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EXAMINING THE USE OF USER-CENTERED DESIGN IN GAMIFICATION: A DELPHI STUDY

Yang Chen
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By  Yang Chen

Entitled
EXAMINING THE USE OF USER-CENTERED DESIGN IN GAMIFICATION: A DELPHI STUDY

For the degree of  Doctor of Philosophy

Is approved by the final examining committee:

James Mohler  Bedrich Benes
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Patrick Connolly

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EXAMINING THE USE OF USER-CENTERED DESIGN IN GAMIFICATION: A DELPHI STUDY

A Dissertation
Submitted to the Faculty
of
Purdue University
by
Yang Chen

In Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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West Lafayette, Indiana
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# TABLE OF CONTENTS

<p>| LIST OF TABLES | viii |
| LIST OF FIGURES | xi |
| ABSTRACT | xii |
| CHAPTER 1. INTRODUCTION | 1 |
| 1.1 Background | 1 |
| 1.2 Significance | 2 |
| 1.3 Statement of Purpose | 3 |
| 1.4 Research Questions | 3 |
| 1.5 Assumptions | 3 |
| 1.6 Limitations | 4 |
| 1.7 Delimitation | 4 |
| 1.8 Definition of Key Terms | 4 |
| 1.9 Overview of Study | 5 |
| 1.10 Organization | 6 |
| 1.11 Summary | 7 |
| CHAPTER 2. LITERATURE REVIEW | 8 |
| 2.1 Approach to This Review | 8 |
| 2.2 Overview of Gamification | 9 |
| 2.3 Gamification Design Approaches | 10 |
| 2.3.1 Pointsification | 10 |
| 2.3.2 Intrinsic and Extrinsic Motivation | 12 |
| 2.3.3 Meaningful Gamification | 13 |
| 2.3.4 Player Centered Design | 14 |</p>
<table>
<thead>
<tr>
<th>2.4</th>
<th>Psychological Basis of Gamification Design</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.1</td>
<td>Behaviorism</td>
<td>15</td>
</tr>
<tr>
<td>2.4.2</td>
<td>Cognitivism</td>
<td>18</td>
</tr>
<tr>
<td>2.5</td>
<td>Applications of Gamification</td>
<td>20</td>
</tr>
<tr>
<td>2.5.1</td>
<td>Gamification in Education</td>
<td>20</td>
</tr>
<tr>
<td>2.5.2</td>
<td>Gamification in Business</td>
<td>22</td>
</tr>
<tr>
<td>2.5.3</td>
<td>Gamification in Collaborative Problem Solving</td>
<td>22</td>
</tr>
<tr>
<td>2.5.4</td>
<td>Gamification in Behavioral Modification</td>
<td>24</td>
</tr>
<tr>
<td>2.6</td>
<td>User-Centered Design</td>
<td>26</td>
</tr>
<tr>
<td>2.6.1</td>
<td>Overview of User-Centered Design Theory</td>
<td>26</td>
</tr>
<tr>
<td>2.6.2</td>
<td>Process of User-Centered Design</td>
<td>27</td>
</tr>
<tr>
<td>2.6.3</td>
<td>Methods of User-Centered Design</td>
<td>29</td>
</tr>
<tr>
<td>2.6.4</td>
<td>Applications of User-Centered Design</td>
<td>30</td>
</tr>
<tr>
<td>2.7</td>
<td>The Delphi Method</td>
<td>30</td>
</tr>
<tr>
<td>2.7.1</td>
<td>Overview of the Delphi Method</td>
<td>31</td>
</tr>
<tr>
<td>2.7.2</td>
<td>Procedures of the Delphi Method</td>
<td>32</td>
</tr>
<tr>
<td>2.7.3</td>
<td>Challenges of Using the Delphi Method</td>
<td>34</td>
</tr>
<tr>
<td>2.7.4</td>
<td>Applications of the Delphi Method</td>
<td>35</td>
</tr>
<tr>
<td>2.8</td>
<td>Summary</td>
<td>36</td>
</tr>
</tbody>
</table>

**CHAPTER 3. RESEARCH DESIGN** ................................................. 38

| 3.1  | Methodology                              | 38 |
| 3.1.1| Theoretical Framework                    | 39 |
| 3.1.2| Research Site                            | 40 |
| 3.1.3| Study Phases                             | 40 |
| 3.1.4| Participants                             | 41 |
| 3.1.5| Sampling Strategy                        | 43 |
| 3.1.6| Motivation                               | 43 |
| 3.1.7| Researcher Relationship                  | 44 |
| 3.2  | Data Collection                          | 44 |


<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.1</td>
<td>Data Types</td>
<td>44</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Phase A Procedure</td>
<td>45</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Phase B Procedure</td>
<td>46</td>
</tr>
<tr>
<td>3.3</td>
<td>Data Analysis</td>
<td>48</td>
</tr>
<tr>
<td>3.3.1</td>
<td>Phase A Data Analysis</td>
<td>48</td>
</tr>
<tr>
<td>3.3.2</td>
<td>Phase B Data Analysis</td>
<td>49</td>
</tr>
<tr>
<td>3.3.3</td>
<td>Delphi Consensus</td>
<td>50</td>
</tr>
<tr>
<td>3.3.4</td>
<td>Item Stability</td>
<td>51</td>
</tr>
<tr>
<td>3.4</td>
<td>Validity and Reliability</td>
<td>53</td>
</tr>
<tr>
<td>3.5</td>
<td>Protection of Human Subjects</td>
<td>53</td>
</tr>
<tr>
<td>3.6</td>
<td>Summary</td>
<td>54</td>
</tr>
</tbody>
</table>

**CHAPTER 4. DATA AND ANALYSIS** ................................................. 55

| 4.1     | Schedule of Data Collection | 55   |
| 4.2     | Pre-Delphi Round Data | 57   |
| 4.2.1   | Participant Description | 57   |
| 4.2.2   | Survey Data | 59   |
| 4.2.3   | Data Analysis | 71   |
| 4.3     | First Delphi Round Data | 89   |
| 4.3.1   | Participant Description | 89   |
| 4.3.2   | Data Presentation | 90   |
| 4.4     | Second Delphi Round Data | 106  |
| 4.4.1   | Participant Description | 106  |
| 4.4.2   | Data Presentation | 106  |
| 4.5     | Third Delphi Round Data | 117  |
| 4.5.1   | Participant Description | 117  |
| 4.5.2   | Data Presentation | 118  |
| 4.5.3   | Summary | 123  |

**CHAPTER 5. RESEARCH FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS** ................................................................. 124
5.1 Research Findings ............................................................................................... 124
  5.1.1 UCD Workflow ......................................................................................124
  5.1.2 Defining Players .....................................................................................126
  5.1.3 Play Testing ............................................................................................129
  5.1.4 Gamification Evaluation ........................................................................130
  5.1.5 User Participation ...................................................................................131
  5.1.6 Challenges of Using UCD in Gamification ...........................................133
  5.1.7 Suggested References for Gamification Beginners ................................134

5.2 Conclusions ...................................................................................................... 136
5.3 Recommendations for Future Studies ................................................................. 139
5.4 Summary ...................................................................................................... 140

LIST OF REFERENCES ........................................................................................... 141

APPENDICES

Appendix A. Example Letter for Participant Recruitment ........................................ 151
Appendix B. Example Letter to the Interested Candidates ......................................... 152
Appendix C. Research Participant Consent Form .................................................... 153
Appendix D. Participant Qualification Checklist and Demographics Information Form .......................................................................................................................... 155
Appendix E. An Interview on Gamification Design Process ..................................... 156
Appendix F. Conditional Questions to Participants Who Answered “Yes” in Question 5 of the Interview on Gamification Design Process .................................................. 157
Appendix G. Conditional Questions to Participants Who Answered “No” in Question 5 of the Interview on Gamification Design Process .................................................. 158
Appendix H. Example Reminder Letter in Phase A ................................................. 159
Appendix I. Example Letter to Participants Who Dropped off in Phase A ............... 160
Appendix J. Example Letter to Participants Completed the Phase A Survey ............. 161
Appendix K. Example Letter of the Phase B Round 1 Survey .................................. 162
Appendix L. Phase B Round 1 Survey .................................................................... 163
Appendix M. Example Thank You Letter in Phase B Round 1 ................................ 173
Appendix N. Example Reminder Letter in Phase B Round 1 ..................................... 174
Appendix O. Example Letter to Participants Who Dropped off in Phase B Round 1 175
Appendix P. List of Design Heuristic Reached Consensus in Phase B Round 1 ...... 176
Appendix Q. Example Letter of the Phase B Round 2 Survey ................................. 184
Appendix R. Phase B Round 2 Survey .................................................................... 185
Appendix S. Example Reminder Letter in Phase B Round 2 ................................. 198
Appendix T. Example Thank You Letter in Phase B Round 2 ............................... 199
Appendix U. Example Letter to Participants Who Dropped off in Phase B Round 2 200
Appendix V. List of Design Heuristic Reached Consensus in Phase B Round 2 ...... 201
Appendix W. Example Letter of the Phase B Round 3 Survey .............................. 212
Appendix X. Phase B Round 1 Survey ..................................................................... 213
Appendix Y. Example Thank You Letter in Phase B Round 3 .............................. 221
Appendix Z. Example Reminder Letter in Phase B Round 3 ................................. 222
Appendix AA. Example Letter to Participants Who Dropped off in Phase B Round 3 ...
...................................................................................................................................... 223
VITA ............................................................................................................................. 224
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1 Delphi Method Diversity - Published Research by Skulmoski, Hartman and Krahn (2007)</td>
<td>35</td>
</tr>
<tr>
<td>Table 2.1 Delphi Method Diversity - Published Research by Skulmoski, Hartman and Krahn (2007) (continued)</td>
<td>36</td>
</tr>
<tr>
<td>Table 4.1 Schedule of Data Collection</td>
<td>58</td>
</tr>
<tr>
<td>Table 4.2 Participants Demographic Information</td>
<td>58</td>
</tr>
<tr>
<td>Table 4.2 Participants Demographic Information (continued)</td>
<td>58</td>
</tr>
<tr>
<td>Table 4.3 Five Themes That Emerged in This Study</td>
<td>72</td>
</tr>
<tr>
<td>Table 4.4 Design Heuristics Related to UCD Workflow</td>
<td>73</td>
</tr>
<tr>
<td>Table 4.4 Design Heuristics Related to UCD Workflow (continued)</td>
<td>74</td>
</tr>
<tr>
<td>Table 4.4 Design Heuristics Related to UCD Workflow (continued)</td>
<td>75</td>
</tr>
<tr>
<td>Table 4.5 Design Heuristics Related to Defining Players</td>
<td>77</td>
</tr>
<tr>
<td>Table 4.5 Design Heuristics Related to Defining Players (continued)</td>
<td>58</td>
</tr>
<tr>
<td>Table 4.6 Design Heuristics Related to Play Testing</td>
<td>80</td>
</tr>
<tr>
<td>Table 4.6 Design Heuristics Related to Play Testing (continued)</td>
<td>81</td>
</tr>
<tr>
<td>Table 4.7 Design Heuristics Related to Gamification Evaluation</td>
<td>83</td>
</tr>
<tr>
<td>Table 4.7 Design Heuristics Related to Gamification Evaluation (continued)</td>
<td>84</td>
</tr>
<tr>
<td>Table 4.8 Design Heuristics Related to User Participation</td>
<td>86</td>
</tr>
</tbody>
</table>
Table 4.18 Stability Calculations for DH19. ................................................................. 121
Table 4.19 Items with the Stability Score Larger Than 0.2........................................... 122
Table 5.1 Process for Reaching Concensus of Design Heuristics in Theme 1........... 125
Table 5.2 Process for Reaching Concensus of Design Heuristics in Theme 2......... 127
Table 5.3 Process for Reaching Concensus of Design Heuristics in Theme 3........ 129
Table 5.4 Process for Reaching Concensus of Design Heuristics in Theme 4........ 131
Table 5.5 Process for Reaching Concensus of Design Heuristics in Theme 5......... 133
<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1 Octalysis gamification model created by Yukai Chou (2010)</td>
<td>13</td>
</tr>
<tr>
<td>Figure 2.2 A chart demonstrating the different response rate of the</td>
<td>17</td>
</tr>
<tr>
<td>four simple schedules of reinforcement, each hatch mark designates a</td>
<td></td>
</tr>
<tr>
<td>reinforcer being given. Skinner (1958)</td>
<td></td>
</tr>
<tr>
<td>Figure 2.3 Three innate psychological needs comprise the Self-Determination Theory of motivation. Deci and Ryan (2010)</td>
<td>19</td>
</tr>
<tr>
<td>Figure 2.4 Foldit, a website about solving puzzles for science.</td>
<td>23</td>
</tr>
<tr>
<td>Figure 2.5 Google image labeler.</td>
<td>24</td>
</tr>
<tr>
<td>Figure 2.6 Speed Camera Lottery turned speeding tickets into lottery</td>
<td>25</td>
</tr>
<tr>
<td>tickets for drivers who obeyed the speed limit, reducing speeding and</td>
<td></td>
</tr>
<tr>
<td>improving driver satisfaction (Retrieved from Zichermann and</td>
<td></td>
</tr>
<tr>
<td>Cunningham, 2011)</td>
<td>25</td>
</tr>
<tr>
<td>Figure 2.7 Fitocracy gamifies users’ performance with points.</td>
<td>25</td>
</tr>
<tr>
<td>Figure 4.1 Participants Age Distribution in the Pre-Delphi Round</td>
<td>58</td>
</tr>
<tr>
<td>Figure 5.1 Responses of Four Data Collection Rounds</td>
<td>137</td>
</tr>
<tr>
<td>Figure 5.2 Responses Rates of the Four Study Rounds</td>
<td>137</td>
</tr>
</tbody>
</table>
This study examined using the user-centered design (UCD) approach in gamification product development with the research question, "What opinions do experienced gamification designers have in using the UCD method as they develop and design gamification products?" Through the multi-phase interactions between researcher and participants of this Delphi study, specific survey questions were developed such as, how does the UCD method work in gamification design, how well does it work, and suggestions on how it should be used. Gamification design experts were recruited as research participants and four Delphi rounds of data collection were conducted. Thirty-three design heuristics within five themes (UCD workflow, defining players, play testing, gamification evaluation, and user participation) about using UCD in gamification were created from Phase A. Participants’ consensus on these design heuristics were examined through three rounds in phase B: four design heuristics or statements were removed, seven design heuristics or statements did not reach consensus based on a series of stability calculations, and all the remaining design heuristics reached consensus. Findings of this research also included gamification design challenges and recommended references for gamification design beginners. This document includes a listing of design heuristics and recommendations, as well as suggestions for future studies on gamification design.
CHAPTER 1. INTRODUCTION

The chapter provides an introduction to this study, focusing on the background, significance, purpose and questions related to the research. It also presents assumptions, limitations, delimitations, key terms, and an overview of the methodology used.

1.1 Background

As one develops an understanding of game studies, it becomes natural for one to ask: how could the fun of games be used and developed to benefit more people than just game players? With further exploration along those lines and reviewing related literature about using game elements in a non-game environment, it is possible to develop a strong research interest focused on gamification. Gamification means, “the use of game thinking and game mechanics in non-game contexts to engage users in solving problems” (Zichermann & Cunningham, 2011). As an interdisciplinary research topic, the study of gamification draws from several fields, including game study, human-computer interaction, and psychology. There have been indiscriminate discussions about gamification’s reasonability, value, effectiveness, etc., which contribute to the need for more studies on gamification and its validity as a discipline. Because gamification has been applied to multiple areas for different products, the ultimate goal of gamification is to motivate and engage users.

