly higher than males, as is the trend.

Purpose & Meaning Questions

Table 12

Cronbach Coefficient Alpha with Deleted Variable

Purpose & Meaning: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Waste less time	0.532639	0.854147	4.25	0.93
2. Spend less time on social media	0.618611	0.846355	3.72	1.16
3. Identify what motivates me	0.702478	0.839482	4.22	0.94
4. Set and achieve goals	0.702637	0.840107	4.22	0.91
5. Connect with people in my community	0.629388	0.845206	3.83	1.03
6. Find spiritual purpose / meaning in life	0.570923	0.854466	3.44	1.35
7. Get out of the house more	0.588202	0.849304	3.53	1.12
8. Feel like I belong and deserve success	0.459965	0.860618	3.93	1.00
9. Make a positive impact	0.602782	0.848672	4.27	0.89

The analysis for purpose and meaning revealed a raw Cronbach's alpha of 0.86, meaning that the questions to measure purpose and meaning have a high measure of internal consistency and reliability. The tool works well here. The table above also shows that removing any of the 9 questions will not improve the value of the Cronbach's alpha level

Questions 1, 3, 4, and 9 were all quite popular, especially among philanthropists and socializers. This learning preference category also has the strongest correlations in the whole data set with specific subquestions of the Hexad as is explored and discussed in Chapter 6.

Lifelong Learning Questions

Table 13

Lifelong Learning: Cronbach Coefficient Alpha with Deleted Variable

Lifelong Learning: Question	Alpha with Deleted Variable		Descriptive statistics	
	Correlation with Total	Alpha	Mean	SD
1. Do better in school	0.569104	0.846094	3.88	1.18
2. Get into university/graduate school	0.572630	0.845948	3.43	1.34
3. Learn an instrument	0.498894	0.85193	3.34	1.32
4. Survive in the woods (outdoor skills)	0.497933	0.851888	3.46	1.30
5. Save someone's life with first aid	0.629206	0.841751	3.70	1.16
6. Survive natural disasters (emergency prep.)	0.623796	0.842346	3.80	1.13
7. Be a better researcher	0.556439	0.847045	3.46	1.25
8. Use my computer more productively	0.566523	0.846344	3.67	1.15
9. Get my homework / projects done on time	0.569509	0.846029	3.83	1.20
10. Improve my writing ability	0.560218	0.847892	4.16	0.95
11. Read books more often	0.449734	0.85465	3.93	1.15

The analysis for lifelong learning revealed a raw Cronbach's alpha of 0.86, meaning that the questions to measure lifelong learning have a high measure of internal consistency and reliability even though the category is fairly diverse and seemingly disjointed, it does follow a common theme of lifelong learning. The tool works well here. The table above also shows that removing any question would not increase the alpha score.

The scores in this preference category were near average, with the most popular learning preference being question 10 “improve my writing ability”. Interestingly in the qualitative analysis, a few people suggested they would like to learn another language or martial arts, which would fit into this category as well.

This learning preference category had the highest gender identity differences. Several significant gender identity differences were found following the trend of females scoring higher than males. Questions 1, 3, 5, 6 and 11 all were significant to the $p < 0.1$ level with the highest mean differences being “read books more” (-0.678) which males scored 3.5 and women scored 4.2 on average ($p = .001$, $f = 10.4$), “do better in school” (-0.625) which males scored 3.5 and females scored 4.1 on average ($p = 0.001$, $f = 11.0$) and “save someone’s life with first aid” (-0.526).

Appendix D. Interview Protocol

For this study the protocol for designing and running the player type storyboard feedback focus groups was based on Krueger and Casey's (2002) Designing and conducting focus group interviews.

Each group had between 3 and 7 participants who were seated in a circle if they chose to attend in person. Those that attended online via ZOOM app were displayed on a 24-inch screen nearby to the physically present participants, so they were all engaged in a group discussion simultaneously in a hybrid format.

1. The facilitator introduced himself and the note taker to all participants once they were present together and it was clear no one was going to be joining late.
2. The facilitator made sure everyone was logged into their tablet computers and that the digital survey was loaded and working on the screen. The back button was locked, and the sound was muted.
3. The facilitator then guided all participants to read the consent form completely and accept the terms by entering their date of birth when they were ready. Participants were instructed that they could opt out of the survey, or any particular question, at any time by clicking next without answering, or closing the survey with the red on their tablets to end the survey.
4. The facilitator introduced the game concept for Facing Dragons and made sure everyone was ready and comfortable with their tablets
5. There were 12 total storyboards, each with five quick quantitative feedback questions on a likert scale that each participant would answer privately before coming together as a group and discussing the one qualitative focus group question.
6. Only 1 group discussion questions were asked by the facilitator per story board; he question was: "What could be done to improve this storyboard?"
7. The storyboard has a script written under each cell describing what the scene is. The facilitator would read the entire script out while participants viewed it. After the script was read, the participants would answer the five short quantitative questions privately on their tablets.

8. The facilitator would indicate that they have 1 minute to answer the 5 questions. He gave a warning when 10 seconds remained, and then again when the time was up to answer the quantitative questions.
 9. That facilitator then informed everyone that we would have five minutes to discuss the question below: "What could be done to improve this storyboard?"
 10. Participants would volunteer to give their feedback to the group. If no one volunteered, the facilitator would select someone who had not recently given feedback verbally.
 11. The facilitator actively listened to the participant speaking, and asked probing open ended questions to encourage a complete answer.
 12. The note taker sometimes would send private digital messages to the facilitator indicating questions that might be asked, or people who seemed like they might want to speak on the Zoom app. The note taker was monitoring the zoom chat box, and video boxes to see if people were trying to speak, or raising their digital hands.
 13. After the first person spoke, the facilitator would ask if anyone agreed, disagreed, or had something to add about the points that were made.
 14. After all participants who volunteered had spoken, if there was time left in the five minutes, the facilitator would assess if more comments seemed appropriate based on the intensity of the discussion; if not the facilitator would thank the participants and move on to the next storyboard – repeating steps 7-14 again for all 12 storyboards.
- One final note: all participants had the option to write their reply in the box below the quantitative questions if they did not feel comfortable sharing their opinions verbally to the group, or if we had run out of time and they still had more they wanted to add. Participants were shown this box and encouraged to take notes in it to plan what they might like to speak about during the storyboard reading.

Appendix E. List of Codes and Themes per User Type

E.1 Socializer

		Themes	Categories	Quotes
Storyboard 01	RQ1	RQ1 Reflecting	The quest 'Things you're Grateful for' feel more useful	the grateful one felt more useful
	RQ2	RQ2 Lacks structure RQ2 Lacks accountability	Lacks proper structure Unclear goal-Additional guidance on the kind of things to search for	people need to reflect but I also feel like it would be a little boring to some people too open ended in terms of guides arbitrary criteria, not really sure what you're supposed to do additional guidance on what kind of things to search for, as it is not entirely clear what the goal is.
Storyboard 05	RQ1			
	RQ2	RQ2 Lacks accountability RQ2 Lacks accountability	Timer to track performance Option to incorporate player accountability	Maybe there could be a timer showing how long they took to do it if the player wants to see that as well. · need accountability in the game · wonder if there is a way to know if the person really did it or if they just slid when done.

		RQ2 Lacks structure	Lack of clarity between activity and question	Fun, but I don't see the connection between the activity and the question.
Storyboard 02	RQ1			
	RQ2	Option to interact	<p>Two-way communication/optional Discussion Boards</p>	<ul style="list-style-type: none"> · posts should be able to be replied to and discussed · to have the option for even further discussion on some of the replies or responses.
		Serious gaming/anti-trolling Serious gaming/anti-trolling	<p>Tools to tackle trolling</p> <p>Options to screen posts/Voting Mechanic</p>	<ul style="list-style-type: none"> · worry about there being people who will respond to questions or comments in negative ways/trolls · option of screening posts · vote on things, then kind of filter the better things to top/ A voting mechanic
Storyboard 06	RQ1			

	<p>RQ2</p> <p>Reward options</p> <p>Serious gaming</p>	<p>Option to deduct points if task not completed</p> <p>Mechanic to detect trash bag in the photo</p>	<ul style="list-style-type: none"> · We could award points automatically and begin deducting if it is not completed the game able to detect the trash bag in the photo?
<p>Storyboard 03</p>	<p>RQ1</p> <p>RQ2</p> <p>Voting can be negative</p> <p>Voting can be negative</p> <p>Voting can be negative</p>	<p>Supervote may sway valid discussion -foster negativity</p>	<ul style="list-style-type: none"> · supervote to just filter out people's opinions they don't agree with, that just seems kind of like it encourages negativity. · will likely just sway certain valid discussions in the way of biased or maybe even salty responders · would lead to people filtering out opinions they disagree with, which would segregate the community.