To engage users toward specific behaviors for solving problems, getting a good command of how to motivate them is very important. An examination of extrinsic and intrinsic motivation research within gamification studies tells us that understanding the needs of the target user should be the first step in gamification design. In gamification practice, there are many unanswered questions about the role and use of the UCD approach in the design process. These include: how does it work, how well does it work,
and are there best practices associated with using UCD methods? To answer these questions and to help gamification designers have a clearer idea for using UCD methods in gamification is a challenge because studies in this field are rare.

With the development of gamification research and practices, game elements have been applied in many other contexts, including business, education, training, and other areas in various forms. This study differs from traditional experimental testing (in which subjects in a control group and an experimental group are compared) in that this study uses the Delphi method to focus on testing a theoretical hypothesis of using UCD in gamification practices by aggregating expert designer opinions.

1.2 Significance

The study results could benefit both gamification designers and academic researchers, who question how to design gamification that could serve users better. By collecting data through Delphi methods from gamification design experts, the research results include the experts' working experiences and design heuristics, which could let novice designers have a better understanding of how to adopt the UCD approach in their gamification design practice. They could become aware of the professional skills that are useful for conducting gamification design with user participation. These strategies can empower them to develop gamification design more effectively and efficiently. Also, the results of this study are significant to organizations that develop gamification designs. A solid understanding of gamification design with a UCD approach could help organizations with their designer recruitment, professional training, and design project optimization, etc.

This study is innovative in that it is the first to use the Delphi method to study UCD in gamification. Delphi methods are suitable for studying topics that are new and undeveloped because the Delphi panels express their opinions from a perspective of forecasting. Using UCD in gamification is an idea that has not been widely explored, thus it is appropriate for this study. The Delphi panel of this study was made of gamification design experts who were asked to share their working experience and opinions about this research topic.
1.3 **Statement of Purpose**

The purpose of this research is to identify and describe how UCD is used in gamification design practices. The Delphi method was used to explore the adoption of UCD in the gamification design industry. It is expected that understanding experienced gamification designer practices will lead to insights that will advance gamification design techniques and increase broader understanding of UCD’s applications.

1.4 **Research Questions**

As noted, one of the main questions in this research is: what opinions do experienced gamification designers have in using the UCD method as they develop and design gamification products?

Because one special characteristic and a big challenge of a Delphi study is the lack of control over the multi-phase interactions between researcher and participants, research questions are dependent upon participant feedback from previous phases. The research questions focus on how UCD methods work in gamification design and how well they work in general, as well as to gather suggestions on how best to use them. In the first phase of this Delphi study, questions about the working experience of using UCD in gamification design and the evaluation of its effect and efficiency were asked in order to help participants open their minds in expressing their opinions in this area. The research questions of second and subsequence phases were developed based upon the results of the analysis performed on data collected during the first phase.

1.5 **Assumptions**

The assumptions of this study are as follows:

1. There was a need to examine the user centered design method in the gamification industry from the experienced designer perspective (with a Delphi method) to get insight into the development of the gamification design approach.

2. All participants provided their responses honestly in the inquiry process with respect to their background, professional knowledge, and working experience in gamification design field.
3. Only experienced gamification designers served as participants in the Delphi study.
4. Participants were free not to answer a question by selecting the "Not Applicable" button in the survey.
5. Participants were able to express their opinions sufficiently by answering the research questions.

1.6 **Limitations**

The limitations of this study were as follows:
1. The study was limited to the participant sample size of volunteer gamification designers that could be reached in the initial stage of the study.
2. This study was limited by the amount of cooperation of participants.
3. This study was limited by the accuracy of the criteria of participant recruitment in defining experienced gamification designers.

1.7 **Delimitation**

The delimitations of this study were as follows:
1. The available data collection tool, Purdue Qualtrics system, was used in this study.
2. The Internet was used in this Delphi study for communicating with participants.
3. A period of six months was allotted to collect data from the participants.

1.8 **Definition of Key Terms**

Delphi Method-A structured communication technique originally developed as a systematic, interactive forecasting method which relies on a panel of experts (Dalkey & Helmer, 1963).

Gamification-The use of game thinking and game mechanics in non-game context to engage users in solving problems (Zichermann & Cunningham, 2011).

Iteration-refers to the feedback process, which allows and encourages the selected Delphi participants to reassess their initial judgments about the information provided in previous iterations (Hsu & Sandford, 2007).

Personas-In user-centered design process, fictional characters created to represent the
different user types that might use a site, brand, or product in a similar way (Lidwell, Holden & Butler, 2003).

Scenarios-In user-centered design process, a fictional story about the "daily life of" or a sequence of events with the primary stakeholder group as the main character (Henry, Martinson & Barnicle, 2003).

User centered design (UCD)-A process in which the needs, wants, and limitations of end users of a product, service or process are given extensive attention at each stage of the design process (Norman & Draper, 1986).

User experience-A person's perceptions and responses that result from the use or anticipated use of a product, system or service (ISO 9241-210, 2010).

1.9 Overview of Study

Use of gamification has been emerging in many areas. In academia, research about gamification has covered areas that include its rationality, value, “pointsification” design, motivation in gamification, etc. Even so, little attention has been paid toward understanding the gamification design approach from the user perspective to determine how to motivate and engage users effectively. Researchers such as Zichermann and Cunningham (2011) have noted that consideration involving the users’ mind is important. UCD, as a mature method, has been developed and used in human computer interaction (HCI) design area for a long time. A study about using UCD as a gamification design approach seemed to be a project that had the possibility to contribute to the gamification industry in a unique way.

All of the questions discussed in this research were intended to solicit the opinions of experienced gamification designers about using UCD in their design practices. As the development of gamification design advances, UCD design practices will demand more and more consideration. We are increasingly realizing that user demand is critical from the perspective of psychology, therefore, the goal of this research is to determine how UCD works in the gamification design industry, how well it worked, and how to take advantage of this design approach appropriately. With these questions
answered, the theoretical argument would be justified and future suggestions could be made. A framework of user centered gamification design approach could be created.

To achieve the goals stated above, the Delphi method was adopted for collecting experienced gamification designer experience, knowledge and practice suggestions. The Delphi method is widely used and accepted for gathering data from respondents within their expertise domain. Compared to other statistical methods, this technique is designed as a group communication process that aims to achieve a convergence of opinion on a specific real-world issue. The Delphi method is also well suited as a method for consensus-building by using a series of questionnaires delivered using multiple iterations to collect data from a panel of selected subjects (Hsu & Sandford, 2007).

1.10 Organization

There are five main chapters. Chapter 1 is the introduction to the study. Chapter 2 provides a literature review of the three main knowledge areas of this study namely, gamification, user centered design approach, and the Delphi method. The chapter starts with a review of gamification in terms of gamification criticism, its psychological basis, design techniques, and examples of gamification applications. The chapter then reviews the user centered design approach with emphasis on the reasonability of user centered gamification design from the perspective of psychology. Finally, a general review of the development, procedure, challenges, and application, is presented.

Chapter 3 describes how the Delphi method is implemented in this study. First, it starts with an overview of this methodology, including the theoretical framework, research condition and participants sampling, etc. Second, the chapter describes how qualitative data and quantitative data was collected in this research. Third, the chapter explains the data analysis methods used. Also, methods of calculating Delphi consensus and item stability are described. Finally, the chapter addresses how validity and reliability was ensured and how participants' rights were protected.

Chapter 4 presents the research data and analysis. First, the timeline of data collection is introduced. Second, the collected research data and analysis is presented in
the order of pre-Delphi round, the first Delphi round, the second Delphi round, and the third Delphi round.

Chapter 5 discusses the findings from this study and makes appropriate conclusions. The chapter also summarizes the entire study in terms of methodology, data collection and analysis, and research findings. Finally, the scope and need for future work recommendations are presented.

1.11 Summary

This chapter has described the research related questions pertaining to this study. It presented the scope and significance of this research. It also provided a list of assumptions, limitations and delimitations. The next chapter presents a brief summary of relevant literature covering gamification, UCD, the argument for using UCD in gamification design from a theoretical perspective, and a review about the Delphi method used in this research.
CHAPTER 2. LITERATURE REVIEW

Using game elements in a non-game environment is not a new idea in the public domain. The traditional game elements such as points, badges and leader boards have been already used in numerous ways by the Boy Scouts and the military (Zichermann & Cunningham, 2011). Today, the idea of gamification continues to be a popular topic within many field of research and design.

In order to gain a better understanding of the existing research in the field of gamification and the related research methods in this study, Chapter 2 presents an overview of gamification research, gamification design approaches, psychological basis of gamification design, and application of gamification. Then, this chapter discusses the UCD Theory in terms of the design process, methods, and applicability. Finally, the chapter reviews the Delphi method, including its procedure, benefits, drawbacks and applicability.

2.1 Approach to This Review

The three main areas reviewed in this study are gamification, UCD, and the Delphi method. First, modern gamification is a relatively new research topic compared to many other traditional research fields, the breadth and depth of its literature is lacking. Because the focus of this dissertation involves the use of UCD as a design approach in gamification, gamification design techniques, user psychological basis, and its applications are reviewed for emphasizing the design-user-application relationship.

Second, how UCD is adopted in game related product design will be reviewed with the purpose of providing its reasonability in gamification product development. The
UCD design process, its methods and application are three main aspects that are covered.

Third, the Delphi method will be reviewed comprehensively including its principles, procedure, benefits, challenges, and applications.

In summary, the three main parts of this literature review aim at stating the logical rationality and feasibility of this study.

2.2 Overview of Gamification

According to Deterding, Dixon, Khaled, and Nacke (2011), gamification can be broadly defined as using those same elements that comprise so-called games, making games fun and motivating users in a non-game context to influence behavior. This definition describes gamification as a process for achieving some intended outcome. With the development of society and technology, video games as a concept have been instrumentalized to various degrees in order to accomplish vastly different goals (McGonigal, 2010) such as the being integrated into marketing strategies, educational methods, and other related fields.

One of the early implementation approaches of the gamification idea is about using points, badges and leaderboards (PBLs) to motivate users to behave in certain ways. This reward-structure was once critiqued with another neologism referred to as "pointsification" (Robertson, 2010). In this type of gamification design, true game mechanics are replaced by simple reward systems and elements like storytelling and experiences are excluded. In the marketing area, Bogost (2011) referred to the term "pointsification" as a marketing fad. He suggested "exploitationware" as a more suitable name for the games used in marketing. Jane McGonigal (2011) labeled her work under the term "gameful design" for emphasizing that gameplay itself is the reward while the rewards in gamification are outside of gameplay.

However, in the author's opinion, the above criticism on gamification has various biases. These include either a focus on limited gamification design techniques such as PBLs, or limited gamification application areas such as marketing. When we consider the concept of "gamification" from a generalized perspective using game elements in a non-game environment, the benefits of this concept are easier and clearer to understand. After
the early discussion of the criticism of the term "gamification", game designers were called to apply their knowledge and skills to the field of gamification design constructively (Herger, 2013). Therefore, even though the criticism of gamification wasn’t formally documented in an academic way (most were articles, blogs, or speeches), the criticism influenced designers and researchers to better understand and elevate gamification to the next level. With the development of this concept, gamification as a general term is more readily accepted and used. Hamari, Koivisto and Sarsa (2014) reviewed empirical studies about gamification effectiveness. The review indicated that gamification provides positive effects, while the effects are very different depending on the gamification implementation context and users. The results show the importance of customized gamification design for different scenarios and user types. Therefore, user study within gamification becomes a promising topic that draws attention from the gamification designer and researcher.

2.3 Gamification Design Approaches

This section reviews four representative gamification design approaches. They are not in an absolute chronological order, but represent a historical sequence of gamification development. The four approaches include pointsification, intrinsic and extrinsic motivation, meaningful gamification, and player centered design.

2.3.1 Pointsification

Pointsification as a gamification design approach started as evidence of the first attempts in the early implementation of gamification. This approach usually features a reward-system based on PBLs. These are used as a form of mechanics to drive the engagement of the user for accomplishing desired tasks or competitions. Lately, these types of rewards have evolved into more complex systems beyond traditional PBLs and include more of a "fun factor" feature.

The term "Pointsification" was first used by Robertson (2010), managing director of the UK game design company Hide&Seek. She pointed out that points and badges are least essential to games and they have no closer relationship to games than they do to
websites and fitness apps and loyalty cards. Therefore, she said, we should use the word “pointsification” instead of “gamification” in cases that are mainly composed of points and badges. Jaech (2012) also stated that points and badges are not actual game mechanics. They are just a means of tracking accomplishments in games and are not even a concept new to video games. People have been using points in sports since time immemorial (Jaech, 2012). Even though, the use of pointsification and the PBLs was criticized as being different from the core concept of gamification, it plays an indispensable role as a phenomenon in the early phase of gamification research. It also represents an approach that emphasizes a direct and simple reward system in gamification design.

With the emergence of pointsification related designs, a discussion about the negative effectiveness of pointsification or rewards-based system has been raised. Scholars argue that the act of doing particular tasks simply to gain points and exclusive badges can be initially interesting but will not last long. After continued use of the product, users may not feel the same involvement and there might be an increasing tendency to abandon the game (“Why gamification is not a simple pointsification”, 2011). Beresford (2011) commented that blindly giving points is a disadvantage because the extrinsic rewards might make people over-justify what they are doing, and will ultimately decrease their initial engagement.

There are other concerns about pointsification. For example, pointsification may not be appropriate for a system that features a high level of user engagement because the reward system might interfere with the users' intrinsic motivation to use the software. Conversely, in an environment where short term rewards are needed for helping with long term objectives, pointsification as a point dominated paradigm can be very useful for maintaining users' commitment. For example, in the context of a fitness program, the results of the exercise on a user's body are not clearly visible in the very beginning. A well designed pointsification system might be able to help the user refrain from losing focus or giving up on a training program (“Why gamification is not a simple pointsification”, 2011).
2.3.2 Intrinsic and Extrinsic Motivation

Generally, most of the current gamification applications are trying to pay more attention to taking care of both users' the intrinsic and extrinsic motivation instead of just simply relying on PBLs such as pointsification. Intrinsic and extrinsic motivation are features stressed by researchers in many gamification design frameworks (Zichermann, 2011). According to Deci and Ryan (2010), intrinsic motivation is defined as the doing of an activity for its inherent satisfaction rather than for some separable, external consequence. When intrinsically motivated, a person is moved to act for the fun or challenge provided, rather than relying on external prodding, pressures, or rewards. Intrinsic motivation refers to doing an activity simply for the enjoyment of the activity itself, rather than for its instrumental value (Deci & Ryan, 2010). Doing something for the purpose of obtaining an external reward or outcome is called extrinsic motivation (Deci & Ryan, 2010).

Theoretically, the approach of emphasizing both intrinsic and extrinsic motivation tries to fix the issue of pointsification that users can only be motivated for a short time. Users could be engaged deeper and longer with the combination of intrinsic and extrinsic motivation; also they can experience more fun in these types of gamification applications. Following the approach of emphasizing intrinsic and extrinsic motivation, gamification design frameworks were developed for various scenarios including the business workplace (Kumar & Herger, 2013) and classroom (Techthought Staff, 2014). One representative gamification design framework within this approach is the Octalysis model (See Figure 2.1) created by gamification guru Yukai Chou (2010). It is a systemic framework of analyzing and building game fun strategies with eight core drives that contain both intrinsic and extrinsic motivations.
2.3.3 Meaningful Gamification

In order to address the relation between intrinsic and extrinsic motivation more appropriately, another representative gamification design approach was created called meaningful gamification (Nicholson, 2012). The idea is: through information interaction between users and designers, it is possible to design game elements that are meaningful to users. The purpose of meaningful gamification is to provide a meaningful game experience to users underlying a non-game setting. The focus of meaningful gamification is on elements of play instead of scoring. Relying on creating better connections between the game elements and interests, needs, or goals in the user's life, meaningful gamification allows users to have a more internalized experience with less dependence upon external rewards for motivation.