Storyboard 12	<p>RQ1</p> <p>RQ2</p> <p>Safety concerns/Privacy</p> <p>Suggestions to uplift positivity</p>	<p>Unsolicited engagement</p> <p>Provide ideas how to improve other people's days.</p>	<ul style="list-style-type: none"> · A little worried that unsolicited engagement with certain individuals may go the wrong way but I like the intent Provide ideas about how to improve other people's days.
Storyboard 04	<p>RQ1</p> <p>RQ2</p> <p>Time pressure</p> <p>More options/audio recording</p> <p>More options/audio recording</p> <p>Option to interact</p>	<p>Dynamic Time allocation</p> <p>Options other than voice recording</p> <p>Option to Archive recordings</p> <p>Restrictive and not much engagement</p>	<ul style="list-style-type: none"> · Depending on the topic, it may be necessary to have dynamic time allocations for learning the material · don't know if people would enjoy speaking into the microphone about what they learned · if this is a recording added into their journal, it would be useful to look back on Seems a bit too restrictive, as it's something you can do on your own, but your own topics/ not much engagement going on.

<p>Storyboard 07</p> <p>RQ1</p> <p>RQ2</p>	<p>Option to interact</p> <p>Lacks accountability</p>	<p>Feedback option as to how well the goal is formed</p> <p>Accountability</p> <p>· Would need some form of feedback on how well formed the goal is.</p> <p>accountability and maybe having an algorithm just track and adjust goals if it sees that someone's going too easy or too hard on themselves.</p>
<p>Storyboard 08</p> <p>RQ1</p> <p>RQ2</p>	<p>Safety concerns/privacy</p> <p>social media concerns</p>	<p>Privacy aspect</p> <p>option of email, text other than positing on social media</p> <p>· I'm worried about privacy, especially when social media networks are involved</p> <p>the option to send it by email should be clearer that you don't have to use social media if you don't want/ Maybe through just email or text or something. I guess email.</p>

Storyboard 10	RQ1 RQ2	Safety concerns/privacy Safety concerns/privacy Safety concerns/privacy Safety concerns/privacy	Unsolicited friend requests Joint quests but wouldn't want personal info accessed. Could intimidate people	· a little worried about the friend request option without further dialogue · would enjoy something like this, though I wouldn't want them to be able to access more personal info, maybe just be able to go on quests together. If used correctly it would be good, but it could be used to intimidate people.
Storyboard 09	RQ1 RQ2	Option to interact Lacks accountability Safety concerns/unethical Safety concerns/unethical Safety concerns/unethical	1. Encourages interaction with others 1. Issue of player accountability-audiovisuals to document actions 1. Touching people's property unethical and risky	Encourages friendliness and interaction with others. · Once again, the issue of accountability comes into play. I'm not sure about the best way to document actions. Audiovisual? · touching other people's property by leaving letters or whatnot may be interpreted the wrong way. · As soon as it prompts the player to touch other people's belongings, it feels unethical or not a good idea.

Storyboard 11	RQ1		
	RQ2	safety concerns/privacy	<p>1. Privacy settings regarding the visual content</p> <ul style="list-style-type: none"> · would like to know the privacy settings regarding the visual content
		safety concerns/privacy	<p>1. A disclaimer or a script to tell other players videos will public</p> <p>the prompt needs to tell the player to tell any other people that they will be recorded on a public video then a bunch of other people can see these videos.</p>

E.2 Free Spirit

Themes		Categories	Quotes
Storyboard 01	RQ1		
	RQ2	Quest lacks a compelling story-ambiguous purpose	<ul style="list-style-type: none"> · The quest does not have a story that compels me I feel confused about the purpose.
	RQ2	Mechanics to report illegal incidents	<ul style="list-style-type: none"> · maybe some mechanisms or if you noticed something illegal happening to be able to report it?

		<p>RQ2 More options</p> <p>RQ2 Lacks structure</p> <p>RQ2 Not fun</p>	<p>Options for More choices</p> <p>Elaborate on what coins are used for</p> <p>Make it complex & compelling</p>	<ul style="list-style-type: none"> · More focused choices? - more specific instead of just things to improve · Elaborate on what the coins are used for. What happens next after the goal is complete? · Make it more complex and cool
Storyboard 05	<p>RQ1</p> <p>RQ2</p>	<p>RQ2 Not fun</p> <p>RQ2 Additional gameplay</p> <p>RQ2 More options</p> <p>RQ2 More options</p> <p>RQ2 More options</p>	<p>1. Feeling of disengagement with the game</p> <p>1. Ability to have more flexible, creative, artistic sort of responses as evidence.</p> <p>1. recording voice bit seems like not everyone might be up for it.</p> <p>1. Alternate option to voice memos.</p> <p>1. Add Fitbit etc.</p>	<ul style="list-style-type: none"> · Much like the panels from before, I do not feel engaged with the game - it feels like I'm jumping through hoops to get through the game rather than having fun. · an ability to have more flexible, creative, artistic sort of responses as evidence. · teach different skills - yoga, mindfulness – · don't like recording, won't listen to it again - I prefer point form, take pictures. · The recording voice bit seems like not everyone might be up for it. · Alternate option to voice memos. · Add Fitbit etc.

Storyboard 02 RQ1	Not fun	1. Gives a school-ish vibe	· Feels too much like schoolwork
RQ2	Not fun/complicated	1. Option to allow simple responses and hashtags	· prompts or sentence starters to get players to start typing allow simple responses e.g. hashtags
	Not fun	Flexible options to make it less chore like	· flexible upload, options different things, and make it feel less like a like a chore.
Storyboard 06 RQ1	Safety concerns	1. real-life interaction and safety might be an issue here.	· The real-life interaction and safety might be an issue here.
RQ2	Lacks accessibility/location	Some of these quest choices are better for some locations in the world than others	· maybe some of these quest choices are better for some locations in the world than others.
	Option to interact	1. Search for friends - small group to work together - Choices of charity	· - Search for friends - small group to work together - Choices of charity

<p>Storyboard 03 RQ1</p> <p>Option to interact</p> <p>RQ2</p> <p>Voting can be negative Real world application/irrelevant</p> <p>Voting can be negative</p>	<p>Seems more like a discussion board/reddit-type space</p> <ul style="list-style-type: none"> · Seems more like a discussion board/reddit-type space that simply uses the mechanism of a game to navigate it <p>1. Modify in order to have less potential for abuse.</p> <ul style="list-style-type: none"> · Modify it so it has less potential for abuse. <p>1. Unsure what life skills this teaches.</p> <ul style="list-style-type: none"> · unsure what life skills this teaches. <p>1. do not like the idea of changing others' rating</p> <ul style="list-style-type: none"> · I do not find this to be too motivating, I do not like the idea of changing others' rating
<p>Storyboard 12 RQ1</p>	

<p>Suggestions to uplift positivity</p> <p>RQ2</p> <p>Give hints</p> <p>Not fun/not interesting</p>	<p>1. Token of encouragement for players to submit their responses</p> <p>1. Prompts/hints might help players in decision</p> <p>Can't be bothered to do these assignments/not enough motivation</p>	<ul style="list-style-type: none"> · give words of encouragements/compliments to the player when they submit their response. · Having hints might help people decide what to do <p>Same problem as before, there does not exist a strong 'game world that would motivate me to do the assignments</p>
<p>Storyboard 04 RQ1</p> <p>RQ2</p> <p>Feedback suggestion</p> <p>Reward option</p>	<p>1. Questionnaire rather than a clip</p> <p>Engaging content with choices and reward in the end</p>	<ul style="list-style-type: none"> · Make a questionnaire instead of clip in end. · I would rather have a questionnaire- you know how a lot of people are self-conscious about recording their voice? So, having a questionnaire I think would be better for me personally. · - provide engaging content to read off of, not just boring text; video content too - give more choices of different life skills - give a prize in the end? an achievement?

<p>Storyboard 07 RQ1</p> <p>Not fun</p> <p>RQ2</p> <p>Not fun</p> <p>Not fun</p> <p>Additional gameplay/storyline</p> <p>Additional gameplay/storyline</p> <p>Lacks accountability</p>	<p>1. Feels more like an assignment find way to make it engaging or fun to do</p> <ul style="list-style-type: none"> · definitely feels more like an assignment to me, and I personally wouldn't find it very engaging or fun to do. · Again, this feels like homework. · More fun. At its current stage it just feels like an assignment. · branching storyline choices that have meaningful outcomes that get you to refine your initial goal. <p>branching storyline choices that have meaningful outcomes</p> <p>accountability</p> <p>give examples for goals - give choices to each section (too much typing if they have to complete all 6 questions) -</p> <p>how to keep players accountable?</p>
<p>Storyboard 08 RQ1</p> <p>Safety concerns/privacy</p> <p>RQ2</p> <p>More options/UI</p>	<p>Some people are self-conscious with taking videos of themselves.</p> <p>Means of getting the message across should be broader and artistic</p> <ul style="list-style-type: none"> · Not everyone feels comfortable with taking videos of themselves. · allow voice message, artistic options (send a photo of the product i made for my family)

<p>Storyboard 10 RQ1</p> <p>safety concerns/strangers</p> <p>RQ2</p> <p>Safety concerns/strangers</p> <p>Option to interact/paired</p>	<p>Safety issues about strangers and interaction with strangers.</p> <ul style="list-style-type: none"> · Again, safety issues about strangers and interaction with strangers. <p>Background check for safety concern before they sign up for the game</p> <ul style="list-style-type: none"> · background check for safety concern before they sign up for the game? Online chat is fine but needs more verification if meet outside in person - who are these people other than they live close to you? <p>In-game vetting to pair people for in-person challenges</p> <ul style="list-style-type: none"> · don't pair people up for in-person challenges until they've both passed in-game vetting.
<p>Storyboard 09 RQ1</p> <p>RQ2</p> <p>Safety concerns/unethical Reward option/delayed response</p>	<p>1. Questions about safety and liability.</p> <p>I like what it is trying to do, but have questions about safety and liability</p> <p>1. Concern about how the system rates a delayed response</p> <ul style="list-style-type: none"> · If I am outside, I might not want to type in my response right away concern about how the system rates the response.

<p>Storyboard 11 RQ1</p> <p>RQ2 Additional gameplay/more challenging</p> <p>Lack of structure/confusing point system</p> <p>Safety concerns/privacy</p>	<p>1. Additional challenges to make it more fun.</p> <ul style="list-style-type: none"> · add additional challenges to make it more fun? e.g. themes/ costume? not very fun just high-5ing people. <p>1. Point of the game seems too confusing.</p> <ul style="list-style-type: none"> · The point of the game seems too confusing, again it feels like the concepts are implemented without any abstraction at all to fit the genre of a game, maybe switch over to a more abstract way of completing tasks that employs traditional game tropes that people are familiar with? need a better framework and narrative around these real challenges that allow you to realize why you're doing these real-life challenges to power up? <p>· Privacy concerns. Some people would prefer not to be on film.</p> <ul style="list-style-type: none"> · Privacy concerns. Some people would prefer not to be on film.

E.3 Achiever

Themes	Categories	Quotes
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<p>Storyboard 01</p> <p>RQ1</p> <p>RQ2 Additional gameplay</p> <p>RQ2</p> <p>RQ2 Additional gameplay</p> <p>RQ2 Additional gameplay</p>	<p>1. Quest should be unrestricted- not just wandering around in the hood.</p> <p>1. Implement action steps</p> <p>Interesting but make it more fun for gamers</p> <ul style="list-style-type: none"> · Not everyone has the same kind of access to wander around the neighborhood. if the point of the quest is to find something that needs to change or that you are grateful for the means of doing that shouldn't be restricted to walking. · why not make this into an action (e.g. pick up the trash)? Can there be an action associated with "things you are grateful for" as well? · Seems interesting, but might not be as fun as every gamer might expect?
<p>Storyboard 05</p> <p>Reward</p> <p>RQ1</p> <p>Lacks accessibility</p> <p>RQ2</p> <p>RQ2 Additional gameplay</p>	<p>anticipate a benefit to this kind of quest</p> <p>Issue of physical abilities and space- ways to make it more accessible</p> <p>1. Other options like (a deep relaxation, five-minute breathing exercise, like 30 minutes of sprinting).</p> <ul style="list-style-type: none"> · anticipate a benefit to this kind of quest. · I worry about some people's physical abilities and space. Are there ways to adjust this to make it more accessible to everyone? · I think there should be something like different, having options. (a deep relaxation, five-minute breathing exercise, like 30 minutes of sprinting).

	<p>Time pressure</p> <p>RQ2 Not fun</p>	<p>30 seconds to answer that question seems too small</p> <p>1. Not a fun aspect of a video game</p> <p>Reflections aren't fun. 30 seconds to answer that question seems too small.</p> <ul style="list-style-type: none"> I like the concept but I am a little confused. I'm not sure how this would work for a video game. I feel like this one is grasping at straws a little bit, and is too much like a given task and not a fun aspect of a video game.
<p>Storyboard 02</p> <p>RQ1</p> <p>RQ2</p> <p>Serious gaming/anti-trolling</p>	<p>Option to interact</p> <p>Not fun/complicated</p> <p>Some players may not want to 'write' answers thinking it won't get the desired ranking</p> <p>1. Ranking system may turn into a rat-race to get more likes.</p>	<p>1. Kinda mirrors existing social media platforms -needs a motivator for players.</p> <p>Some players may not want to 'write' answers thinking it won't get the desired ranking</p> <p>1. Ranking system may turn into a rat-race to get more likes.</p> <ul style="list-style-type: none"> Seems like a good idea, but mirrors a lot of social media platforms already. It seems like there's an incentive for doing this and that might be the main motivator for players. Some players may not want to write answers People might think their idea isn't the greatest if it doesn't get ranked. I wonder if the ranking system defeats the purpose of the quest. I feel that people will try to write things that will get them "likes" rather than things they honestly feel could inspire people. Maybe those things are the same, but maybe they are different.

<p>Reward</p>	<p>Incentives to read and like posts.</p>	<ul style="list-style-type: none"> · what incentives are there for people to read and like posts? I'd post for the gold and then walk away. Why wouldn't everyone? Similarly, why do people want to post questions?
<p>Storyboard 06 RQ1</p> <p>Option to interact/social media RQ2</p> <p>Safety concerns</p> <p>Real world application</p>	<p>no social media connection</p> <p>1. Safer options</p> <p>Player's motivation to actually go out and do this because most gamers play to escape the real world.</p>	<ul style="list-style-type: none"> · I wouldn't change anything about this quest personally, other than the fact that it suggests to share it on social media but earlier it said that this game doesn't require social media accounts. · Oh, safety, there were other options we didn't have to do the garbage. So, there was the writing a note and putting it on a neighbor's car, or the donation to the food bank, neither of those are unsafe. So, I think by giving options, that no safety wouldn't be an issue. <p>Again, I worry about the player's motivation to actually go out and do this because most gamers play to escape the real world. I do like the concept though, and I like the meaning behind it</p>

<p>Storyboard 03</p> <p>RQ1</p> <p>Real world application/irrelevant</p> <p>RQ2</p> <p>Voting can be negative</p> <p>Voting can be negative</p> <p>Voting can be negative</p> <p>Suggestions to uplift positivity</p>	<p>1. Counterproductive- don't see a real-life experience relating to this quest.</p> <ul style="list-style-type: none"> · I don't see a real-life experience that relates to this quest. There isn't a situation where you get to "bumped someone down" because you disagree. If anything, it seems counterproductive, in my opinion. <p>1. Bad seeing your post go down.</p> <ul style="list-style-type: none"> · Like we discussed earlier, it just seems bad seeing your post go down. <p>1. Appears to empower individual's voice- can result in hateful and fiery comments</p> <ul style="list-style-type: none"> · Could be useful and appears to empower the individual's voice, but also seems like it would cause lots of fiery opinions and hateful comments to arise. <p>1. Ranking others' ideas is not very kind on a public platform</p> <ul style="list-style-type: none"> · I don't think ranking others' ideas etc. is a very kind thing to do if this is public <p>Don't make it negative</p> <ul style="list-style-type: none"> · Don't make it negative... how do votes affect starts etc.?
<p>Storyboard 12</p> <p>RQ1</p> <p>Serious gaming/anti-trolling</p> <p>RQ2</p>	<p>1. Accountability check-ins- people could lie on the text-box</p> <ul style="list-style-type: none"> · People can lie on the text box.

	<p>Reward options</p> <p>Reward options</p> <p>Additional gameplay</p> <p>Additional gameplay</p>	<p>1. Introduce option to just write about what you 'would do', with a smaller reward</p> <ul style="list-style-type: none"> · What if you had the option to just write about what you <i>would do</i>, and it just had a smaller reward? <p>1. take a bit of motivation to do- worry about the extrinsic motivation making the gesture a little insincere</p> <ul style="list-style-type: none"> · This one's nice! I feel like it would take a bit of motivation before the player actually did this, and again I worry about the extrinsic motivation making the gesture a little insincere, but I also think this would be a good way to strengthen those with fewer social skills. <p>1. suggestions on possible scenarios</p> <ul style="list-style-type: none"> · I would like suggestions on possible scenarios. I feel like I would be willing to step out of my comfort zone to complete them but I would possibly get stuck on what to do. <p>1. more options other than picking flowers and alternative for gold as an incentive</p> <ul style="list-style-type: none"> · maybe avoid encouraging people to pick flowers? That's not nice. Also, some people who look sad and lonely aren't. I like the different options for recording this activity. Is gold the best incentive?
<p>Storyboard 04</p> <p>RQ1</p> <p>Give hints/tutorial</p> <p>RQ2</p> <p>Time pressure</p>	<p>1. provide tutorials or curate some online resources to learn from</p> <p>1. Timing can often be stressful- be longer than 30 seconds/ a soft time limit?</p>	<ul style="list-style-type: none"> · How can you off-the-cuff rattle out 30 seconds of something you've been self-learning for 15 minutes? Maybe provide tutorials or curate some online resources to learn from? · Timing can often be stressful. Is there a playback option for what you learn? And can the recording be longer than 30 seconds/ a soft time limit?