Under the theoretical framework of meaningful gamification design, monotonous game elements and designs cannot fit all users' meaningful desire. Gamification designers...
should customize the game elements design in order to appeal to different users. Users can even create their own activities based on customizable gamification systems.

Meaningful gamification design not only creatively involves the use of UCD in gamification design for the first time, but also emphasizes the relation between intrinsic and extrinsic motivation. However, this design approach was presented in a theoretical manner. Little applied experimental studies about its use have been conducted, and there are calls for much further work in this area (Nicholson, 2012).

2.3.4 Player Centered Design

User Centered Design is a design theory that puts the user and his/her goals in the center of the design and development process. UCD products should be closely aligned with the user’s needs. Based upon the UCD theory, Kumar and Herger (2013) introduced a concept called Player Centered Design (PCD) that puts the player at the center of the design and development process to incorporate the concept of engagement. According to examples presented by PCD in Kumar and Herger (2013), PCD is primarily used in the business gamification design area.

The PCD process typically starts with a good understanding of the player and his or her goals. Then, the designer defines the mission, which involves the understanding of current business scenario, identifying the desired target business outcome, and creating an appropriate activity for the gamification project. All these processes will be followed by psychological research on motivation. In the end, based on a solid research foundation, designers can apply game mechanics thoughtfully into the gamification design system.

PCD and meaningful gamification both involve the theory of UCD. However, PCD provides more attention to the gamification project client’s interests by including the client's business research, while the meaningful gamification approach is based on the users' intrinsic motivation. PCD is a more mature design approach that requires a series of detailed systematic design plans. As a relatively new gamification design approach, PCD has not been developed enough. Currently, there is little evidence of empirical study
about PCD. Therefore, further studies are needed to examine its usability, generalizability, effectiveness and efficiency evaluation, etc.

2.4 Psychological Basis of Gamification Design

According to the gamification design approaches reviewed above, more research on the empirical study of gamification users is needed. This section examines the psychological basis of gamification users and its effect on the rationale and justification of this study.

2.4.1 Behaviorism

There is a long history of psychological study to get people to do things. In the latter half of the twentieth century, one dominant theory in that area was known as behaviorism. The basic idea involving behaviorism is that humans and animals respond to external stimuli in predictable ways. Two classical behaviorism studies include the experiment of salivating dogs by Ivan Pavlov (Saunders, 2006) and the “Skinner boxes” experiment that gave food or electric shocks to pigeons and rats by B.F. Skinner (Catania & Harnad, 1988). Behaviorist studies like these examined the reinforcement effects of reward and punishment on animals and extrapolated the lessons learned to humans.

Behaviorist thinking suggests that a systematically applied reward or punishment would condition and reinforce responses in anticipation of further rewards or punishments. For example, in the corporate world, rewards of payment and punishments of demotion or firing are expected to influence employees’ behaviors, and clearly, they do.

The behaviorism approach works in explaining human behavior purely based on external stimuli. In the author's opinion, it can be seen as a theoretical framework that explains the efficacy of gamification outcomes. People's behaviors are modified through positive and negative reinforcement of adaptive behavior and/or through extinction, punishment and/or satiation of reduction of behavior. Gamification design works in a similar approach to influence user behavior through its incentive mechanism. For example, the PBL's reward system is a typical application of positive reinforcement used in gamification design. The treatment of PBLs used in the gamification discourse is
similar to the way that token economies handle their tokens. A token economy is a system of behavior modification based on the systematic reinforcement of target behavior (Deterding, Sicart, Nacke, O’Hara, & Dixon, 2011). The specific method of influencing or changing behavior is what ties gamification approaches directly to behaviorism.

Within the field of behaviorism, the idea of the principle of reinforcement suggests that human free will is actually an illusion and any human action is the result of the consequences of some stimulus (Skinner, 1958). When an action's consequences are good, the action has a high chance to be reinforced and repeated, but if the consequences are bad, there is a high chance that the action will be terminated. When tokens are used for motivating and engaging users in gamification designs, these indicate the presence of an applied principle of reinforcement.

The most notable schedules of reinforcement are the operant conditioning principles presented by Skinner (1958):

1. Fixed Interval Schedule (FI): Reinforcements are presented at fixed time periods, if an appropriate response is made
2. Variable Interval Schedule (VI): Reinforcements are presented based on an average time that has expired since the last reinforcement
3. Fixed Ratio Schedule (FR): Reinforcements are delivered after a specific number of responses have been made
4. Variable Ratio Schedule (VR): Reinforcements are delivered after a particular average number of responses, like slot machines

The response rates of these simple schedules of reinforcements are shown in Figure 2.2. Both FI and VI reinforcements follow a time scale that is independent the number of responses. These two schedules tend to produce slow and methodical responses. Compared with the FR schedule, the VR schedule produces slightly higher rates of response because the participant doesn’t know when the next reinforcement will occur. The higher the ratio of reinforcements delivered, the higher the response rate tends to be (Schacter, Gilbert, & Wegner, 2009). Actually, games designers have been
benefiting from this phenomenon about reinforcements and responses for a long time. One example is the slot machine. Players don’t know when the next reinforcement will be, so the rate of responses (keep playing) is high.

Figure 2.2. A chart demonstrating the different response rate of the four simple schedules of reinforcement, each hatch mark designates a reinforcer being given. Skinner (1958)

By reviewing and analyzing behaviorism and related psychology theories, the significance of the extrinsic reward system in gamification design is reinforced. When implementing extrinsic stimuli of players, designers need to realize that the responses are not only influenced by the schedule of reinforcement, but also by the types and amounts of reinforcement. This concept holds for both reinforcement and punishment. Therefore, the question of what and how much reinforcement to give to the users for getting the desired behavior modification deserves more attention. Acquiring a solid understanding of target users is very important in properly manipulating game elements in the gamification design process. UCD as a design approach that places users in the center of
design and emphasizes the importance of user study with various methods could be an appropriate candidate design approach to be adopted in gamification design.

In general, behaviorism partially explains the working system of gamification from the perspective of user extrinsic motivation, but it lacks realization and explanation about the complexity of user mental activity and their intrinsic motivation outcomes. In the next section, cognitivism is reviewed as a different perspective for studying the gamification user psychological experience.

2.4.2 Cognitivism

Yet another psychological basis featured in gamification design is cognitivism. Different from behaviorism, cognitivism asks what’s actually going on in people’s minds. One of the most influential cognitivism theories is the Self-Determination Theory (SDT) by Deci and Ryan (2010). Deci and Ryan (2010) suggest that human beings are inherently proactive with a strong internal desire for growth. However the external environment must support this internal desire, otherwise, these internal motivators will be thwarted. Thus, instead of assuming that the human being only responds to external reinforcements, SDT focuses on studying what people need to grow and flourish their innate well-being tendencies.

According to the SDT theory, there are three categories of innate human needs: competence, relatedness, and autonomy (see figure 2.3). Competence, or mastery, means dealing with the external environment effectively. Overcoming a difficult challenge such as learning how to dance the tango or filing a tax return would be an example of competence/mastery. Relatedness involves the universal desire of social connection and interaction with others, including being involved with family and friends. It can also manifest itself as a desire for a higher purpose, or making a difference. Autonomy suggests the innate need to feel in command of one’s life. It is a desire for doing meaningful things that are in harmony with one’s values.
Tasks that implicate one or more of the three innate human needs tend to be intrinsically motivated (Werbach & Hunter, 2012). Faced with an activity a person wants to do exemplifies "intrinsic" motivation. On the other hand, if a person feels that "he/she needs to do", involves "extrinsic" motivation because the motivation is not from the inside. The presence of intrinsic motivation means that a person wants to conduct a behavior without any hope of payment or other external benefits. Its origin can be traced to different activities for different people. Extrinsic motivation comes from outside a person's enjoyment or engagement with the activity (Werbach & Hunter, 2012).

Based on the SDT theory, users may be motivated intrinsically for doing the tasks that satisfy their innate needs. Gamification design takes advantage of this theory to motivate users in various ways. For example, gamification players enjoy leveling up and accumulating points with the motivation of competence or mastery; they enjoy social interactions because of the human need for relatedness; they enjoy multiple game choices and experiences since they have the desire for autonomy.

From the perspective of SDT, tangible rewards tend to have a substantially negative effect on the use of only intrinsic motivation (Deci, Koestner, & Ryan, 1999). Therefore, gamification designers and researchers need to work on motivating users, both intrinsic and extrinsic types. This is the mainstream of current gamification study. From
2.5 Applications of Gamification

Before gamification became a research topic, the idea of applying game elements, for example PBLs, had already been used for a long time. Zichermann and Cunningham (2011) mentioned that the Boy Scouts and the military are two examples:

In the Boy Scouts, badges serve as a visual point system. If a scout collects a certain number of badges, he is automatically elevated to the next level. In the military, badges are a public display of accomplishment. In both cases, they serve as a reward for the completion of an action that the institution deems important and worthy (p.56).

With the development of gamification research and practices, game elements have been applied in many other contexts, including business, education, training, and other areas in various forms. This section reviews the main application areas of gamification.

2.5.1 Gamification in Education

Education is an important application area of gamification design. In the educational context, gamification is adopted to maximize learner enjoyment and engagement through capturing student interest and inspiring them to continue learning (Huang & Soman, 2013). Gamification design can potentially influence student behaviors such as attending class, focusing on meaningful learning tasks, and learning initatively (Borys & Laskowski, 2013).

There are a few concepts like game-based learning and serious games that share a
similar meaning with gamification education. Gamification education occurs when a series of game elements is arranged into a non-game context such as a traditional school classroom (Lee & Hammer, 2011). Different from game-based learning, gamification education won't let students play a commercially produced video game or ask students to design and create their own games. Draeger (2014) summarized that each term has its specific emphasis: gamification emphasizes a non-game environment and motivation purpose; game-based learning emphasizes using games as instructional media and its education purpose; and serious games emphasize non-entertainment purposes. Bhasin (2014) suggests that gamification, game based learning, and serious games are effectively the same thing. Regardless, all these terms relate to strategic objects and a unique purpose.

One example of an interesting and successful gamification education approach is the Microsoft game Ribbon Hero 2, an add-on to the Office productivity suite. It is available as a free Microsoft download and aims to help educate users of Office 2007 and 2010 how to use the tools in the new Ribbon interface. In this system, users earn points by using new tools or functions automatically. Another example is an educational motivation system called Cogent in the Computer Graphics Technology department of Purdue University. It is used through the four years of study and emphasizes making the learning process more interesting and engaging. Students earn Cogent money through doing internships or participating in study related activities. Cogent money can be transacted in the Cogent currency market or used for paying labor in group projects in the curriculum.

Domínguez and colleagues (2013) conducted a series of quantitative experiments involving the study of the effectiveness of gamification in education. The research shows that students in an experimental group with gamified experience got higher scores in practical assignments than students in the control group. But research results also show that students in the experimental group participated less in class activities and performed poorly on written assignments. This research concludes that gamification education can help with student performance in some aspects, but further research is required to study how to fully develop the benefits of gamification design in the education area.
2.5.2 Gamification in Business

Besides its use in the field of education, gamification has also been implemented in business, especially in E-commerce. Companies like Foursquare, challenge people to earn badges and status by "checking in" at locations or events. Retail businesses also use various game elements such as competition and auction system to optimize customers' shopping experience. Customers need to compete with others to "win" the opportunity of purchasing some specific products. Gamification in business aims in letting customers not only enjoy the fun of shopping itself, but also making the shopping experience a game.

The academic study of gamification in the business area is limited, even though there are many practical cases adding excitement and fun to motivate customers. One example is the Gilt Groupe, clothing and accessories shopping website. The firm operates as a member-based system where only its members can view time-limited sales. For the top 1% most loyal customers, based on total value of past purchases and duration of membership, an exclusive service called the Gilt Noir category was launched. Gilt Noir members can view sale items 15 minutes earlier than others with their early access privilege, but cannot purchase them. Gilt Noir uses the early preview privilege as a premium benefit of access and exclusivity. This gamification design case shows that some game elements, like letting players being elite, successful, having ownership and possessions, are adopted by business industry to attract customers, influence their behavior, and increase sales.

2.5.3 Gamification in Collaborative Problem Solving

There are some studies that show gamification can be used for collaborative problem solving activities, such as structured brainstorming and crowd sourcing activity. For example, an MIT study found that ideation games could help by generating more and better ideas (Toubia, 2006). In the ideation activity, the researcher develops a practical, web-based, asynchronous "ideation game", which allows the implementation and testing of various incentive schemes. Two experiments were conducted using this system and the results demonstrated that incentives do have the capability to improve idea generation.
Crowd sourcing has also been gamified in games, like a website called *Foldit: Solve Puzzles for Science* (see Figure 2.4). This gamification design offers different puzzle games that are made of difficult science questions. The game is competitive and players can help with solving these science problems by playing the puzzle games. One game asks players to manipulate proteins into more efficient structures as a competition. This website quickly attracted a dedicated following of thousands of players (Markoff, 2010) because players could get the feeling of fun and accomplishment. This gamification activity does help with some scientific research, such as a paper (Eiben, et al., 2012) published on nature biotechnology. Another case, *Google Image Labeler* (see Figure 2.5) is used for generating image metadata, where users put labels for images for getting points. Players have the game fun experience through labeling images and collecting points for their work. Meanwhile, Google benefits from players' contribution to creating a huge image database.

*Figure 2.4. Foldit, a website about solving puzzles for science.*
2.5.4 Gamification in Behavioral Modification

Gamification can also be applied to behavioral modification in areas such as public administration and exercise training. Game designer Kevin Richardson designed a *Speed Camera Lottery* game (see Figure 2.6) with the gamification idea. In this game, all the cars that pass the checkpoint are photographed. Cars that obeyed the speed limits are entered into a prize drawing to win the fines of the speeders. The modified camera gave instant positive feedback in the form of a thumb up if a car obeyed the speed limit. The effect of this design shows that the speed dropped at the checkpoint by an average of 20% (Zichermann & Cunningham, 2011). The feedback from drivers was also positive; they thought the idea was fantastic.

In health care applications, *Fitocracy* (see Figure 2.7), is an example of gamification used for motivating user exercise behavior. This app encourages users to exercise more effectively by awarding the user with points according to their workout performance. When their points reach a specific amount, they can level up. The users can also gain levels and achievement badges by reaching fitness milestones or completing workout challenges of the gamification system (Jeffries, 2011).
Figure 2.6. Speed Camera Lottery turned speeding tickets into lottery tickets for drivers who obeyed the speed limit, reducing speeding and improving driver satisfaction (Retrieved from Zichermann and Cunningham, 2011).

Figure 2.7. Fitocracy gamifies users’ performance with points.
2.6 **User-Centered Design**

After examining the existing design approach, user psychology analysis and application of gamification in the previous sections, this section will examine UCD theory in terms of its definition, process, methods and application.

### 2.6.1 Overview of User-Centered Design Theory

User-Centered Design, abbreviated as UCD, can be considered as a practice, field, craft, framework, philosophy, discipline, or method of designing tools for human use by involving humans in the design process (Bødker, 2009). In UCD practice, users are invited to participate in the design activities, but do not produce the final design deliverables themselves. UCD is not about asking users directly what they want (Bødker, 2009), it is a collaboration of work between designer and users. Another definition of UCD is provided by Williams (2009) as follows: "...UCD is about a UCD practitioner (such as a user experience architect, interaction designer, information architect, etc.) profiling users and defining their behaviors of use and preferences for various aspects of a given application, and using that information to make design decisions about the web application (P.1)."

From the 1980s and 1990s, UCD has had multiple theory-related precursors involving research and design methods. For example, usability engineering (UE) (Nielsen, 1993) focused on user interface design and provided a solid foundation for the UCD theory. Human-computer interaction (HCI) (Norman & Draper, 1986) emphasized the relation between users and computer use from the perspective of cognitive psychology, computer engineering, and system design.