	<p>Safety concerns/Wrong information</p> <p>Not fun</p> <p>Not fun</p>	<p>2. concerned that people could research something that will give them wrong information.</p> <p>Gives a very 'schooly' feel</p> <p>1. people play games to escape the real world and have fun. I hope this could be fun though.</p>	<ul style="list-style-type: none"> · Not everyone learns by reading, I wonder if there was a way to include resources that aren't articles. Also, as university students I assume we know how to weed out a bad article but I don't feel that everyone has this skill. I would be concerned that people could research something that will give them wrong information. · feel it's also very 'schooly' <p>I feel like this one (though it is super useful and empowering) would cause players to drag their feet. Most people play games to escape the real world and have fun. I hope this could be fun though.</p>
<p>Storyboard 07</p> <p>RQ1</p> <p>RQ2</p> <p>Time pressure</p> <p>Time pressure</p> <p>Time pressure</p> <p>Lacks accountability</p>		<p>1. Change time limit on coming up with a goal</p> <p>1. Option to set goals while creating the profile rather than setting them in 10 seconds.</p> <p>2. Accountability mechanics?</p>	<ul style="list-style-type: none"> · This is the best one so far. Why aren't they all like this? My only concern is the time limit on coming up with a goal. Get rid of the timer. Gets rid of pressure. · It might be good maybe like when you're creating your profile or something that just have like what are three goals and then you can draw that instead of having them come up with something in ten seconds. · I also wonder like I don't know about everybody else in the group, but I am not a very good goal setter, and like the follow-through for me is <i>not</i> good. Accountability mechanics?

<p>Not fun</p>	<p>3. Feels a little bit school-esque- find a way to make it more game-like.</p> <ul style="list-style-type: none"> · I like this a lot! Feels a little bit school-esque with needing to do a lot of writing, but I love the concept and think it's a great idea to pursue. My suggestion would be to find a way to make it more game-like.
<p>Storyboard 08</p> <p>RQ1</p> <p>Reward option</p> <p>RQ2</p> <p>Social media concerns</p> <p>Social media concerns</p> <p>Social media concerns</p> <p>Safety concerns/Privacy</p>	<p>1. forced/extrinsically motivated by the gold takes the meaning out of the heartfelt message.</p> <ul style="list-style-type: none"> · This feels a little bit too forced/extrinsically motivated by the gold. It almost takes the meaning out of the heartfelt message if it was done out of ulterior motives. <p>2. Means of getting the message across should be broader and not so restricting.</p> <ul style="list-style-type: none"> · Email and social media seeming far apart from each other. My grandparents don't have social media and I have no idea what their emails are. However, I could text, call, or write them a letter. I feel that the means of getting the message to the person could be broader and not so restricting. · Not everyone is on social network (or has a grandpa). You've addressed this with the e-mail, but it feels like an after-thought. · Offer different ways for the player to share their appreciation. Lots of people I would want to share with don't use social media enough to know how to use this concept properly. <p>3. Have it privately on your account.</p> <ul style="list-style-type: none"> · I don't know how i feel about this. If i wanted to say something to my grandparents, it would be quite difficult. Maybe have it privately like a video you just post on your account.

Storyboard
10

RQ1

Option to
interact/ignore

RQ2

Option to
interact/meet new
people

Option to
interact/meet new
people

Reward option

Option to
interact/feels like a
dating app

Option to interact

**1. "ignore" button in
addition to "thank you"
and "add friend."**

**2. Random selection
instead of who you
want to be friends with
from a list**

**4. people would just say
whatever to earn the
quest seems artificial.**

**5. Feels like a dating
app.**

Combined the idea of
the street, the smart
goal and random
kindness by
encouraging people
who are on streaks

· I would like an "ignore" button in addition to "thank you" and "add friend."

· It feels weird to pick who you want to be friends with from a list, what if 'joe shmoe' never gets picked? poor joe. Maybe randomly select a single person.

· I feel like you could even give it like a 50/50 where they get to pick. And like what are the odds that if every single time someone gets wrong, that the same player doesn't get picked. Rather than having to completely select, like if the game gave you two choices and you pop through the profiles, and then you commented on one.

· I worry that people would just say whatever to earn the quest. It seems artificial. It would depend greatly on what kind of information the players profile had on it.

· This feels kind of like a dating app, which I'm not interested in. I do appreciate the social connections, however.

combined the idea of the street, the smart goal thing, and the random kindness by encouraging people who are on streaks.

<p>Storyboard 09</p> <p>RQ1</p> <p>reward options</p> <p>RQ2</p> <p>reward options</p> <p>reward options</p> <p>time pressure</p>	<p>1. Example of what a 1, 2 & 3-star responses are.</p> <p>· an example of what a 1, 2 & 3-star responses are.</p> <p>1. Extrinsic vs. intrinsic motivation.</p> <p>· Same answer as I had before: I worry a little about the extrinsic vs. intrinsic motivation. I still like the concept though.</p> <p>1. what constitutes a bonus-worthy award?</p> <p>· Examples of what constitutes a bonus-worthy award.</p> <p>1. Remove the timer</p> <p>· No timer</p>
<p>Storyboard 11</p> <p>RQ1</p> <p>User's choice</p> <p>RQ2</p> <p>User's choice</p>	<p>1. Other option than high fives for people who are shy.</p> <p>· Other option than high fives for people who are shy.</p> <p>2. Allow gamers to complete a task like this when it is optimal for them.</p> <p>· Are you able to determine when you are able to complete the task once you view the task? For example, if I opened this quest at a time when no one was around can it be completed at a later date? If it can't, I feel that it would be beneficial to allow gamers to complete a task like this when it is optimal for them.</p>

timing	<p>3. 60 seconds is a 'long time' for getting high fives.</p> <p>4. Challenges accessible for different abilities</p>	<ul style="list-style-type: none"> I like the idea of a leaderboard challenge, I think this would appeal to lots of competitive gamers out there!
timing		<ul style="list-style-type: none"> This feels really easy to game/optimize. 60 seconds is a 'loooooooooong time' for getting high fives. This could be an economy breaking challenge.
timing Lacks accessibility		<ul style="list-style-type: none"> timing How are these challenges accessible for different abilities?

E.4 Disruptor

Themes		Categories	Quotes
Storyboard 01	RQ1 RQ2 Additional gameplay	<p>1. More options besides needle</p>	<ul style="list-style-type: none"> using something different besides a needle to represent
Storyboard 05	RQ1		

<p>RQ2 More options</p> <p>RQ2</p> <p>RQ2 More options</p> <p>RQ2 Lacks accountability</p> <p>RQ2 More options</p>	<ol style="list-style-type: none"> 1. compare the answer to "<i>what motivates</i>" from post exercise and not doing exercise. 2. Categories or topics of the type of things that motivates player and post exercise they can actually answer themselves. 3. Person may just slide without doing it include a video recording option. 4. Narrative to encourage them to have done the exercise <ul style="list-style-type: none"> · It would be interesting to somehow compare the answer to "what motivates" from after doing exercise and not doing exercise. · Maybe first, they could pick out of a selection of categories or topics of the type of things that motivates them, and then after doing exercise they can actually answer themselves. · I think incorporating a physical exercise component may be difficult into the game as the person may just slide when done without doing it. Maybe include a video recording option? come up with sort of this hybrid -- this bridging narrative to encourage them to have done the exercise because of the beneficial effects of physical movement and then reminds them that if they're answering the question without having done the physical activity, they're not getting the benefit of the activity or something.
<p>Storyboard 02</p> <p>RQ1</p>	

<p>Reward</p> <p>RQ2</p> <p>Not fun</p>		<p>1. Incorporate a type of incentive for reading and voting on people's post.</p> <p>1. Make it more of an optional task</p>	<ul style="list-style-type: none"> · maybe provide some type of incentive for reading and voting on other people's post; like five posts and have your gold doubled sort of thing. · I might not make this specifically a daily quest and more of an optional task to improve the engagement side of things to make it more engaging, and to have people able to skip it if they don't like it.
<p>Storyboard 06</p> <p>RQ1</p> <p>Lacks accessibility</p> <p>RQ2</p> <p>More options/autonomy</p> <p>Not fun/not interesting</p>		<p>1. change the make a donation to a food bank to non-monetary if a person has monetary issues.</p> <p>2. a fourth option for the player to make their own task for this as they level up.</p> <p>3. Players might lose spark after a day or two.</p>	<ul style="list-style-type: none"> · The toughest one, the only thing I could think of was maybe change the make a donation to a food bank to something as non-monetary. In case the person has monetary issues. · It might be nice to include a fourth option for the player to make their own task for this as they level up. · I would worry about players losing that spark after a day or two. They might think like " well what good did that actually do".

<p>Storyboard 03</p> <p>RQ1</p> <p>RQ2</p> <p>Voting can be negative</p> <p>Voting can be negative</p> <p>Voting can be negative</p> <p>Suggestions to uplift positivity/option to respond</p>	<p>1. a big blow to the writer of the post that gets shot down.</p> <ul style="list-style-type: none"> This could be a big blow to the writer of the post that gets shot down. <p>2. Make supervote work in a positive way- May deter users from commenting or posting</p> <p>I think this quest might be too broken... it may deter other users from commenting or posting if they find their post rapidly dropping by one person's vote. It may be more beneficial to make the super vote work in a positive way only</p> <ul style="list-style-type: none"> Eliminate rating, allow free discussion. <p>Introduce a reply option</p> <ul style="list-style-type: none"> Make option to reply
<p>Storyboard 12</p> <p>RQ1</p>	

<p>RQ2</p> <p>Give hints</p> <p>Give hints</p> <p>Additional gameplay</p>	<p>1. Suggestions/clues to the player as what could be done</p> <p>2. An option to try another one instead if you can't do this one today.</p> <ul style="list-style-type: none"> · I think many players would overthink this and not be able to think of something to do. Maybe have a few suggestions. · little bit smarter context with the clues, but giving notifications. · I think this quest is a 50/50. by that I mean you're either going to do very well or very poorly dependent on a few factors; who you are, what type of personality you have and maybe even what you are doing that day. I think it's a good quest but I think there should be an option to try another one instead if you can't do this one today.
<p>Storyboard 04</p> <p>RQ1</p> <p>RQ2 More options/audio recording</p>	<p>other methods than audio recording</p> <ul style="list-style-type: none"> · Like if you wanted the option to either write it down or write down my hand, take a photo of it, or type it in, or record it, or--.

Storyboard 07	RQ1	More options/review answers	1. an option to show or look back at the original answer as players go through each revision.	<ul style="list-style-type: none"> · Maybe have an option to show or look back at the original answer as you go through each revision so you don't lose sight of it or have it to reference so some way to keep track of what you've changed from, so you don't lose the original intent
	RQ2	Reward options	Better to have more a defined reward	<ul style="list-style-type: none"> · Would be better to have more a defined reward. I don't think many people would actually try hard to achieve or work towards their goal.
Storyboard 08	RQ1	Safety concerns/privacy	1. ability to skip the social media side of it and maybe not video to make a more private	<ul style="list-style-type: none"> · Maybe give the option of calling or texting them if they want it to be more private the ability to skip the social media side of it and maybe not video?
	RQ2			

Reward options

Safety concerns/privacy

2. An option to send an audio or text message with giving bigger incentives for the more personal it is.

· I think that for some writing a video may be too much. Perhaps have an option to send an audio or text message instead; giving bigger incentives for the more personal it is (50g for video, 30 for audio, 10 for text)

3. option to privately send a video message.

· Have an option to privately send a video message.

Storyboard
10

RQ1

Option to interact/without adding as a friend

RQ2

Safety concerns/Privacy

Safety concerns/Report button

Option to interact

Option to interact/without adding as a friend

1. Option for a one-time message.

· So maybe have the option for a one-time message.

2. A private mode.

· the option in your character profile to be private? To turn on private mode or something.

3. Report negative behavior button.

· maybe a report negative behavior button if they send you a chat. So, the receiver should have a report button I think which would immediately delete their interaction or something.

· **more options than just an automated thank you like option to write a message instead.**

· I think this storyboard teaches a really great lesson! Some feedback I could give though is maybe having more options than just an automated thank you like maybe have the option to write a message instead.

4. An option or a place for them to communicate before doing that potentially.

· It seemed to me that the quest sort of encouraged the two people to become friends in real life. So, I think it would be a good idea to have more of an option or a place for them to communicate before doing that potentially.

<p>Option to interact/without adding as a friend</p>	<p>An intrinsic friends list of people recently communicated with rather than an explicit add friends</p> <ul style="list-style-type: none"> · Maybe something like an intrinsic friends list of people you've recently communicated to rather than an explicit add friends. So, if you say, 'send a reply' and then they send a reply back then you've got a threaded response going with somebody and that's like a de facto friends list?
<p>Storyboard 09</p> <p>RQ1</p> <p>Lack of structure/clarity</p> <p>RQ2</p> <p>option to interact/interpreting response</p> <p>time pressure</p> <p>lacks accountability</p>	<p>1. Let the user know that how much they write will affect star rating.</p> <p>2. Concerned about people's responses not being interpreted correctly</p> <p>3. ability to start the timer when you're ready.</p> <p>4. A slider of zero to 100</p> <ul style="list-style-type: none"> · Maybe let the user know that how much they write will affect star rating. · I would be a little concerned about people's responses not being interpreted correctly by the computer system or whatever. Then, if they get a lower score than they might have expected then they'd be discouraged or somehow have a bad reaction to it. · An ability to start the timer when you're ready. · Maybe a slider of zero to 100, they could they could dial in and say I felt it was okay 82%. I probably could have been slightly better or something.

Storyboard 11	RQ1		
		option to interact	<p>1. Option for an interactive challenge (with other people) or a solo challenge in case they struggle with anxiety.</p> <ul style="list-style-type: none"> · I think depending on the audience utilizing this game, it may be beneficial to have the option for an interactive challenge (with other people) or a solo challenge in case they struggle with anxiety.
	RQ2	safety concerns/strangers	<p>2. Seems strange to video others.</p> <ul style="list-style-type: none"> · I like the idea of community problem solving challenges, but it seems strange to video others because I can see a lot of people maybe going in to be like, okay. I'm curious of what that means--. --open it and go, oh, well, yeah. This wasn't for me.
		user's choice	<p>A way of ranking the daily challenges from most to least liked daily challenges</p> <ul style="list-style-type: none"> · Maybe having a way of ranking the daily challenges from most to least liked daily challenges. So, if there's one particular daily challenge that you don't like. Let's say the high five for days one, for example, because you don't like going out into the world or you have anxiety or something that keeps you inside. Maybe having that option to sort of rank it lower, so you're less likely to get it. After you're done your like, 'Oh, did you enjoy this activity?' But one of five stars help us improve questing and this may be one people really like but maybe once one they didn't like opposed to different ones. Kind of in game feedback of the questing.

E.5 Player

Themes	Categories	Quotes
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<p>Storyboard 01</p> <p>RQ1</p> <p>RQ2 Additional gameplay</p> <p>RQ2</p> <p>RQ2 Additional gameplay</p> <p>RQ2 Improve UI</p> <p>RQ2 Lacks structure</p>	<p>Quest other than picking a needle</p> <ul style="list-style-type: none"> · Maybe a piece of litter rather than a used needle as this could be quite upsetting for some people. Quest could be to pick the piece of garbage up and dispose of safely rather than photographing a used needle. · When it comes to finding things that have to change should the player take action for fixing it if it is something, they can do such as throwing out trash on the ground? (not saying they should pick up used needles, better to report it). Might be more fulfilling for the player and help improve the area. · From logic-oriented experience, if there were something more self-evident to change rather than a needle, it would help. · Possibly give hints as the kind of thing to look for. · Maybe if they choose that something needs to change, they should be prompted to not only find something that needs to change, but also suggest possible ways to change it, or to undertake research on ways they could change it. I think this would make the challenge more valuable. <p>1. A menu for taking action for fixing something- more fulfilling.</p> <p>1. Colorful UI with more options for taking pictures.</p> <p>Need to Explicitly state game's outcome</p> <p>More pictures less text. Maybe add more colour in first three panels. Purpose not really explained. Maybe explicitly stating game outcome. Don't feel inclined to continue the quest without knowing what the goal is in the end</p> <p>I think I'm simply missing perhaps, an introduction. Because I'm unsure of the term "focus", is this going to be used on every level?</p>
<p>Storyboard 05</p> <p>RQ1</p> <p>Lacks accessibility</p> <p>RQ2</p>	<p>1. Physically disabled players</p> <ul style="list-style-type: none"> · It all looks good, but what about physically disabled players?