In the development history of UCD, Xerox’s Palo Alto Research Center (PARC) (established in 1970) played a significant role in the foundation of UCD. By 1971, impact of the psychological advances on the human factors of how computers were used was not yet very great, though the potential was clearly there (Card, Newell & Moran, 1983). In 1974, the Applied Information-Processing Psychology Project (AIP) was developed to create an applied psychology of human-computer interaction by conducting requisite basic research within a context of application (Card, Newell & Moran, 1983), which was
a cornerstone in the history of UCD. Norman and Draper (1986) first used the term UCD in their publication User Centered System Design: New Perspectives on Human-Computer Interaction. Today, ISO (ISO 9241-210, 2010) is available for human-centered design work involving interactive system. The standard provides six key principles that ensure a design will be user-centered. These are:

- The design is based upon an explicit understanding of users, tasks and environments.
- Users are involved throughout design and development.
- The design is driven and refined by user-centered evaluation.
- The process is iterative.
- The design addresses the whole user experience.
- The design team includes multidisciplinary skills and perspectives.

2.6.2 Process of User-Centered Design

There are three phases in the UCD process: design research, design, and design evaluation. The following sections describe these in more detail.

2.6.2.1 Design Research

Specifically, the design research phase of UCD contains multiple activities involving the study of the business and target users (Williams, 2009). Typically, designers begin the design research process by studying the client's business goals, constraints, and assumptions. Then, design research is conducted using investigative methods. Face-to-face interviews followed by contextual inquiry are among the most highly effective investigative techniques (Beyer & Holtzblatt, 1997). Through these investigations, designers get to observe how users behave in the natural usage context and gain a better understanding of their behaviors. After that, design research can be analyzed. Through design research data analysis, designers can debrief the findings with interviewees, list some initial assumptions or key recommendations, and organize trends between different research sessions. In the end, design research results are reported about
who the users are and what they need, as well as suggestions for the next phase, UCD design.

2.6.2.2 Design Research

Based on the results from the previous the design research, UCD practitioners start to brainstorm, conceptualize, and sketch initial design drafts. Usually, digital design drafts will be made after the initial design drafts are sketched by hand. The products of UCD design phase contains wireframes, process flows, prototypes, content strategies, and sitemaps or site diagrams in a web design project (Williams, 2009).

After design is finished, a usability test plan can be produced for preparing the next phase, design evaluation. Normally, a usability test plan has test goals, test participants descriptions, test sites, test protocols, and details about what to measure in the testing. The usability test plan may be updated in the design evaluation phase.

2.6.2.3 Design Evaluation

The last phase of the UCD process is design evaluation and typically involves testing the design product for usability. In order to collect information of how real users use a product, usability testing is used as a technique that tests the product on users (Nielsen, 1993). Usability testing measures a product's capacity to meet its intended purpose including effectiveness, efficiency, and ease of use, etc. In a usability test, observers watch and draft notes on how the user performs tasks with the tested product in a realistic scenario. Other test instruments such as scripted instructions, paper prototypes, and pre- and post-test questionnaires are also used to gather feedback in usability testing.

Beside usability testing, UCD practitioners can also use other design evaluation methods such as cognitive walkthrough, heuristic reviews, and satisfaction questionnaires to measure how the design works and how to improve it (ISO 13407, 1999). After conducting the design evaluation activity, a usability test report is produced.
2.6.3 Methods of User-Centered Design

Through the process of UCD, there are multiple methods that can be adopted for facilitating the design. Personas and scenarios are two methods that are widely used, and will be reviewed in the following two sections.

2.6.3.1 Persona

A persona is an archetypal character that represents a group of users who share common goals, attitudes, and behaviors when interacting with a particular product or service (Cooper, Reimann, & Cronin, 2007; Mulder & Yaar, 2007). Even though a persona is not a real person, it can be represented with a name or a profile picture (Miaskiewicz & Kozar, 2011). Narrative forms are used for describing a persona for the following two reasons. One is that a narrative style description helps make the persona seem like a real person, and the other is to provide a vivid scenario that addresses the context of a persona using the designed product. Typically, a persona narrative starts by describing what type of person the persona is, what the persona likes and dislikes, the persona's occupation, and other information if necessary. Then, the narrative should describe what the persona’s specific needs and goals are in the product designed context (Manning, Temkin, & Belanger, 2003). All these narrative descriptions help with bringing a persona into a real life (Pruitt & Grudin, 2003). Much research indicates that creating personas increases empathy, focus, and communication, and helps designers avoid stereotypes in the design process. (Cooper, Reimann, & Cronin, 2007; Kuniavsky, 2003; Mulder & Yaar, 2007).

2.6.3.2 Scenario

A scenario is used to tell the story of how a persona conducts an activity related to the product (Carroll, 2000a; Go & Carroll, 2004; Quesenbery, 2006; Rosson & Carroll, 2003). Quesenberry (2006) states that:
Stories are an important augmentation to personas because stories are effective at communicating culture and transmitting persona information into a memorable format. Whereas personas describe the person who will interact with a product, scenarios describe the content and context of the interaction. (P.523)

Because complex information is easier for people to accept through storytelling, scenarios are an effective way for designers to accomplish this activity (Grudin, 2006). In the scenario descriptions, designers need to involve the typical and significant user activities that show the interactions between users and the tested product or service (Carroll, 2000b; Go & Carroll, 2004).

2.6.4 Applications of User-Centered Design

Research shows that UCD has been fully or partially applied in various situations. For example, in the field of human computer interaction, the value of UCD has been more and more recognized. The UCD framework has been widely used in applications such as mobile communication device design (Cassim & Honiball, 2015), commercial product development (Wilkinson & De Angeli, 2014), communicable disease investigations (Turner, Reeder, & Ramey, 2013), consumer health technology development (LeRouge, Ma, Sneha, & Tolle, 2013), driving simulator designs (Bhatti, et al., 2014), and many other fields. Also, game development is another area that has used UCD (Ebner & Holzinger, 2007, Flynn, et al., 2012; Jung, Kim, & Lee, 2014). Gamification design and video game design share many similarities in terms of design purpose, such as being fun and other aspects, which indicated the possibilities of adopting UCD in gamification design.

2.7 The Delphi Method

This section provides a review of the Delphi method, which was used as the research method of this study. This review covers a brief history, procedures, challenges, and applications of the Delphi method.
2.7.1 Overview of the Delphi Method

The Delphi method was first developed in the Cold War to forecast the impact of technology on warfare. After trying different traditional forecasting methods such as the theoretical approach and quantitative models, the shortcomings of forecasting without precise scientific laws blocked the process. Then, based on the assumption that group judgments are more valid than individual judgments, the Delphi method was developed by the RAND Corporation in 1954 for the purpose of military consulting (Skulmoski, Hartman, & Krahn, 2007). At that time, experts were asked to give their opinions on the probability, frequency, and intensity of possible enemy attacks. Other experts could anonymously give feedback. This process was repeated several times until a consensus emerged.

Now, with the development of the Delphi method, it can also be used to facilitate open and unbiased communications among experts from a same field through a structured information exchange. (Linstone & Turoff, 1975). Studies show the Delphi method is very suitable for research that aims in understanding current thoughts, defining ill-defined topics and identifying solutions to current and future problems (Cuhls, 2003; Rowe & Wright, 1999; Skulmoski, Hartman, & Krahn, 2007).

The Delphi method has three features that are well recognized and make it the logical analytical tool of choice for data collection and analysis in this study. The features are:

1. Anonymity. Throughout the entire a Delphi study, all the participants are anonymous to each other. Therefore, participants are able to communicate freely in an environment where the influence of individual social biases are minimized (Skulmoski, Hartman, & Krahn, 2007).
2. Iteration. With the purpose of reaching the consensus in the end, the Delphi method asks participants to communicate in multiple rounds. Participants can feel free to change their answers based on the results of previous rounds (Skulmoski, Hartman, & Krahn, 2007).
3. Feedback. After the first round results are collected and in order to maintain a high level of feedback integrity, the statistic results of responses and text comments are presented to the participants. When participants are asked to complete a new round, their answers might be changed according to these previous feedback (Skulmoski, Hartman, & Krahn, 2007).

The Delphi method works iteratively and has multiple rounds. Theoretically a Delphi study should not be stopped until the consensus of the outcomes of the research topic is reached. In most cases, three iterations are usually enough to complete a Delphi study where consensus is reached or the needed information is collected (Brooks 1979; Custer, Scarcella, & Stewart, 1999; Cyphert & Gant, 1971).

2.7.2 Procedures of the Delphi Method

According to Judd (1972), Taylor and Judd (1989), and Jacobs (1996), selecting the appropriate subjects before conducting a Delphi study is the most important procedure in use of the Delphi method. Experience shows that having qualified experts as participants ensures the success of the project. Therefore, it is the most significant process in the entire study. The criteria of participant selection for a Delphi study varies based on specific topics and disciplinary areas. In general, participants should be professional experts who are well trained or experienced with related knowledge to the target issue because the focus of a Delphi study is to elicit expert opinions over a short period of time. Basically, the participation selection works through a nomination process (Jones & Twiss, 1978). Specific details of who the selected participants are and how to select them may be different. Decisions are made by the principal investigators (Oh, 1974). One popular approach for selecting possible participants involves contacting individuals such as positional leaders (Kaplan, 1971; Ludwig, 1994), related publication authors (Meyer, 1992; Miller, 2001), and those involved in related issues (Anderson & Schneider, 1993; Jones, 1975). Concerning the appropriate number of participants of a Delphi study, using a minimum number of participants is preferred. The actual number depends on different cases (Delbecq, Van de Ven & Gustafson, 1975).
Once the participants have been chosen, four rounds are used to complete a Delphi study. Usually, the first round is called Phase A and the remaining three rounds are called Phase B. The first round, which is Phase A, involves conducting an open-ended interview or survey. This step is intended to solicit specific information about content area from the Delphi subjects (Custer, Scarcella, & Stewart, 1999). Such information may include nominating candidate ideas to be discussed in the following rounds.

As described above, Phase B contains three Delphi rounds. In the first Delphi round of Phase B, each participant is asked to complete a survey that contains the feedback items organized based on results collected from Phase A. After the survey data is collected and analyzed, the ideas for which consensus is reached are removed from the next round to simplify the survey (Pfeiffer, 1968). The ideas for which consensus was not reached are discussed again in the following rounds.

In the second Delphi round of Phase B, participants receive a survey that includes the ideas for which consensus was not reached in the first round and feedback from other participants. In this round, participants are given liberty to change or retain their answers based on the feedback from other participants (Pfeiffer, 1968). After data collection and analysis, the ideas for which consensus is reached are removed from the next round and the ones for which consensus is not reached remain for use in the next round. Participants also receive a document that contains the response results and feedback about the ideas that reached consensus in the first Delphi round of Phase B.

The third Delphi round of Phase B usually is the last round of the entire Delphi study. In the last Delphi round, participants receive a survey that contains the remaining ideas for which consensus was not reached from the first and second Delphi rounds. This survey also includes the response results and feedback about these remaining ideas. As in the case of the second Delphi round of Phase B, participants receive a document that contains the response results and feedback about the ideas for which consensus was reached in the previous round. After the survey data from the final round is collected and analyzed, the entire Delphi study is terminated.

Data analysis in a Delphi study goes through the entire data collection process. After each round data is collected and the researcher needs to analyze the data including
both the statistical outcome of the Likert scale responses and the text comments for each survey item identified. Therefore, two types of data analysis, qualitative and quantitative, are conducted. The analyses results are then presented to the participants with each successive round until the last round is completed. The researcher also analyzes the data to determine if a consensus is achieved for each survey item. If so, the survey item will be listed in a consensus item list and removed from the successive survey. Also, item stability is calculated after at least two Delphi survey rounds are conducted. Stability is used to determine whether a survey item result is stable with little or no possibility for change in the subsequent rounds. Details of these data analysis methods are presented in chapter 3.

In most cases, the time required to complete a Delphi study can be long, especially in cases where participants are asked to finish surveys with a large number of survey items. Participants should be provided with a reasonable amount of time for each round. Setting at least 45 days for completing a Delphi study is recommended by Delbecq, Van de Ven, and Gustafson (1975), Ulschak (1983), and Ludwig (1994). Prior to the Internet and the widespread use of computers, two weeks was allotted for participants to respond to each survey round (Delbecq, Van de Ven, and Gustafson, 1975). Today, the time required to complete a Delphi round may be as little as a few days (Carmody, 2012).

2.7.3 Challenges of Using the Delphi Method

Because of the use of multiple rounds in Delphi studies, maintaining a good response rate and robust feedback is one of the biggest challenges when using this research method. Ludwig (1994) emphasized in his study that keeping a participant's motivation is the most important part in conducting a successful Delphi study. Researchers should actively encourage and motivate participants throughout all the survey round as much as possible. Reminder notices are usually used to remind participants who haven't completed the survey before or even after a survey is due.
2.7.4 Applications of the Delphi Method

The use of the Delphi method is most appropriate when a research topic hasn't been empirically studied (Okoli & Pawlowski, 2004) and due to its complex nature, would benefit from the opinions of experts in the research topic area. Okoli and Pawlowski (2004) also point out that there are two specific areas where the Delphi method has been successfully applied. One is in forecasting and issue identification/prioritization, and the other is in conceptual framework development. The range of Delphi possibilities was reviewed by Skulmoski, Hartman and Krahn (2007) and can be seen in Table 2.1. This review focused on Delphi studies in the Information System/Information Technology area and provides both evidence in the popularity of using the Delphi method in IS/IT studies, and the potential of its continued use in IS/IT related areas.

Table 2.1.

*Delphi Method Diversity - Published Research by Skulmoski, Hartman and Krahn (2007)*

<table>
<thead>
<tr>
<th>Non IS/IT Study</th>
<th>Delphi Focus</th>
<th>Rounds</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustafson, Shukla, Delbecq, &amp; Walster</td>
<td>Estimate almanac events to investigate Delphi accuracy.</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>(1973)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartman &amp; Baldwin (1995)</td>
<td>Validate research outcomes.</td>
<td>1</td>
<td>62</td>
</tr>
<tr>
<td>Czinkota &amp; Ronkainen (1997)</td>
<td>Impact analysis of changes to the International business environment.</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>Kuo &amp; Yu (1999)</td>
<td>Identify national park selection criteria.</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Nambisan et al. (1999)</td>
<td>Develop taxonomy of organizational mechanisms.</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Lam, Petri, &amp; Smith (2000)</td>
<td>Develop rules for a ceramic casting process.</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 2.1 (continued).