RQ2 Additional gameplay	2. Gyroscopes enabled phones to show movement.	<ul style="list-style-type: none"> · gyroscopes could be enabled on the phone and you could be told to hold it while you're doing the movement to show that it's moving around during the whole time or something like that.
RQ2 Lacks accountability	3. Accountability. How can we prevent cheating?	<ul style="list-style-type: none"> · Having to hold your phone in your hand while doing the jumping jacks, I think that helps hold people accountable. · Accountability. How can we prevent cheating? · Is there any way to ensure that the jumping jacks are actually done? Or could the person just randomly slide the button?
RQ2 Additional gameplay	4. Expand on the quest to go outside and do it to make it more challenging	<ul style="list-style-type: none"> · Expand on the quest for example to go outside and do it. Maybe too easy and not challenging enough to just get up in your bedroom and do it.
RQ2 Lacks accountability	5. An option to write down response then recording it to track progress.	<ul style="list-style-type: none"> · Having an option to write down response then recording it to track progress.
Lacks accessibility	6. Providing sitting options for students to do at their desk, at work etc.	<ul style="list-style-type: none"> · Providing sitting options for students to do at their desk, at work etc.
Lacks accessibility	7. physical limitations some people may have and give options for exercises.	<ul style="list-style-type: none"> · I don't see anything that could be improved. Maybe think about the physical limitations some people may have and give options for exercises.
Reward	8. A way to cancel the quest partway while still getting partial rewards in case the player needs to stop partway through exercising.	<p>Even though the instructions tell me to grin I don't think I would. But the dialogue does seem friendly and charming so it doesn't have to go away. Maybe a way to cancel the quest partway while still getting partial rewards in case the player needs to stop partway through exercising.</p>

<p>Storyboard 02</p> <p>RQ1</p> <p>Lacks structure</p> <p>RQ2</p> <p>Lacks structure</p> <p>Lacks structure</p> <p>Serious gaming/anti-trolling</p> <p>Serious gaming</p> <p>Serious gaming</p> <p>Serious gaming</p> <p>Option to interact</p>	<p>1. Need clarity in options</p> <ul style="list-style-type: none"> · Will it be clear that there are a variety of questions you can choose? Also do ratings affect how many coins you get at all? · I'm going to assume that there's going to not only be simply likes, but perhaps other users can ask questions to get more of the gold from the person posting great advice! Otherwise, excellent. <p>Maybe have it so the answers have to be a certain length so the player doesn't just put in one-word answer to get easy points.</p> <p>2. Concern of negative interaction</p> <ul style="list-style-type: none"> · I liked this quest. I wouldn't change anything about it but there is a concern of negative interaction. <p>3. Implications if person doesn't get positive feedback at all</p> <ul style="list-style-type: none"> · What happens to the people that don't get positive feedback? · What could the negative implications be for someone whose post doesn't get a high rating? I like the idea of having the posts visible to others and allowing others to show their appreciation for the posts, however, the ranking system may make some people feel as though their ideas are not valuable and may discourage them. Perhaps it could be like Instagram's new test where they don't allow others to see how many likes your post gets. · Needs to be moderated. <p>4. Option of partnering and challenging friends</p> <ul style="list-style-type: none"> · willing to partner with someone like if you reach X number of steps, you get a certain amount of scene points, and you can challenge friends.
<p>Storyboard 06</p> <p>RQ1</p>	

<p>RQ2</p> <p>Safety concerns</p> <p>Sharing knowledge</p> <p>Safety concerns/Privacy</p> <p>Real world application</p>	<p>1. the right safety equipment when dealing with strange trash.</p> <p>2. reminded of what is trash and what is recycling- screen pops up while picking up trash.</p> <p>3. Not ideal to encourage players to share their experience on social media takes away from the building of intrinsic motivation to complete these tasks.</p> <p>4. Once the picture is taken people may be tempted to just leave the trash bag... what do they do with it when they are done</p>	<ul style="list-style-type: none"> · I love this challenge but do see the negative implications when dealing with strange trash. Maybe request that players only do this quest with the right safety equipment. · Player should maybe be prompted to get some trash picking up tongs for sanitary reasons. Or maybe be reminded of what is trash and what is recycling. Maybe the screen pops up while you are picking up trash. · Maybe quest of picking up litter or recycling would be more sustainable. Add a did you know fact about waste · Is the option given within the game to share on Instagram? Or was that just the player's choice. I don't know if it is ideal to encourage players to share their experience on social media because it almost takes away from the building of intrinsic motivation to complete these tasks. · Elaborate a little on the quest. Once the picture is taken people may be tempted to just leave the trash bag... what do they do with it when they are done?
<p>Storyboard 03</p> <p>RQ1</p>		

RQ2	Voting can be negative	1. Destructive/icky opportunity would be abused my many	<ul style="list-style-type: none"> This seems like a destructive opportunity that most people will abuse.
	Voting can be negative		<ul style="list-style-type: none"> I think this ability would have too many negative implications and could be used for trolling. Making really inappropriate comments go to the top of all the messages
	Voting can be negative		<p>I personally think this whole concept is a little...icky, I guess? We shouldn't be encouraging "voting down" posts that you disagree with by sheer power of a 100x vote. What is the game trying to teach with this?</p>
	Suggestions to uplift positivity	1. A section for super-voted messages.	<ul style="list-style-type: none"> There could be a special super vote page where only super voted messages go.
	Suggestions to uplift positivity	1. Option to upvote a previously downvoted post by making adjustments.	<ul style="list-style-type: none"> Can the person get their post back if they make an adjustment?
	Voting can be negative	1. Undemocratic yet giving people power/sense of control	<ul style="list-style-type: none"> It's rather undemocratic to be doing something like this. If a lot of people gave a post a 5 star, and then one user decided 2 stars instead. However, giving people power/sense of control is usually a great thing. It's a novel experience and people should experience more of that.
Suggestions to uplift positivity	1. Moderator for downvoting or use upvoting only	<ul style="list-style-type: none"> Moderate it or only use it to upvote and can't use it for downvoting 	
Suggestions to uplift positivity	1. Posts with a supervote should be marked with a badge or sticker	<ul style="list-style-type: none"> Posts with a super vote should be marked with a badge or sticker that note that it has been super voted. 	

	<p>Suggestions to uplift positivity</p> <p>Introduce celebrities</p>	<ul style="list-style-type: none"> · Journal entry about impact of their vote- make players think about the impact of their vote more thoroughly. interesting to see celebrity or youtubers be on the discussion board. 	<ul style="list-style-type: none"> · maybe a journal entry about the impact of their vote would be an interesting addition because it would make players think about the impact of their vote more thoroughly. · It would be interesting to see celebrity or youtubers be on the discussion board. Pretty satisfied with the customizable ability with it.
<p>Storyboard 12</p> <p>RQ1</p> <p>RQ2</p>	<p>Observe other users</p> <p>Voting can be negative</p> <p>Give hints</p>	<p>1. option to see what other people have done.</p> <p>2. Whole thing seems very virtue-signaling- not actually doing good things for the sake of doing them, but to just make yourself feel better.</p> <p>Suggestions to tell the player on what they can do- player might annoy people who don't want to be talked to improve their day.</p>	<ul style="list-style-type: none"> · It would be nice to be able to see what other people have done. · This whole thing seems very virtue-signaling in that you're not actually doing good things for the sake of doing them, but to just make yourself feel better about yourself, which, like, shouldn't be the point in helping another person? But I have a gripe with the whole random acts of kindness movement in general because of that. The example of picking a flower for the lady might be bad because it's now the man's garden. The player might annoy people who don't want to be talked to improve their day. Suggestions may help to tell the player on what they can do.

Storyboard 04	RQ1		
	Time pressure	1. A sense of anxiety or stress for some people, with the possibility of failure.	This could create a sense of anxiety or stress for some people, with the possibility of failure. I wouldn't put a time limit on learning, and rather allow the player to return when they are ready
	RQ2		
	Time pressure	1. A message before you begin the timer about how much time you will have to research the topic.	· There should be a message before you begin the timer about how much time you will have to research the topic. So, the player knows if they can commit for that long.
	Safety concerns/Privacy	1. soundbite, is it reviewed, can other users see it, or is it kept private, or deleted.	· Knowing what happens to the soundbite, is it reviewed, can other users see it, or is it kept private, or deleted · This could work well. Assuming that the people who have downloaded this app are willing to admit they lack knowledge in areas and are willing to learn new things, this is great. Ensuring this is truly gamified.
	Give hints/too broad	1. Should be more of a guide or make it more specific. It can be hard with such broad subjects.	More prompting. While the initial prompt can help, there should be more of a guide or make it more specific. It can be hard with such broad subjects · Research prompts provided for those who want them. (Possible research questions)

	Sharing knowledge	multiple links that includes videos maybe book recommendations under the heading "further research:"	<ul style="list-style-type: none"> · Offer multiple links that includes videos maybe book recommendations under the heading "further research:"
<p>Storyboard 07</p> <p>RQ1</p>	Lacks accountability	1. option to hold players accountable-a consistency badge for insistence, daily reminders.	<ul style="list-style-type: none"> · Having an option to hold them accountable. Consistency badge for insistence, daily reminders.
	RQ2	Lacks accountability	<ul style="list-style-type: none"> · How will they be held accountable to the goal? Integrating it into the quests down the line is a great idea.
	Safety concerns/Privacy	1. Public and private mode	<ul style="list-style-type: none"> · The ability to be either private or public
	Time pressure	2. For the final goal player should be given unlimited time in comparison to the other times plus bonus for the achieved goals.	<ul style="list-style-type: none"> · When you create your final goal, you should be given unlimited time in comparison to the other times. But I like the rush for the first version of the goals. Maybe get a bonus if they achieve their goals they placed.
<p>Storyboard 08</p> <p>RQ1</p>			

Storyboard 10	RQ2	Safety concerns/privacy	1. Players should be able to "share" via text, email, etc.	· I really like this one! Players should be able to "share" via text, email, etc.
		Option to interact	2. Make it about someone they haven't communicated with in a while.	· Vary it a bit too. Can make it about someone they haven't communicated with in a while etc.
		Safety concerns/privacy	3. Should not be contingent on being posted on social media.	· I don't really like the idea of having to post it on social media, in the chat it is being said it won't be forced to be shared, but it seems like this storyboard is contingent on being posted on social media?
		Option to interact/face-to-face	4. I'd rather talk to people in person.	· I think this power up would be great for some people but I'd rather talk to people in person.
	RQ1			
	RQ2	Safety concerns/privacy	1. Remove location/proximity data and make it universal across all regions	· I would remove the location/proximity data and make it universal across all regions.
		Safety concerns/privacy		· Maybe it shouldn't be organized by region, I would be more likely to participate if it wasn't based on location. (Opens up privacy and safety concerns.) Or perhaps give players an option of whether or not to contact someone local or global.
		Safety concerns/privacy		· Listing players based on distance, common interests, etc. to make it easier to find.

<p>Safety concerns/privacy</p> <p>Safety concerns/hire a moderator</p> <p>Option to interact/without adding as a friend</p> <p>Option to interact</p>	<p>2. Moderator</p> <p>A way for the player receiving the message to talk back to them before befriending them.</p> <p>Accountability</p>	<ul style="list-style-type: none"> Can you control how far of a distance is possible? Like people 30km away, 10km away, etc.? What distance will be the maximum? What if there are players of the game in isolated communities who are not "close" to other players? <p>How would it be moderated? People may send nasty messages, or alternatively be flirtatious and shady</p> <p>Maybe have a way for the player receiving the message to talk back to them before befriending them. There should be a way to get more background on the person you are messaging.</p> <ul style="list-style-type: none"> Great way for the app's users to be connected and add increased accountability. Also allows for shared experiences and community cohesiveness.
<p>Storyboard 09</p> <p>RQ1</p> <p>Lack of structure/clarity</p> <p>RQ2</p> <p>real world application</p> <p>real world application</p>	<p>1. A rubric that players know what their response should look like.</p> <p>2. Prompting the player to leave messages on cars may leave to people littering them onto the ground.</p>	<ul style="list-style-type: none"> Having a rubric would be helpful so that players know what their response should look like. I feel like prompting the player to leave messages on cars may leave to people littering them onto the ground. I definitely do NOT suggest the idea of putting notes on people's cars. Yah the idea of the game scanning the text in slide 5, I don't really understand how that would work?

real world application

safety concerns/strangers

reward option

Lacks accountability/outside the game

additional gameplay

time pressure

3. Not everyone likes getting messages from strangers.

4. Shouldn't have a rating system

5. In case of no paper/pen nearby, Is complimenting others fine? Would that count as an act of kindness.

6. Add a question of "would you do it again? Why or why not?"

Time limit for someone is using the game while at school or at work, can't get out to do these things within 15 minutes.

· I love the idea of random acts of kindness, but I do see the potential for backlash from strangers. Anything that has real-world interaction has risks. I like the idea of friends being able to rate as well as strangers. Also, is it a list choice of random acts or open-ended.

· Not everyone likes getting messages from strangers even if they are wholesome.

· I don't think there has to be a rating system, other goals don't have a rating system.

· Let's say there's no paper/pen nearby, what would be next? Is complimenting others fine? Would that count as an act of kindness.

· Add a question of "would you do it again? Why or why not?"

Can be difficult with the time limit. If someone is using the game while at school or at work and they can't get out to do these things within 15 minutes.

Storyboard

11

RQ1

RQ2	serious gaming/anti-cheating	1. Mechanics/Report button to measure no. of genuine high-fives completed to avoid dishonesty.	· How will honesty be measured in terms of number of high fives completed? Will people have ability to report others for being dishonest?
	serious gaming/anti-cheating		· I like the accountability of posting it publicly (So that people do not lie about how many high fives they got). Report button so that people do not lie.
	option to interact	2. A great challenge for more socially-available people- option of other ways of interaction	· This would be a great challenge for more socially-available people. I think having another way player can interact with each other rather than physical interactions would be more ideal. But I think this is a great option for people who like social interaction.
	option to interact		· Very cool idea! I can see a lot of social anxiety disappear and a lot of growth occur for every individual undergoing this exercise. The video portion takes care of accountability. And I'm assuming there is a friend/acquaintance that can take care of videotaping.
	safety concerns/privacy	Privacy of those who player is getting high-fives from	· How about the privacy of those who are getting the high fives from?
	safety concerns/privacy		· Some people may get filmed who do not want to be. People could also heckle people for high fives and film them without their consent.

E.6 Philanthropist

	Themes	Categories	Quotes
Storyboard 01	RQ1		

	RQ2	RQ2 Additional gameplay	<p>1. Would turn into a mundane routine- hard to find new things</p> <p>1. Implement Action Steps</p> <p>1. More examples</p> <p>Option to pin places visited</p>	<ul style="list-style-type: none"> · if I have to do this as a routine, it might be hard to keep finding new things. · Implement Action Steps. Opportunity to take immediate action. · More Examples Have an organized list of the places visited
Storyboard 05	RQ1	RQ2 Additional gameplay	<p>1. Account for different types of physical activity to challenge them.</p> <p>2. A summary of previous motivators</p> <p>3. A fact sheet regarding physical, mental or emotional impact of the exercise</p> <p>4. Option to post a picture or a video with other players might be rewarding.</p> <p>5. Step counter or way to tell that they're doing the exercise.</p> <p>6. Add music as it can increase mood.</p>	<ul style="list-style-type: none"> · Account for the different types of physical activity a player can do, so they are properly challenged. · A summary of previous motivators? · A small fact regarding the physical, mental or emotional impact of the exercise? · I think having an option to post a picture or a video of you completing your Daily Motivation might be rewarding, and perhaps the option to share it with other players? · There should be some sort of step counter or way to tell that they're doing the exercise. Otherwise this seems good. Perhaps add music as it can increase mood.
	RQ2	Sharing knowledge		
		Sharing		
		RQ2 Lacks accountability		
		RQ2 More options		

<p>Storyboard 02</p> <p>RQ1</p> <p>Option to interact</p> <p>RQ2</p> <ul style="list-style-type: none"> Serious gaming Serious gaming/anti-cheating Additional gameplay Serious gaming/anti-trolling User's choice 	<ol style="list-style-type: none"> 1. Option to interact with the player- would encourage collaboration 2. Discouragement if post not received well. 3. Competition aspect might foster copying from other places. 4. Options of deeper questions to foster creativity. 5. Disable seeing other users to filter trolls. 6. Option to change daily powerup if the player isn't up for it <p>I think people should be given a place to respond to the player, it would really encourage positive thinking and collaboration.</p> <p>Player might be discouraged if their post doesn't receive much attention.</p> <p>The competition aspect might push people to copy from other places</p> <p>Options of deeper questions to foster creativity.</p> <p>Filter out trolls. Disable seeing other users.</p> <p>I feel like they should be able to change their daily power up if they don't feel comfortable with it.</p>
<p>Storyboard 06</p> <p>RQ1</p> <p>Not fun/complicated</p> <p>RQ2</p>	<ol style="list-style-type: none"> 1. Add options that would be easy to do with minimal to no materials <ul style="list-style-type: none"> · Add options that would be easy to do with minimal to no materials (e.g. garbage bags, post it notes).