*Delphi Method Diversity - Published Research by Skulmoski, Hartman and Krahn (2007)*

<table>
<thead>
<tr>
<th>Non IS/IT Study</th>
<th>Delphi Focus</th>
<th>Rounds</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roberson, Collins, &amp; Oreg (2005)</td>
<td>Examine and explain how recruitment message specificity influences job seeker attraction to organizations.</td>
<td>2</td>
<td>171</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IS/IT Study</th>
<th>Delphi Focus</th>
<th>Rounds</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niederman, Brancheau, &amp; Wetherbe (1991)</td>
<td>Survey senior IS executives to determine the most critical IS issues for the 1990s.</td>
<td>3</td>
<td>114, 126 &amp; 104</td>
</tr>
<tr>
<td>Duncan (1995)</td>
<td>Identify and rank the critical elements of IS infrastructure flexibility.</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Nambisan et al. (1999)</td>
<td>Develop a taxonomy of knowledge creation mechanisms.</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Scott (2000)</td>
<td>Rank technology management issues in new product development projects.</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Wynekoop &amp; Walz (2000)</td>
<td>Rank the most important characteristics of high performing IT personnel.</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>R. Schmidt, Lytytinen, Keil, &amp; Cule (2001)</td>
<td>Identify and rank software development project risks: an international comparative study.</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Keil, TIwana, &amp; Bush (2002)</td>
<td>Rank software development project risks.</td>
<td>3</td>
<td>15, 15 &amp; 10</td>
</tr>
<tr>
<td>Brungs &amp; Jamieson (2005)</td>
<td>Identify and rank computer forensics legal issues.</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

2.8 **Summary**

This chapter reviewed three main areas that are related to the topic of this research: gamification, UCD and the Delphi method. First, a general approach to this review was presented. Second, the concept of gamification was reviewed in terms of
design approaches, psychological basis, and application after a brief overview of the gamification idea. Third, the chapter presented the UCD Theory including its design process, methods, and applicability. Finally, the chapter reviewed the Delphi method since it was the principal methodology used in this study. The procedure, challenge and applicability of using this method was reviewed.
CHAPTER 3. RESEARCH DESIGN

The purpose of this chapter is to describe the research design process used in the study with emphasis on the theoretical framework, research site, study phases, participants, sampling strategy, motivation, and researcher/participant relationship. Also, this chapter provides an overview of data collection and analysis. The chapter concludes with a discussion of measures used to ensure validity and reliability of the overall effort. The chapter ends with a brief description of the protection of human subjects in the study.

3.1 Methodology

The Delphi method was used in this study as the research method to determine how UCD is used in gamification design practice by experts. Three reasons are provided to explain why the Delphi method was the most appropriate method for this study.

First, the target population of this study consisted of gamification designers, who are located around the world. Participants who are geographically dispersed (Vernon, 2009) can be easily enlisted to participate in the study, especially in the age of the Internet. Second, current literature dealing with design gamification methods in the workplace was limited. One of the advantages of the Delphi method was that it can help in the gathering of opinions from professional experts about less studied topics (Hejblum, et al., 2008). Third, the cost of using the Delphi method was flexible and effective. Traveling for data collection was not necessary. All the participants completed the survey at their own location. Before the computer and Internet became widely available, Delphi studies were conducted through the mail or in person. Now, online survey tools such as Survey Monkey, Typeform, and Google Forms, etc. are very convenient and widely used. For the three reasons cited, the Delphi method was selected as the prime research design tool for this study.
3.1.1 Theoretical Framework

The Delphi method doesn’t have an identified theoretical framework according to the existing academic study. On the one hand, the Delphi method fits in the positivist paradigm that assumes the researcher to be both an objective and an uninvolved observer. As such a quantitative approach can be used in Delphi data collection and statistical measures can be applied for identifying consensus (Robson, 1993). With the purpose of achieving consensus from experts, the Delphi method assumes an ontological position of single reality. Its reductionist approach to identify consensus could also be understood as adhering to positivistic principles (Blackburn, 1999; Monti & Tingen, 1999).

On the other hand, the Delphi method can also be perceived as subjective and qualitative (Fitzsimmons & Fitzsimmons, 2001). Through multiple survey rounds, the process of achieving Delphi consensus is iterative and fits in an interpretative paradigm because the feedback of participants contains information in the form of opinions, ideas and words (Stewart, 2001). Also, the structure of group interaction in a Delphi study is based on the assumption that participants' opinions towards the research topic are formed, influenced, or even revised through communication process (Marshall & Rossman, 1995; Reed & Roskell, 1997). Therefore, the interpretative paradigm, constructivism, and particularly social constructivism, all appear to offer the epistemological basis for the Delphi method (Hanafin & Brooks, 2005).

Based on the above discussion, it seems that there isn’t a clear conclusion about a paradigmatic assumption in Delphi studies, because some parts of the Delphi method fit a constructivist paradigm and others a positivist paradigm. However, the theoretical framework used in this study is underpinned by social constructivism. The main structure of this study is to achieve individual reconstructions through the interactions between participants by identifying the consensus, which could contain multiple statements defined by certain principles. The ontology of this study is based on subjective reality. In general, this research is primarily a qualitative study (Creswell, 2009), while some quantitative analysis was also used to determine consensus.
3.1.2 Research Site

As a natural feature of a Delphi study, no specific research site was required. Communications between the researcher and participants were facilitated electronically via emails and Purdue Qualtrics, an online survey tool. As long as participants could get access to the research material through Internet, the geographic location made no difference with respect to the research results. In the process of participant recruitment, potential participants were reached via emails. Both Delphi phases, Phase A consisting of the initial survey and Phase B, the three consensus reaching rounds of the Delphi surveys were conducted through Purdue Qualtrics. Emails were used for sending thank you letters and consensus results of the survey rounds.

3.1.3 Study Phases

As noted, this study had two phases: Phase A and Phase B. Phase A was the pre-Delphi survey round, where 16 qualified participants were asked to take an online survey. Then, the survey data was analyzed and coded into categories and themes. The results of the survey data analysis were organized into design heuristics using UCD gamification design practice. Phase A results were subsequently used in Phase B surveys.

Phase B had three Delphi survey rounds. The first round survey asked participants to rate their level of agreement with the design heuristics identified in Phase A. A five-point Likert scale with an additional option of choosing "Not Applicable" was used to let participants indicate their responses. If the "Not Applicable" selection was made by a participant, his/her response to this item is removed from the consensus calculation for this item. After the first round survey data was collected and analyzed, the heuristics items for which consensus was already achieved, were also removed from the survey. The remaining items were then used in the second round. In the second round survey, participants were asked to rate their level of agreement with the design heuristics. They were also provided both statistical response results and comments from the previous round. Based on the information provided, participants were requested to adjust their second round responses as needed. The third and final Phase B round used the same process of inquiry and participant feedback as in the second round.
After Phase B was completed, the research results were analyzed and the outcome of this study, namely, the design heuristics of using UCD in gamification were obtained. Details of the final research results are presented and discussed in the chapter 4 and 5.

3.1.4 Participants

Based on existing literature, there isn't a consensus on the best number of participants in a Delphi study (Delbecq, Van de Ven, & Gustafson, 1975). Witkin and Altschuld (1995) noted that the number of participants in a Delphi study should not be more than 50, even though a few cases did have more. Ludwig (1997) documented that the majority of Delphi studies have used between 15 and 20 respondents. On one hand, a situation where the number of participants is too small may not be adequate to represent the breadth of opinions possible on a given research topic. On the other hand, when the sample size is too big, research cost in terms of time and money are likely to increase and be wasted. Ludwig (1994) noted that two factors determine the expert panel size. One is the number required to constitute a representative pooling of judgments and the other is the information processing capability of the research team. Delbecq, Van de Ven, and Gustafson (1975) suggested that 10 to 15 participants could be sufficient for the cases where the participants have homogeneous backgrounds. When the research topic needs to be viewed from various perspectives, a bigger sample size involving more participants with different backgrounds is required. In this research, all the participants are gamification designers considered to be homogeneous in their professional backgrounds. Thus, a sample size of 10 to 15 participants was chosen for this study.

Purposeful selection of the participant was used to ensure that the feedbacks provided by participants would fit the research purpose of this study (Maxwell, 2012; Patton, 1999). The sampling strategy used in this study was based on a series of criteria related to the research purpose, which was to explore the idea of using UCD in gamification design. The initial requirement for selecting participants was that they must be within the gamification design field, either employed by gamification companies or working as individual gamification designers. Four criteria were used to select qualified participants. The first criterion involved the participants' working experience in
The basis for this criteria was working years defined roughly as 5,000 to 10,000 hours or five to ten years in a field (Ericsson & Charness, 1994; Ericsson & Lehmann, 1996). Unfortunately, gamification design activity, similar to other new and innovative technology-based works, emerged in recent years and evolved rapidly. Because the idea of practical gamification as a formed design activity made its debut in roughly 2011 (Zichermann & Cunningham, 2011), the criterion of working for participants in the study was set at "more than two years".

Working time by itself could not guarantee participants' experience in one domain. There might be a case that a person does work in one field, but doesn't get much exposure to a broad base of experience. Such a situation could exist where an individual's collective experience may come from one, rather than multiple, projects. Because the duration of a gamification product design can vary from a few months to a year, work experience from several projects over a given work period was emphasized. Thus, the criterion that participants should have worked on at least three gamification design projects became the second criterion.

The third criterion for participant selection was education. Gamification design is a field that requires people with various skills and knowledge obtained almost exclusively from their diverse backgrounds. Usually, a gamification design team includes individuals such as graphic designers, game mechanic designers, computer programmers, web designers, and consultants with project related knowledge. Research has shown that being educated and trained is important for forming expertise (Day & Lord, 1992; Ericsson & Charness, 1994). Therefore, this study required that participants should at least have a bachelor's degree in a relevant major, which was usually a minimum requirement for hiring a designer for information technology related projects.

The fourth criterion involved the participants' relationship with each other. In order to avoid biased responses from participants if they knew each other's identity, this study required that no two participants should have working experience on the same project or with the same company.
3.1.5 Sampling Strategy

The methods of sampling potential participants for this study were individual direct contact and snowballing. Individual contact letters for participant recruitment (Appendix A) were sent to individuals whose contact information was obtained from the Gamification Gurus Power 100 list (https://www.rise.global/gurus). This was a list that ranked the top 100 people according to their digital impact, such as making news, publications, talks, etc., involving the topic of gamification each month. Even though it is not an official ranking and the rankings changed each month, the manner in which the list was made seemed like a valid method for the selection of potential participants. The list was also popular within the gamification design community and was, for the author, a way to stay informed about the leading gamification professionals. In this study, the top 20 candidates on the April 2015 published list were selected.

Secondly, public participant recruitment letters were posted on professional websites such as LinkedIn (Gamification Networks, Certified Gamification Designers, and Gamification Europe), a gamification group on Mendeley (Gamification), and the gamification homepage on Facebook. All interested candidates were invited to participate, and via snowballing, were encouraged to feel free to spread the recruitment information. All participant candidates were asked to reply through email if they were willing to participate in the study. Then, using Purdue Quatrics, an email (Appendix B) contained a web link with the consent form (Appendix C), participant qualification checklist and demographics information form (Appendix D) were sent to the interested candidates. Based on their feedback, candidates who satisfied the recruitment criteria were invited to join the expert panel for this study. Candidates who didn't meet the qualifying criteria were sent a note of appreciation for their willingness to participate.

3.1.6 Motivation

In order to motivate potential participants in the study, the benefits of participation were presented in the recruitment letters and the consent forms. The main benefit of participating this study focused on the opportunity to contribute to the gamification design process while sharing experience and opinions of leading experts in
the gamification design community. Also, participants were informed that the study results would be available to them upon request when the study was completed. No other motivation beyond these were used for motivating participants in this study.

Keeney, Hasson and McKenna (2001) suggested that one of the most common challenges of the Delphi study is the onset of participant fatigue. Compared with other research methods, Delphi studies require multiple survey rounds and can take a long time to complete. Therefore, in order to reduce participant fatigue and encourage continued motivation to participate, thank you letters were sent to the individual participants after each research round. The thank you letters also contained information about plans to complete future rounds, thereby making participants aware of the progress of the study and how much was left. In addition, to eliminate the redundancy of Delphi surveys, each survey round from the second to the final round only contained the design heuristic items that had not reached consensus. For instance, when a design heuristic item reached consensus, it was removed from the next survey round. This approach was primarily aimed to shorten the survey and alleviate participant fatigue.

3.1.7 Researcher Relationship

The relationship between researcher and participants was limited. The online participant recruitment, Phase A, and Phase B were all conducted online. All interactions between researcher and participants were through the Internet, Purdue Qualtics survey tools, and emails. No other interactions between the participants and researcher occurred during the entire study.

3.2 Data Collection

This section describes the two types of data collected in the study, namely, qualitative and quantitative data, and how these were collected.

3.2.1 Data Types

Both quantitative and qualitative data were collected through the entire research. In Phase A, only qualitative data was collected. The data was used for creating the survey
information in Phase B. In Phase B, participants were asked to provide their responses in quantitative form using a Likert scale. Also, participants were encouraged to comment in text boxes. The comments served to provide qualitative data for the survey. Two supplemental questions were used to collect qualitative data from participants in each round in Phase B. After the each survey round, descriptive statistical results of each design heuristic were analyzed and listed on the second survey. Also, comments from the previous round were retained and presented to the participants. This process enabled participants to acquaint themselves with opinions from other panel members. By so doing participants could choose to maintain their opinions about a design heuristic or change their response.

3.2.2 Phase A Procedure

Phase A, which served as the pre-round for the three Delphi survey rounds in Phase B, had the following four activities:

1. The researcher replied the participants who presented their interest in participating this study with an email (Appendix B) saying thank you and a Purdue Qualtrics link containing the informed consent letter (Appendix C), participation qualifying criteria check list and demographic information collection questionnaire (Appendix D). Also, the initial survey on gamification design process (Appendix E, F, and G) was included in this inquiring process. The goal of combining these data collection activities into one activity was to reduce unnecessary interaction rounds with the participants, attempting to eliminate the participant mortality or withdraw.

2. Three reminder emails (Appendix H) were used to encourage participants to complete the survey round.

3. If a participant didn't complete the questionnaire or failed to qualify in this study, he/she was informed and thanked for willingness to participate (Appendix I).

4. Once a participant candidate completed the Purdue Qualtrics questionnaire, and his/her information qualified the individual to participate in the this study, he/she
received an appreciation letter (Appendix J) and were informed of the expected
date of the remaining Delphi surveys (Phase B).

3.2.3 Phase B Procedure

Phase B portion of the study consisted of three survey rounds where activities
include the following:

1. In the first round, participants were provided with a link through an email
(Appendix K) to the design heuristics developed from the results of initial survey
survey (Appendix L). Participants were then asked to rate their level of agreement
with the design heuristics provided. The rating format was based on responses
noted as strongly agree, agree, neutral, disagree, strongly disagree, and not
applicable. Participants could also submit comments to justify their ratings, to
question or clarify the heuristic item, or to elaborate on any concept they felt was
necessary. Rating agreement levels to each item was mandatory to proceed in the
survey, while making comments was optional. Reminder emails were used to
encourage participants to complete the survey.

2. Participants who finished the first round portion of the survey would
automatically get a thank you email (Appendix M) and expected data for Round 2
of the survey.

3. Participants who didn't finish the first round portion of the survey by the
designated due date received get reminder email (Appendix N) (as many as three
reminders were used in some cases).

4. Participants who failed to respond to all the reminders of the Round 1 survey
received a thank you email (Appendix O) and were dropped from the Delphi
panel.

5. Once data collection and data analysis of the first round portion of the survey
were completed, participants were provided a document (Appendix P) containing
the list of design heuristics that had already reached consensus in Round 1 with
the responses from the participants.
6. Participants were also presented an email (Appendix Q) with the Round 2 survey (Appendix R) containing the results of Round 1 survey, including both the statistical and comment data. Participants were allowed to revise their ratings based on the statistical results and comments from the Delphi panel.

7. Three reminder emails (Appendix S) were used to encourage participants to complete the survey round.

8. Participants received thank you emails (Appendix T) and an expected date for the Round 3 survey upon completion of the Round 2 portion of the survey.

9. Participants who failed to respond to all the reminders of Round 2 survey received a thank you email (Appendix U) and were dropped from the Delphi panel.

10. Once data collection and data analysis of the second round portion of the survey were completed, participants were emailed a document (Appendix V) containing the list of design heuristics that had already reached consensus in Round 2 with the responses from the participants.

11. In round 3, which was the last round of Delphi survey, participants were emailed (Appendix W) with the link that presented with the survey information (Appendix X) based on the results of Round 1 and Round 2 and were asked to express their opinions as in the previous two rounds.

12. Participants received an email saying thank you for completing all these surveys when they completed the round 3 survey (Appendix Y).

13. Participants who didn't finish the round 3 survey received a reminder email (as many as three reminders were used (Appendix Z).

14. Participants who failed to respond to all the reminders of the Round 3 survey received a thank you email (Appendix AA).

15. The final result of this study would be available for participants upon their requests.

Besides the above steps, supplemental questions were used at the end of each survey of all the three rounds. The supplemental questions consisted of two open-ended questions about participants' suggested references for gamification beginners and the
challenges of using UCD in gamification design. It was mandatory for participants to answer the two supplemental questions in the first round survey. In the second round survey, participants were provided the responses collected from participants in the first round survey and asked the same questions again. It was not mandatory to answer the two questions in the second round survey but participants were encouraged to provide more responses based upon the existing answers from the experts panel and to make comments. In the last round, participants were provided the responses of the two supplemental questions from both Round 1 and Round 2 surveys. Similarly with the second round, participants could provide more feedback toward these two questions if they want.

3.3 Data Analysis

After the research data was collected, the data was analyzed. Different data analysis techniques were used for Phase A and Phase B. A brief description of these techniques follows.

3.3.1 Phase A Data Analysis

For Phase A data, the following activities based on a six-step thematic analysis defined by Braun and Clarke (2006) was used:

Step 1: Familiarizing yourself with your data. Transcribing data (if necessary), reading and re-reading the data, noting initial ideas.
Step 2: Generating initial codes. Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
Step 3: Searching for themes. Collating codes into potential themes, gathering all data relevant to each potential theme.
Step 4: Reviewing themes. Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis.
Step 5: Defining and naming themes. Ongoing analysis to refine the specifics of each theme and the overall message the analysis tells, generating clear definitions and names for each theme.

Step 6: Producing the report. The report should contain a selection of vivid, compelling extract examples, and a final analysis of selected extracts relating back to the analysis of the research question and literature.

Because the survey was conducted via an online survey, no data transcription was needed. However reviewing the raw data submitted by each participant was necessary as noted in Step 1. Step 2 was used to organize participant feedback and code it into an initial data set. As more survey data was coded, themes emerged because more and more similar codes were summarized and categorized in Step 3. In step 4 and step 5, each initial theme was reviewed and polished. A final set of all themes was created. Last but not least, the Phase A analysis was completed and presented as described in Step 6.

3.3.2 Phase B Data Analysis

Phase B consisted of three survey rounds. In Round 1, the design heuristic list was developed. The list was based on results from Phase A. Each design heuristic was presented as a statement with a five-point Likert scale of agreement. The five-point scale was used in this study based on its successful application by researchers in previous Delphi studies (Carman, 1999; Hendrix, 2005; Wicklein, Smith, & Kim, 2009; York, 2010).

The results were used to determine if a consensus among participant responses was achieved. The details to determine consensus are explained in the Delphi consensus section later. After consensus was achieved, the heuristic item would be removed in preparation for the next survey round. All the design heuristics that had reached consensus were compiled into a separate document and sent to participants after each survey round. The qualitative feedback to the two supplemental questions was organized and presented to participants in the second round survey.
After the Round 2 survey was completed, the result of each design heuristic was analyzed to determine consensus again. For items where consensus had not been reached, item stability was calculated. Calculation of item stability is discussed in the latter part of this chapter. Greatorex and Dexter (2000) stated that if an item is considered stable, the item has a low probability of change and can be removed from the following round. Otherwise, the design heuristic item would remain and be used in the following round. The qualitative feedback to the two supplemental questions in the Round 2 was organized and presented to participants in the third round survey.

In the third Delphi survey round, participants were asked to complete the final round survey. After final data was collected, consensus of all the design heuristic items was calculated and feedback from the two supplemental questions was analyzed.

3.3.3 Delphi Consensus

Scheibe, Skutsch, and Schofer (1975) claimed that a Delphi consensus happens if a percentage of items falls into a predefined range or level of agreement. Unfortunately, no specific number is universally available for ensuring that consensus has been reached. The number depends on the research purpose, participant sample size, research domain, and other research conditions. In this study, two criteria were used to define an acceptable level of consensus.

The first criterion was "percentage of agreement". The range of agreement level from 50% to 80% had been used in previous studies (Kerrigan, 2005). One popular setting level was 75% (Anderson-Woo, 2008; Hendrix, 2005; Witt & Almeida, 2008). Of course, the higher the accepted level of agreement is set for a study, the lower the probability of reaching consensus. The higher level could also lead to participant fatigue where large sample sizes or a large number of Delphi rounds are used. Conversely, if the number setting is too low, the credibility of a study may be reduced, because it represents expert opinion on agreement of a topic.

In this study, the level of agreement was set at 75% in Round 1 and 80% for Round 2 and Round 3. That is, consensus was reached when 75% of participants indicated to strongly agree or agree with a design heuristic item or to strongly disagree or
disagree with an item in Round 1 and 80% in Round 2 and 3. A lower criterion of agreement percentage was used in Round 1. This was done to reduce the survey item list and alleviate possible participant fatigue. The high criterion of agreement level used in Round 2 and 3 was based on experience of research in Delphi studies (Carmody, 2012; York, 2010).

The second criterion for defining consensus involved the interquartile range (IQR). Technically, IQR is used to measure dispersion (Griffiths, 2008). IQR represents a measure of the difference between the highest value and lowest value in a data set, and indicates how distributed the participant opinions are. Defined as the upper quartile minus lower quartile, IQR represents the range of values in the middle 50% of a sample. Compared to the standard deviation, which is used for measuring statistical dispersion, IQR is more suitable to a Delphi study where sample size is relatively small and outliers may make a big difference in the analysis result. IQR is not influenced as much by outliers and works well in Delphi studies.

In the context of the agreement percentage, there is no universally accepted standard IQR value available for use in Delphi studies. Based upon different research goals and other methodology conditions, researchers can set IQR acceptance standards at different levels. In general, a larger IQR value is used in applications involving a nine-point Likert scale, and a smaller IQR value is used in a five-point Likert scale. In this study, a five-point Likert scale was used and the IQR criterion was set at 1.5 for the 3 survey rounds. This compares favorably with a study that used a six-point Likert scale and values of IQR at 1 or 2 (Carmody, 2012; Doughty, 2006; York 2010).

3.3.4 Item Stability

According to Fink, Kosecoff, Chassin, and Brook (1984), item stability is used for measuring the potential for change to a survey question as more rounds are conducted in a Delphi study. Details of methods used to calculate item stability are provided below. Typically, stability is calculated in order to end a study in the last round or to remove survey items that still have not reached consensus in previous rounds (Dajani, Sincoff, & Wayne, 1979). In this study, item stability was calculated after two rounds of data were
collected. If the calculation showed the stability of an item was larger than the criterion that considered "acceptable", the item would be removed from the last round because it represented a condition such that the item would not change in the final round. After Round 3 data was collected, item stability was calculated again for those items that still had not achieved consensus.

The procedure for calculating item stability used in this study was cited from the work of Scheibe, Skutsch, and Schofer (1975) and is summarized as follows:

1. Clean the data sets by removing a participant's Round 1 data if he/she didn't participate in Round 2 of the survey.
2. Accumulate the frequencies of each agreement level for each design heuristic item in Round 1 and Round 2 respectively.
3. Calculate the absolute difference between each agreement frequency in Round 1 and Round 2.
4. Calculate the sum of all the absolute difference values of each design heuristic item.
5. Divide each value attained in step 3 by "2", the number of rounds, which in this instance involves Round 1 and Round 2.
6. Divide each value from step 4 by the total number of participants in Round 2.

The final value from step 6 represents a decimal fraction between zero and one for each design heuristic item. A larger value indicates a greater potential for change if more survey rounds were provided. A smaller value means that less change happened between Round 1 and Round 2, indicating that the result was stable and less likely to change in subsequent rounds. As in the case involving calculation of the standard of agreement percentage and IQR, no standard value of acceptable item stability is available. Scheibe, Skutsch, and Schofer (1975) and York (2010) suggested that for similar studies, set item stability between 15% and 20%. In this study, the value was set at 20% in order to shorten the duration of the last round survey and avoid possible participants’ fatigue.
3.4 Validity and Reliability

According to the definition by Joppe (2000), validity “…determines whether the research truly measures that which it was intended to measure or how truthful the research results are.” (P.1). A three-fold approach was used to ensure validity in this study.

The first approach was bracketing, which aims to limit the subjective influence of researcher and to analyze the data objectively (Creswell, 2009). In this study, multiple rounds of data collection and analysis were conducted thereby giving the researcher opportunities to check on potential bias in the data analysis.

The second approach involved the use of the Delphi method itself. A Delphi study inherently features multiple survey rounds and all the participants can review and validate their own responses and the responses of others considered to be experts in the topics on which the study is based.

Finally, anonymity and the controlled use of online communication between researcher and participants lessened potential social biases.

Joppe (2000) defines reliability as: “…the extent to which results are consistent over time and an accurate representation of the total population under study…” (p.1). In this study, the framework of research methods was created based on a previous similar study about developing design heuristics for serious game with a Delphi method (Carmody, 2012). Also, all the participants of this study were selected according to the purposeful sampling strategy with multiple sampling criteria to ensure they were representative of the population of gamification designer experts. The research methodology was also reviewed by experienced experts in the field of gamification, UCD, and Delphi study.

3.5 Protection of Human Subjects

Participants were informed of their rights in this study during the participant recruitment phase of the study. After receiving the notification of willingness to participate in the study from the interested individual, the individual was provided with an informed consent form describing the risk and benefit of participation, research
purpose, research methods, and expected length of participation. The potential risk of participating in this study was not greater than everyday life. Participation was completely voluntary. Participants could refuse to answer any questions during the surveys and could withdraw from the study at any time. All collected personal information was anonymized by means of a securely stored ID number. Any association relating an ID number to an individual was destroyed. All data was stored in a locked container in the primary investigator’s office. To ensure that participant privacy was protected, only the primary investigator and co-investigator had access to the stored data.

Although there are no direct benefits to individuals participating in this study, participants were formally encouraged to participate on the basis of promoting and advancing the process for gamification product design innovation. The results of this study would be submitted for publication in an academic journal as a means to help further human knowledge. All the participants could also receive a copy of the completed dissertation upon request.

3.6 Summary

This chapter described how this research was conducted. It provided the theoretical framework and the specific steps of how the Delphi method was used in this study. A description of data collection and analysis procedures used in various research phases was provided. In addition, the chapter explained the validity and reliability of the study, and the means taken to ensure the protection of human subjects. Research data developed and analyses used in the study are presented in the next chapter.
CHAPTER 4. DATA AND ANALYSIS

As previously noted, the Delphi method was used in this study to gain in-depth knowledge of experts' opinions regarding the use of UCD in gamification design. This chapter presents the research data collected throughout the entire study. The chapter begins with a schedule of data collection. This is followed by descriptions of the participants in the study and comprehensive data provided by the participants in the four Delphi rounds.

4.1 Schedule of Data Collection

In Chapter 3, it was noted that the duration for a Delphi study can be as long as a couple months or as long as a year. In this study, participant recruitment was initiated February 11th, 2015 and the final round Delphi closed on August 24th, 2015, for a duration of just over six months. Details of activities involved in the data collection phase of this study are presented in Table 4.1, Schedule of Data Collection. Table 4.1 shows that duration of the participant recruitment process lasted two weeks, a period which followed the convention used in other Delphi studies (Hsu & Sandford, 2007) and also suggested by research design experts. When the recruitment activity ended on February 24th, the number of participant candidates who replied to the inquiry was 26. This was more than the expected response sample size of 10 to 12.

The pre-Delphi round survey began on February 28th and lasted four weeks, ending on March 30th. The original plan for the pre-Delphi round duration was two weeks. When the original due date of March 14th came, only 15 people completed the survey. Therefore, another two weeks were added to the activity. However, no more responses were received.
After analyzing the data collected from the pre-Delphi round, the first Delphi round survey started on April 8th and ended on May 1st. Based on the experience of the pre-Delphi round, three weeks were provided, which was longer than the original plan but less than four weeks. Although four weeks were used in the participants' recruitment activity, no additional responses were received in the fourth week. The second Delphi round started on May 11th and ended on June 5th. The original duration for this round was the same as that for the first Delphi round namely, three weeks. However the duration was increased to four weeks based on need to improve the response rate. The third Delphi round was held for three weeks from August 3rd to August 24th. In each round, three reminders were sent to individuals who had not completed the survey.

Table 4.1.

Schedule of Data Collection

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start date</th>
<th>Ending date</th>
<th>Duration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Recruitment</td>
<td>02/11/2015</td>
<td>02/24/2015</td>
<td>2 weeks</td>
<td></td>
</tr>
<tr>
<td>The Pre-Delphi round</td>
<td>02/28/2015</td>
<td>03/30/2015</td>
<td>4 weeks</td>
<td>Three reminders: 1st: March 6th 2nd: March 10th 3rd: March 24th</td>
</tr>
<tr>
<td>The First Delphi round</td>
<td>04/08/2015</td>
<td>05/01/2015</td>
<td>3 weeks</td>
<td>Three reminders: 1st: April 13th 2nd: April 20th 3rd: April 24th</td>
</tr>
<tr>
<td>The Second Delphi round</td>
<td>05/11/2015</td>
<td>06/5/2015</td>
<td>4 weeks</td>
<td>Three reminders: 1st: May 20th 2nd: May 25th 3rd: May 30th</td>
</tr>
<tr>
<td>The Third Delphi round</td>
<td>08/03/2015</td>
<td>08/24/2015</td>
<td>3 weeks</td>
<td>Three reminders: 1st: August 7th 2nd: August 16th 3rd: August 20th</td>
</tr>
</tbody>
</table>
4.2 Pre-Delphi Round Data

The pre-Delphi round, also called Phase A, was used to collect participants' opinions regarding the use of UCD in gamification. These opinions were evaluated and transformed into design heuristics for use in Phase B. In the three Phase B Delphi survey rounds, participants were asked to indicate their agreement levels with each of the design heuristics. In order to minimize the frequency of communication rounds and probability of losing participants, the informed consent form, the participation qualification checklist questions, and the pre-Delphi survey questions were combined and sent as a single unit to all potential participants.

4.2.1 Participant Description

As described in Chapter 3, a purposeful sampling strategy was used to recruit participants for this study. Twenty-six individuals responded and expressed their willingness to participate. After sending out two reminders before and one reminder after the original due date, a total of 15 people completed the pre-Delphi survey resulting in a response rate of 57.69%. All 15 responders qualified to participate in this study. The 100% qualification rate might be the result of the clear description of participants' criteria listed in the recruitment letters.

Among the 15 qualified participants ($n_p=15$), two were females and 13 were males; three participants were between the ages of 20 and 30, five participants were between the ages of 31 and 40, six participants were between the ages of 41 and 50, and one participant was between the ages of 51 and 60 as shown in Figure 4.1. All 15 participants indicated having work experience in the gamification design area as gamification designers, design consultants or in some related capacity; five were also CEOs of gamification design companies. They all had more than one year of professional experience, and designed or participated in the design of at least two gamification projects. Thirteen out of 15 participants (87%) of the participants worked in gamification between one and five years. Among these 13 participants, the average work experience in gamification was 2.77 years (Average = 2.77) and the mode was two years (Mode = 2). Two outliers were obtained in the work experience data set. These were 12 years and 15
years. Regarding education, two participants had doctoral degrees, and 11 had master's degrees, and two participants had bachelor's degrees as their highest level of education. All the participants' demographic information is shown in Table 4.2.

![Participants Age distribution](image)

*Figure 4.1. Participants Age Distribution in the Pre-Delphi Round.*

Table 4.2.