<p>Sharing knowledge</p>	<p>2. Option to connect with orgs. and groups to continue doing these acts, or be more informed of different groups with those missions.</p>	<ul style="list-style-type: none"> · Add connections to organizations and groups to continue doing these acts, or be more informed of different groups with those missions.
<p>Reward</p>	<p>3. A set of achievement titles for each of the achievement</p>	<ul style="list-style-type: none"> · A set of achievement titles for each of the achievements? · I think 70% of people would choose the middle option since it can be done quickly and easily without using resources or going outside.
<p>Option to interact</p>	<p>Option to bring a friend</p>	<ul style="list-style-type: none"> · Bring a friend

<p>Storyboard 03</p> <p>RQ1</p> <p>RQ2</p> <p>Voting can be negative Suggestions to uplift positivity</p> <p>Voting can be negative</p> <p>Voting can be negative</p>	<p>1. A community vote instead of player vote to discourage trolling.</p> <p>1. For transparency introduce two categories of supervote.</p> <p>Not in favor of this quest-gives the impression of one opinion is worth more than the others.</p>	<ul style="list-style-type: none"> · a community vote instead of that one person because this is just like trolling, and it's not going to be very accurate. · to implement the super vote, I think that would make sense to kind of have two categories. Just to get more transparency. · I don't think this quest/reward should exist since it gives the impression that their opinion is worth more than others. · This introduces too much chaos and potential for bias targeting.
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	Voting can be negative	<ul style="list-style-type: none"> · I'm not sure I get the point of a super vote.... · I don't really see the purpose of this in terms of making people feel good about their post...
<p>Storyboard 12</p> <p>RQ1</p> <p>Suggestions to uplift positivity</p> <p>RQ2</p> <p>Safety concerns/Privacy</p> <p>Safety concerns/Privacy</p> <p>Reward options</p> <p>Accountability</p> <p>Voting can be negative</p>		<ol style="list-style-type: none"> 1. Have ways for participants to deal with rejection/hostility from people. 2. Option of player helping player- rather than helping a random stranger- 3. Quest pretty hard to complete - need to find someone in need first and People might react negatively/offended. 4. Doesn't fit the theme of intrinsic motivation and then asking to take a picture/video of the event. 5. Some form of proof- maybe a photo 6. Getting the feedback from random people without prior interaction would be hard. <ul style="list-style-type: none"> · Have ways for participants to deal with rejection/hostility from people. · maybe instead of helping like a random stranger, you could be helping another player at the game that you might not have interacted with before. · I think this quest could be pretty hard to complete since you need to find someone in need. People might react negatively. · Not sure if it really fits the theme of intrinsic motivation to have someone change someone's day for the better and then ask them to take a picture/video of the event. Maybe just a reflection. · Some form of proof it was done such as a photo. · Getting the feedback from kind of just random people who don't have any interaction with the game would be quite difficult.

<p>Accountability</p> <p>Safety concerns/Privacy</p>	<p>7. better to choose the submission method after the action.</p> <p>8. Text box should be the only option- people wouldn't appreciate being filmed or getting their photo taken</p>	<ul style="list-style-type: none"> · Might be better to choose the submission method after the action. <p>I definitely think that having a text box should be the only option. I don't think people would appreciate being filmed or getting their photo taken. It would cheapen the experience.</p>
<p>Storyboard 04</p> <p>RQ1</p> <p>Sharing knowledge</p> <p>RQ2</p> <p>More options/UI</p> <p>Lacks accountability/cheating</p> <p>More options/audio recording</p> <p>Time pressure</p>	<p>1. Interactivity to create a higher chance of information absorption.</p> <p>1. a written component for those who don't express their ideas orally.</p> <p>1. Some people might select a topic they already know about and complete it for the points.</p> <p>1. Archiving option for the recordings</p> <p>1. Increase quest duration</p>	<ul style="list-style-type: none"> · More interactivity to create a higher chance of information absorption. Visuals, etc. · I think a written component would be great for those who don't express their ideas orally. · Some people might select a topic they already know about and complete it for the points. · I don't know from the storyboard if the recording is for the person him or herself or for the system. I think if I can story it somewhere and go back the it later might help the learning more. · I feel the quest should last at least 20 minutes. I don't think 15 minutes is quite long enough and may turn the player off of playing.
<p>Storyboard 07</p> <p>RQ1</p>		

		Give hints/provide direction	1. Demo to change a vague goal to SMART goals for players for sense of direction	<ul style="list-style-type: none"> I think that an example of how a vague goal can be changed to be SMART would be really helpful and give players some direction.
	RQ2	Give hints/provide direction		<ul style="list-style-type: none"> Give SMART examples first. No time limit to creating a goal. Encourage small SMART goal creation first so players get the hang of the concept. Don't aim so high right away, as people get discouraged easily.
		Give hints/provide direction	2. Prompts of areas of life that somebody might want to actually set some goals might be helpful.	<ul style="list-style-type: none"> some prompts of areas of life that somebody might want to actually set some goals might be helpful. Like financial, relationship, and maybe some examples. Some people have a zero goal-setting skill.
		User's choice	1. Not everyone might want to share like, self-reflective.	<ul style="list-style-type: none"> Not everyone might want to share like, self-reflective.
		Additional gameplay	1. Option to write another goal for more badges.	Maybe once they finish writing their goal, they have the option to write another for more badges
		User's choice	Might be hard to decide/choose only 1 goal	<ul style="list-style-type: none"> Might be hard to decide/choose only 1 goal.
		Modify actions	1. Make them take action early	<ul style="list-style-type: none"> Make them take action early.
		Give hints/provide direction	1. Should just stick to suggest players to make more realistic goals.	I wouldn't tell the player that their goals are doomed from the start. I think it should just say to make it more realistic.
Storyboard 08	RQ1			
		Safety concerns/privacy	1. Private mode and allow for ways to reply a thoughtful message.	<ul style="list-style-type: none"> Keep it more private. Allow for ways to reply a thoughtful message (e.g. a letter, in person, messenger, on the phone, text)
	RQ2			

		Give prompts	2. More than one person or give prompts for different people (e.g. family member, colleagues, a friend)	· I'd like to vulnerability of the video. I think it shows more powerful then say a text for example.
		Give prompts		· Make it to more than one person or give prompts for different people a family member, send one to colleagues, send one to a friend, send one to somebody you haven't talked to in years.
		Social media concerns	Face to face is good enough, sending on social media might be uncomfortable to some people.	Maybe saying something face to face is good enough, sending on social media might be uncomfortable to some people.
Storyboard 10	RQ1	Option to interact/meet new people	build friendships	· I think this type of quest would be good to build friendships around similar preferences/ levels of friendship
		Safety concerns/Hire a moderator	1. Moderator- to filter creepy or inappropriate messages.	· Might need some kind of way to moderate the messages being sent - too much opportunity for creepy or inappropriate private messages to be sent to each other.
	RQ2	Option to interact	2. A reply option instead sending an automated response.	· Maybe a reply option would be nice, instead of just sending an automated response. And I think it is cool that there are quest involving more than one person.
		Safety concerns/privacy	Privacy	Levels of privacy as well.

<p>Storyboard 09</p> <p>RQ1</p> <p>lacks structure/rubric</p> <p>RQ2</p> <p>reward option</p> <p>safety concerns/privacy</p>	<p>1. Ranking based on completion or paragraph length, Rubric?</p> <p>2. background to the amount of kindness you usually give in comparison to this act.</p> <p>Not comfortable having other people review my response</p> <ul style="list-style-type: none"> · I don't know if I like the ranking based on quality. It might make the player feel like their random act of kindness wasn't good enough. Maybe just a ranking based on completion or paragraph length? Rubric? · I think there should be background to the amount of kindness you usually give in comparison to this act. · The act or whatever you do, might not mean much to some people, but to the people that might be closer you or know you better, might be like, oh, wow. That's something I never would have seen you do · I would not be comfortable having other people review my response.
<p>Storyboard 11</p> <p>RQ1</p> <p>RQ2</p> <p>option to interact</p> <p>lacks structure/confusing</p>	<p>1. More options instead of high five-ing.</p> <p>2. Don't fully understand the point of this quest.</p> <ul style="list-style-type: none"> · Adding different options instead of high five. · The quest sounds fun. But I don't fully understand the point of it? When the game fully releases, I may understand more.

<p>lacks structure/confusing option to interact</p>	<p>3. Option to allow player to get feedback from the people they high-fived- to see how they felt it might make them feel better.</p>	<p>Not sure what this is trying to teach, perhaps explain</p> <ul style="list-style-type: none"> · I'm not sure how but if the player could get feedback from the people, they high fived to see how they felt it might make them feel better.
<p>safety concerns/privacy</p>	<p>4. People might not like to have their face in a random game.</p>	<ul style="list-style-type: none"> · People might not like to have their face in a random game, and it might not be too nice to just ask them to leave the room.
<p>real world application/causes disturbance option to interact/would rather not</p>	<p>5. Don't like the idea of disrupting people's time for a personal cause. Difficult since it relies on the participation of others</p>	<ul style="list-style-type: none"> · I don't know if I like the idea of disrupting people's time for a personal cause (and for something as particularly frivolous as a high-five video) · A little bit more difficult since it relies on the participation of others.