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Age</th>
<th>Highest Degree</th>
<th>Years of Gamification Design</th>
<th>Current Position/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>M</td>
<td>40s</td>
<td>PhD</td>
<td>5</td>
<td>CEO</td>
</tr>
<tr>
<td>P2</td>
<td>F</td>
<td>20s</td>
<td>Master</td>
<td>2</td>
<td>Journalist, Writer, Artist, Toy &amp; Game Designer</td>
</tr>
<tr>
<td>P3</td>
<td>F</td>
<td>40s</td>
<td>Master</td>
<td>15</td>
<td>Chief Game Designer</td>
</tr>
<tr>
<td>P4</td>
<td>M</td>
<td>40s</td>
<td>Master</td>
<td>1</td>
<td>Game Designer</td>
</tr>
<tr>
<td>P5</td>
<td>M</td>
<td>20s</td>
<td>Master</td>
<td>1</td>
<td>CEO</td>
</tr>
<tr>
<td>P6</td>
<td>M</td>
<td>30s</td>
<td>Master</td>
<td>2</td>
<td>Entrepreneur, Professor, Consultant</td>
</tr>
<tr>
<td>P7</td>
<td>M</td>
<td>40s</td>
<td>PhD</td>
<td>12</td>
<td>Researcher and CEO</td>
</tr>
<tr>
<td>P8</td>
<td>M</td>
<td>30s</td>
<td>Master</td>
<td>3</td>
<td>Visionary MD</td>
</tr>
</tbody>
</table>
Table 4.2 (continued).

Participants Demographic Information

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Age</th>
<th>Highest Degree</th>
<th>Years of Gamification Design</th>
<th>Current Position/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P9</td>
<td>M</td>
<td>30s</td>
<td>Bachelor</td>
<td>2</td>
<td>Founder/CEO</td>
</tr>
<tr>
<td>P10</td>
<td>M</td>
<td>40s</td>
<td>Master</td>
<td>2</td>
<td>CEO</td>
</tr>
<tr>
<td>P11</td>
<td>M</td>
<td>50s</td>
<td>Master</td>
<td>4</td>
<td>Senior Learning Specialist</td>
</tr>
<tr>
<td>P12</td>
<td>M</td>
<td>30s</td>
<td>Master</td>
<td>4</td>
<td>Gamification consultant</td>
</tr>
<tr>
<td>P13</td>
<td>M</td>
<td>40s</td>
<td>Master</td>
<td>4</td>
<td>Researcher</td>
</tr>
<tr>
<td>P14</td>
<td>M</td>
<td>20s</td>
<td>Bachelor</td>
<td>4</td>
<td>Product Owner &amp; Gamification Designer</td>
</tr>
<tr>
<td>P15</td>
<td>M</td>
<td>30s</td>
<td>Master</td>
<td>2</td>
<td>Chief of E-learning department</td>
</tr>
</tbody>
</table>

4.2.2 Survey Data

In the pre-Delphi portion of the surveys, questions, mostly open-ended, were listed to collect participants' opinions regarding the use of UCD in gamification design. This section lists the responses of the 15 participants to the questions. Considering the text-type nature of the responses, the responses shall be referred to as the qualitative portion of the survey data. All 15 participants' identities are referred to as P1 to P15.

Replies to the pre-Delphi (Phase A) questionnaire now presented:

Question 1: Could you please list the steps in the common gamification design process you have used in your career experience? Please provide as much detail as possible.

P1: I use the Design Thinking process as a basis. 1) Observation, 2) Understanding the problem, 3) Player Point of View (motivations, interests), 4) Ideation, 5) Prototyping and in between all the way back iterating. Differences are that I refer to users as players, which is a huge difference. If I refer to a user as a user, I never am interested in the motivations and interests of the user, just how to make life/tasks/etc. easier to do and with less errors. When I refer to the user as player, I always have to keep in mind: is this still fun for them? Are the still motivated and interested? This creates a huge mental shift. The other differences
is that metrics become an important part of the process, due to the nature of big
data of gamification.

P2: I am a content creator. Hence, I do not deal with the programming aspects of
game design. Instead, I focus on the storyline of the game, the characters, and
even the ideas for the look of the game and how the game is played (such as if it
will be a word game, a walk-through, etc.). The steps I use to design a game
include considering the format of the game (such as if it will be for an app or a
console) [console], the age range of the target audience, and the genre of the game
(i.e., scary game, silly game, action game). In cases of educational games, the
"genre" is the subject like math, history, etc.

P3: 1) Understand the business objectives of the client and or project. 2) Understand
the user motivation or target audience motivations. 3) Look at what they have
already working for them and how people have been motivated in the
past. 4) Design a gamification architecture. 5) Present this to the client, seek
approval and may tweak accordingly. 6) Implement first version. 7) Tweak and
follow-up to ensure success rate.

P4: I have done extensive game design, and was asked to do a white paper on
gamification. I did extensive research in the area, and currently rest as a critic of
the current approach.

P5: Define the objective and the problem of a business or school, select the target
behaviors will be focused to improve then find and define the stakeholder or
players who are going to collaborate and help us in the process, then co-create
along the stakeholders, after this we're going to devise the engagement and
progression loops, creating a platform with the game elements as badges, points,
challenges, etc. and strengthen the feedback of the system to motivate the user to
continue and then deploy the certain tools.

P6: 1) Understand the problem: which is the core behavior that the client aims to
change. 2) Understand the public: create personas and verify which player's type
are stronger in them. 3) Select dynamics, mechanics and components: according
to the profile verified in the personas define the actions, rules and game elements
which will be in the experience. 4) Narrative and aesthetics: create a story and
audio/visual elements that will touch and engage users. 5) Create levels, progress
and share possibilities: define how the player will grow in the experience and how
it becomes viral. 6) Prototype and refine: test low fidelity and refine. 7) Implemen-
tation: hire developers and design to make tangible the experience.

P7: 1) Analyze real-world processes. 2) Select appropriate game mechanics. 3) Map
game mechanics (optional: implement sensors). 4) Implement rewards
schemes. 5) Implement graphics.
P8: 1) The Why we are doing the project. 2) The QUEST statement (what we want to achieve). 3) The behaviors for the Quest. 4) Define the Players. 5) Select the players that would have the largest impact, and design the player journey through the quest to achieve the behaviors. 6) Interview the players with creative interviews. 7) FUN (unpack the mechanics, dynamics, and aesthetics, play etc...). 8) Technologies, (what are the most effective platforms, investment costs etc...). 9) Play (full project implementation plan).

P9: 1) Define gamification objective (as a business objective). It is the foremost important aspect of designing gamification, as this would translate into the Epic Goal of the solution we’re going to implement. It is the target that we compare our progress to and helps us later on to measure efficiency and the success of the solution. It has to be a business smart goal. 2) Analyze the target user and define his profile as a player. This includes demographic analysis, personality analysis and playing preferences analysis. 3) Create a brief of the proposed gamification solution and present it to the client. It usually consists in 10 pages document, some graphic design to help the client understand the concept and get his approval for development. 4) Design and develop the gamification solution until reaching the MVP (minimum viable product) stage. 5) Start testing the MVP on a small testing group selected from the target audience. 6) Adjust design according to the feedback received and observed, while continuing the development. 7) Deploy solution when it is finalized. 8) Train (if necessary) key users as gamemasters to use and generate continuous activities on the platform. 9) Measure and analyze results. 10) Adjust if necessary. 11) Refresh content if necessary.

P10: 1) Identify a problem to be fixed 2) Identify the metrics that reflects how good is the solution working 3) Identify what pieces of Mechanics, Dynamics or Elements are going to be involved in the solution 4) Launch a test - minimal unit 5) Launch a complete solution.

P11: 1) Identify and define organizational goals. 2) List activities that will move population toward organizations goals. 3) List game elements to use in the reward structure i.e. status, feedback, reward, points distributions, transparency. 4) Brainstorm creative methods to gain interest, fun elements, and reward mechanisms, from the player perspective of "what is in it for me?" 5) Begin to prototype and test individual components of program.

P12: 1) Defining which problems to solve and which behavior we want to change on players which can help to solve them. 2) Learning about the players, who/how they are and what motivates them. 3) Analyzing which other motivators exist in the environment and which system/web/app have to be modified or created. 4) Designing progress and indicators, depending on long term goals or short term ones. 5) Available budget for investing in gamification. 6) Looking for funny things to be included everywhere (even serious fun). 7) Select the mechanics and tools which will be applied in the platform.
P13: First define the players, the platforms and the behaviors. Then the mechanics, the elements and the dynamics. My work experience involve defining the learning outcomes, identifying the players’ expected behavior and analyzing their characteristics and identifying the different mechanics and dynamics.

P14: 1) Why: purposes (more users, more income, better performance), Who: target users, and What: actions to be encouraged. 2) Decisions between: Collaborative or competitive, solo or social, types of rewards (privileges, recognition, monetary value). 3) Storytelling (campbells model), mechanics, aesthetics, balance. 4) Implementation (scrum in stages).

P15: 1) Briefing with the client. 2) Starting with storytelling. 3) Know the different user types based on a specific tool. 4) Thinking and designing the mechanics and dynamics that will apply to the project. 5) Designing the missions of the project. 6) Designing the PBLs. 7) Prototyping. 8) Playtest.

Question 2: How do you define target users and their preferences in a gamification design project?

P1: First, I call them players, not users. Second, we observe them, interview them, and then we create personas. We do not talk about market segments. A market segment is nobody. It doesn't tell me anything about motivations and interests.

P2: This varies. In some cases I have been approached by game makers (usually programmers) who want to create a certain kind of game for a certain audience and want my creative input on the project. For example, I recently helped a company come up with an app game concept that will teach Brazilian children the value of saving water. I based my concept on the fact that they wanted a simple game that could be played on a phone (i.e., an app) and be easy for children to play but also appealing to adults. If I am designing my own games (with no partners or requirements) I usually consider my target audience based on whichever genre I am working in. For instance, horror game players tend to be teens and young adults whereas cute "pet" type games are popular with kids, especially little girls.

P3: Target users is usually defined by the purpose of the project. I see users often as end-users, managers and administrators. I hold workshops to draw up motivational preferences and often add surveys in the mix if we don't have a representative sample of people we can have participate in the workshops. I use games in the workshop to observe behavior and often ask to spend time in the office to watch people engage with the particular subject in question as part of their daily routine.
P4: The core issue with gamification is engagement. Current game design methodologies can be reduced to feedback mechanisms. More needs to be done in the area of gamification, and lessons learned from games, before it can really be successful.

P5: I did that by the User-Centered Design and the Bartle Types of players.

P6: Using the persona method: talking with people involved in the project to define the most common archetypes. Interviewing people: selecting a sample of potential users and asking preview questions.

P7: Most of our project are already related to a specific target group. We look at age, gender and skills both IT and professional.

P8: "Players - using Prof. Richard Bartle's Player Types, Amy Jo Kim's derivative as well as our own focus of definitions.

P9: In order to define the target users we use three Quiz sessions. One is the Bartle test aimed to determine the player type, one is a standard demographic analysis and the last is a personality test.

P10: While designing employee gamification users, a way to define is to go through surveys, personal conversations and focus groups. Preferences are hypothesis tested with focus groups and with testing - minimal units before launching a complete solution.

P11: My experience is limited to organization learning goals. In these instances the population is predefined as all employees.

P12: On one hand, I classify them by gender, age, education, and other social traits. On the other hand, I analyze which is their character: social, challenging, learners. This allows me to know what motivates them.

P13: Usually I work in education area. So my target users are always students. Other cases should use market studies.

P14: Focus group and past user experiences.

P15: Trying to define them by any known method: Marczewski, Bartle, Amy Jo Kim, etc. Sometimes making them to answer a special survey designed especially for the project.

Question 3: During the design process, what do you do to make the gamification products fit users' demand?
P1: Quick iteration, we make quick prototypes and playtest it with the players. Then we go back to the drawing board, and fine tune it and playtest again. As long as we are comfortable enough to implement it.

P2: I made sure the game was fun. I described how the scenes should be animated and the characters cartoony. Since the project was intended to have appeal for children I suggested many bright colors. I also made sure that "saving water" was a central theme, as requested.

P3: I use the Octalysis framework to map motivational drivers to game elements, during the user workshop I also use card sets and other tools with game elements in them to design the solution. After the first choices are made and the first version goes live, then the iterative review process starts. For most of my clients we have started with a small pilot group before making the tools available to everyone.

P4: It is critical the end in mind for the users is determined before a gamification product is picked.

P5: One effective way is to involve the users into the process, making a collaborative environment to co-create.

P6: I use the information collected in the previous stage and test in low fidelity prototype.

P7: We iterate the design process - classic user-center design.

P8: Conduct Player interviews that are linked to the player journeys. This way we understand the culture, climate and appetite for gamification implementation.

P9: We develop the product in sprints, at the end of each one of these sprints there is at least one new feature or "gameplay" element that can be tested by a selected testing group. We allow them to play at the end of every sprint and analyze their feedback. We observe their reaction and take notes and also ask them questions about the tested product. The feedback is then analyzed and we determine if and what we have to modify, adjust, drop or add in order to correct the course of the project.

P10: While in the design process, I validate the approach of the solution with the main stakeholders, to ensure approach and focus is user-accepted. The most recurrent way is though focus groups and targeted surveys.

P11: Prototype and testing reveals elements that are interesting to the user. The larger challenge is keeping it fresh by constantly introducing new challenges, and elements of surprise, luck and renewal.
P12: First definition always follows motivations brought from the players' analysis, but then the only way is to make players play. I always define an expected behavior, interactions, how often they use the platform, etc. and compare with the real behavior.

P13: Through user models, personas. The conception and development include, among others, the involvement of learners in the construction of the game-like application in order to guide and refine its development by means of user-centered evaluation.

P14: Again focus' groups with ideal core users. This is all UX so we usually follow the normal UX procedures.

P15: Trying to put intrinsic motivators inside the project, not only PBLs.

Question 4: How do you evaluate the effectiveness of gamification design?

P1: By measuring behaviors before and after. If we want people to fill out more fields in a timelier manner, then we measure this, take the base line and measure after the gamification implementation again for a certain period.

P2: If I play a game and enjoy it then I know it has been effective. If an educational game manages to teach me something then it's effective. If a horror game makes me jump or scream then its effective. If a silly game makes me laugh, or an app game keeps me amused, then they are effective.

P3: In terms of business objectives achieved and any other KPI's agreed in the initial phase of the project. These may include participation, completion, certification, levels, etc.

P4: Without effectively measuring engagement, gamification design evaluation is close to useless. Once you have this, what is going to be needed is to know what results are going to be desired by users.

P5: Follow by users traction or measuring the usage and the satisfaction rate of the players.

P6: Ideation process: testing in low fidelity prototype and refining.

P7: Depending on the aim we look at, motivation, happiness, task completion time, or error rate.
P8: Using the measurable behaviors that were defined at the strategy stage. We do a pre-implementation and post-implementation measure, and ongoing dynamic changes - until all the behaviors are achieved.

P9: During the first (pre-production) stage we define the goal of the gamification solution and the KPIs to be followed and measured. From the first moment actual users get in touch with the platform we monitor all the indicators resulting from their activity and compare to the desired outcome of the KPIs.

P10: The effectiveness of the gamification design is measured with key performance indicators elaborated in step 2. Effectiveness is measured while the launch of the minimal test as well during launching and adjusting phase of the complete solution.

P11: A proper design of the reward system is in itself an evaluation of the effectiveness of movement toward the organizations goals. The reward system should also provide metrics in the user population participation.

P12: Even when the users (players) are playing and behaving as expected, the indicators which lead the gamification design to success or not are the business related ones, the goals we defined at the first stage of the process. Gamification is only effective when it has been able to solve the initial problems.

P13: The information related to learners’ behavior during the application is obtained through qualitative methods such as usability tests and game experience tests, as well as by collecting learners’ perceptions while they are effectively interacting with the application. Traditional data collection methods such as questionnaires, interviews, game interaction tests, step-by-step cognitive walkthroughs, heuristic reviews, among others, are usually necessary in order to understand the root causes of learners/users’ behavior.

P14: With Data Mining, no other possible way to measure in a realistic way.

P15: By the play test, and for sure, by measuring the ROI.

Question 5: Is there any user participation in your gamification design process? Except for P9, all participants answered "Yes" and were asked three questions. Their responses are:

Question 6 - Yes: Could you please describe one design experience that involved user participation?

P1: All of them have player participation. Building a design without player participation (playtesting it with them) is shit.
P2: User participation happens occasionally. As a content designer, user participation is when I run my ideas past someone who will be the target audience. For instance, I have come up with several game concepts that vary between simple app games and more complicated PC/consul games. Many of these games are intended for children and I have actually had conversations with small children (my cousins children, ages 2-8) about the kinds of characters, locations, themes, music, colors, and so on, that they like most.

P3: I host a workshop to design the learning platform for a client, where the users were learners engaging with the platform to learn how to do their job better. In the workshop I look at what motivates the users to learn and have them draw up lists and images of what learning means to them, how it makes them feel. We then look at tools they currently use and game elements that could be used to improve them. They create some of them, they rank the importance of some and they engage actively to make the outcome the best possible for learning.

P4: I currently generated community engagement, not by gamification techniques, but other areas.

P5: The feeds of co-creation where the gamers interact and could see other ideas hence, to improve each other.

P6: When the basic prototyping is ready, potential users are invited to engage in a simulation and talk about their thoughts and feelings.

P7: After working with a prototype, users are asked for comments and improvements. This is a regular part of the user-centered design process.

P8: It was a life insurance company that wanted the employees to buy into the new company strategy. We built the gamification strategy with 12 of the employees over 2 days, and the strategy was VERY different to what we expected. The "rewards schedules" were predominantly based on altruism and building schools for the rural underprivileged communities. And different add-ons were based on each employee achieving company strategic drivers. When the employees decided HOW to be rewarded. This was a powerful session.

P10: While designing a gamified recruiting tool, I asked a test group of candidates to use the tool and to give feedback about the usage of it (User Experience related questions). The information also provided feedback about the simplicity of use and potential of changes / updates to match user’s requirements.

P11: Prototyping and testing.

P12: User is always involved when I need to find out triggers and motivations. I designed a gamified platform for salesmen and it was important to know why
gamification could benefit them, as they were already motivated by sales commissions. So, we re-designed the main goals, which were not to sell more, but to achieve a better commercial management.

P13: I usually work with public schools that are invited to collaborate. The procedure is inductive, through experience tests with user models represented by personas, heuristic processes of direct observation of the use of the interface, and elicitation of users’ opinions. These instruments and techniques are useful to capture players’ feedback, to assess their reasons and motivations behind actions, or to understand what they think of the game experience. They are also useful to understand the impact of design decisions, e.g. how the interface works in the real world and which of its characteristics need changing, improving, developing further or eliminating.

P14: Any of the ones we have designed had constant feedback from users, you build up something and then measure. It's all about the lean model of doing things: build, learn, pivot.

P15: For example, my company needed to find a solution to get more communicated with each other. We decided to meet by groups, and write down all the solutions that workers talking out loud. Once one solution was selected by the most of them, we decided to bring it to life.

Question 7 - Yes: How well do you think the user participation contributed to the gamification design?

P1: It is crucial. If you never playtest it with the users, you never know what motivates them and how they try to cheat, or what activities they will do to e.g. earn the most points.

P2: For me it contributed greatly. I use the feedback I get to alter my ideas or sometimes even get additional ideas for all new game concepts.

P3: It is essential, without active participation the design would have been solely based on my preferences, which is representing only 1 learner. By having various learners in the room, we had a more rounded view and also saw it through their eyes. The participants also were more interested to see the end result and how their impact is on the end product. So it creates curiosity which for learning is a great driver.

P4: It is critical one knows what motivates users in order to know how to design a system.
P5: The participation of user in the process gives him an intimate relationship and a sense of accomplishment by creating a system which he's going to make use.

P6: Decisively: without feedbacks the experience would be ineffective.

P7: User participation is essential. The first design never holds up.

P8: BRILLIANT. Because they OWNED the project for implementation.

P10: In this particular case, user participation was critical: if we never measured, tested or prototype with a user-focus-groups, we would never realize about how the users will use the tool - not always 100% exactly as you design it.

P11: Essential to delivering a gamification program that meets the needs of the population.

P12: It does not help, because you cannot ask users about "what do I have to do to change your behavior", but it is essential in order to learn about how are the people who will play your game.

P13: When it's well done could be very useful. Is very important give more importance to what they do than what they say.

P14: Quite well, no one better than your users to know what they felt when trying your experience. Anyway, sometimes users are wrong so you have to make sure you know when they say something that is meaningful and when not.

P15: It's one of the most important processes about the implementation of gamification in any project. Could be like a test session, or like a beginning phase, or whatever... but for sure if you want to implement a right gamificated[gamified] project and want it to be success you have to count with the users likes.

Question 8 - Yes: What suggestions do you have for involving users appropriately in gamification design?

P1: Playtesting all the time. Listening and observing them. Having empathy with the players, this is very very important.

P2: For people who deal with content, as I do, it is important to discuss your initial game ideas with people who are dedicated to whatever kind of game you desire to create and listen carefully to their feedback. For example, if I want to focus on creating a plotline for a survival-themed game then I would try to talk to 3-5 fans of survival games. I would want to know their thoughts on my ideas for
the storyline and gameplay in order to craft the best game possible. Programmers who work on sounds and graphics should be strongly encouraged to do the same.

P3: Just do it! It is essential. I chose either surveys or workshops or both in combination, to make sure we cover all the possible angles and have the biggest amount of input.

P4: The interests of users need to map to the interests of the organization. At that point, you then can discuss feedback mechanisms to inform users how close they are to meeting the needs of the organization. Short of doing this and you are playing games with Skinner mechanisms, and scoreboards that point nowhere, unless backed up with bribing users with incentives. This latter approach ends up eroding intrinsic motivation.

P5: Give him meaningful choices and purpose, always exploring their hidden potential and show the importance to be creative.

P6: Giving special status in the experience when the project is ready.

P7: Test early, test often. Use standardized questions (btw: you should do so, too), like NASA-TLX or ATTRAK-DIFF.

P8: Stay focused on the goal, don't make it too big to start, and ALWAYS grow incrementally.

P10: My suggestion is to have a testing / user group that can be solicited as consultancy-users: a group to which you could ask open questions as "would you use this platform if it were in black or grey or green or pink?" as well as "what else would you include I didn't?" type of questions.

P11: Pilot testing, rewards for ideas, status and recognition for user involvement. Not only in the design but as a constant throughout the life of the program. This give the users the sense that this is not something done to them, but something they have created for themselves.

P12: Involving them just to know them, without asking any issue directly related to the gamification process. Just asking about their actual activities, rewards, problems, suggestions to improve their daily tasks, etc.

P13: Be natural!

P14: Choose people wisely, not everyone is valid as a tester.

P15: For a specific project for a specific business, the best is choosing different users to help you in designing the project. Not only important users inside a
business, you have to choose all kind of users. Then for sure your project will be known in every level inside the business.

The sole participant who answered "No" to question 5 was asked two questions. The responses to these questions are:

Question 6 - No: What are the reasons that you do not involve user participation in gamification design?

P9: A gamification solution is not just a set of features thrown over an existing business solution. It is in itself an entire business solution which requires more than technical knowledge. The design includes elements of psychology, sociology, behavior science, arts, game design and many more. It is also a solution aimed to influence groups of people not just individual and as we all know a real social group is not as homogeneous as in theory. Involving user into the design process might skew it towards personal biases (likes and dislikes) which might not be correctly aligned with the likes and dislikes of the entire target group.

Question 7 - No: What do you think about the idea of involving user participation in gamification design?

P9: Of course the target group of users may hold a large pool of good ideas that can be leveraged later on when they would be asked to provide feedback on the solution they are subjected too. In later stages of design or implementation we can develop tools the users can use to unleash their creativity within certain boundaries.

4.2.3 Data Analysis

As noted in Chapter 3, the method used for analyzing pre-Delphi round Phase A data was the six-step thematic analysis (Braun & Clarke, 2006). After carefully analyzing all the data collected from 15 participants, 33 design heuristics within five themes for using UCD in gamification design emerged. The five themes are shown in Table 4.3. An in-depth analysis of each theme and its related design heuristics are now presented.
Table 4.3.

*Five Themes That Emerged in This Study*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UCD Workflow</td>
<td>The workflow for using UCD in a regular gamification design.</td>
</tr>
<tr>
<td>2. Defining Players</td>
<td>The methods of defining target users in gamification design.</td>
</tr>
<tr>
<td>3. Play Testing</td>
<td>The importance and techniques of conducting play testing in gamification design.</td>
</tr>
<tr>
<td>5. User Participation</td>
<td>Using UCD in gamification design in general.</td>
</tr>
</tbody>
</table>

4.2.3.1 UCD Workflow

UCD workflow is the first theme identified in the study. As reviewed in section 2.6 of Chapter 2, User-Centered Design, UCD is a design approach that emphasizes the important role of users, containing a three-phase workflow: design research, design, and design evaluation. When asked about the working process of gamification design in the first question of the survey, the experiences that most participants described were similar with the UCD workflow. Based on the participants' responses, gamification design process starts with research involving understanding client demands, and studying players' motivations. Secondly, gamification designers conduct a series of design activities such as selecting product platforms, creating player personas, determining dynamics, mechanics, narrative, aesthetics, game levels and progress, as well as sharing possibilities. Lastly, gamification designers conduct iterative play testing until the product is completed. In general, participants' responses showed that UCD workflow functioned actively in their gamification routine.

Ten design heuristics related to the first theme were identified and coded with the prefix "DH". These design heuristics and their data resources are listed in Table 4.4. A brief overview of each theme and the related design heuristics follows.
Table 4.4.

*Design Heuristics Related to UCD Workflow Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH1</td>
<td>Understanding the business objectives of the client regarding which problems to solve and which player behaviors to change is the most important aspect of designing for gamification.</td>
<td>P3's response to Question 1, P5's response to Question 1, P6's response to Question 1, P11's response to Question 1, P12's response to Question 1</td>
</tr>
<tr>
<td>DH2</td>
<td>Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals.</td>
<td>P12's response to Question 1</td>
</tr>
<tr>
<td>DH3</td>
<td>It is important to study what motivators have already worked for players and how players have been motivated in the past.</td>
<td>P3's response to Question 1</td>
</tr>
<tr>
<td>DH4</td>
<td>Designers should propose brief gamification solutions to the main stakeholders to get approval before further development.</td>
<td>P3's response to Question 1, P5's response to Question 1, P9's response to Question 1, P10's response to Question 3, P15's response to Question 1</td>
</tr>
<tr>
<td>DH5</td>
<td>When a gamification development project reaches the Minimum Viable Product (MVP) stage, designers need to start testing the MVP on a small testing group selected from the target audience.</td>
<td>P9's response to Question 1, P10's response to Question 1, P10's response to Question 4, P11's response to Question 1</td>
</tr>
<tr>
<td>ID</td>
<td>Design Heuristics</td>
<td>Data Resources</td>
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<td>----</td>
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</tbody>
</table>
| DH6 | Designers need to measure and analyze the results of the play testing and adjust the design iteratively. | P1's response to Question 6-Yes  
P1's response to Question 8-Yes  
P6's response to Question 4  
P7's response to Question 3  
P9's response to Question 3  
P11's response to Question 3  
P11's response to Question 6-Yes |
| DH7 | Designers may train some key players as “game masters” to use and generate continuous activities on the desired gamification platform. | P9's response to Question 1 |
| DH8 | One effective way of gamification design is to involve the users into the process, making a collaborative environment to co-create the product. | P5's response to Question 1  
P5's response to Question 3  
P13's response to Question 6-Yes |
| DH9 | The gamification design workflow should always follow the classic User-Centered Design approach. | P7's response to Question 3 |
| DH10 | The following design activities can be used in a gamification design process: | |
| DH10-a | Select the most appropriate product platforms. | P5's response to Question 1  
P8's response to Question 1  
P9's response to Question 1  
P13's response to Question 1 |
Table 4.4 (continued).

*Design Heuristics Related to UCD Workflow Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH10-b</td>
<td>Create player personas.</td>
<td>P1's response to Question 2</td>
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<td></td>
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<td>P6's response to Question 1</td>
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<td></td>
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<td>P6's response to Question 2</td>
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<td></td>
<td></td>
<td>P13's response to Question 3</td>
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<td></td>
<td></td>
<td>P13's response to Question 6-Yes</td>
</tr>
<tr>
<td>DH10-c</td>
<td>Determine dynamics, mechanics, and game element components according to the profile described in the personas.</td>
<td>P6's response to Question 1</td>
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<td></td>
<td></td>
<td>P7's response to Question 1</td>
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<td></td>
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<td>P8's response to Question 1</td>
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<td></td>
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<td>P11's response to Question 1</td>
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<td></td>
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<td>P12's response to Question 1</td>
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<td></td>
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<td>P13's response to Question 1</td>
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<td></td>
<td></td>
<td>P14's response to Question 1</td>
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<tr>
<td></td>
<td></td>
<td>P15's response to Question 1</td>
</tr>
<tr>
<td>DH10-d</td>
<td>Design the narrative and aesthetics (game story and audio/visual elements that will touch and engage players).</td>
<td>P6's response to Question 1</td>
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<tr>
<td></td>
<td></td>
<td>P8's response to Question 1</td>
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<tr>
<td></td>
<td></td>
<td>P14's response to Question 1</td>
</tr>
<tr>
<td>DH10-e</td>
<td>Create game levels and progress, as well as sharing possibilities (define how the player will grow in the experience and how it might go &quot;viral&quot;).</td>
<td>P6's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P12's response to Question 1</td>
</tr>
<tr>
<td>DH10-f</td>
<td>Brainstorm creative elements related to making the game fun (mechanics, dynamics, aesthetics, etc.).</td>
<td>P8's response to Question 1</td>
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<td></td>
<td></td>
<td>P11's response to Question 1</td>
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<tr>
<td></td>
<td></td>
<td>P12's response to Question 1</td>
</tr>
</tbody>
</table>

The theme of UCD workflow consists of 10 heuristics for gamification design. DH1-4 are related to the first phase of UCD workflow, design research. For example, P11 mentioned "Identify and define organizational goals" as the first step of his gamification
design process. Similarly, P12 described the first step as "Defining which problems to solve and which behavior we want to change on players which can help to solve them." He also said, "Designing progress and indicators, depending on long term goals or short term ones." P9 provided more information involving communication with the main stakeholders of the design project as:

Create a brief of the proposed gamification solution and present it to the client. It usually consists in 10 pages document, some graphic design to help the client understand the concept and get his approval for development.

DH5 and DH6 are related to the third phase of UCD workflow, design evaluation. Participants indicated how they conduct play testing iteratively for design evaluation in their responses to Question 1 and Question 3. For example, P9 described the play testing step as, "...design and develop the gamification solution until reaching the MVP (minimum viable product) stage" and "...start testing the MVP on a small testing group selected from the target audience. Adjust design according to the feedback received and observed, while continuing the development."

DH 7-10 described the design activities of gamification design which relates to the second phase of the UCD workflow, design. Participants mentioned some keywords like "co-create" (from P5's response to Question 1 and 3) and "classic UCD design approach" (from P7's response to Question 3) and showed that UCD design activities are used in gamification design. DH10 specially listed six design activities that were collected from participants' description of their gamification design process.

4.2.3.2 Defining Players

Defining players is the second theme that emerged from the pre-Delphi survey data. Following the UCD work, defining players is a very important activity in the phase of design research. Through the responses to the pre-Delphi study, participants shared their ideas about defining players in gamification design. Also, multiple methods of conducting player research and analysis of the research data for defining players were
indicated by participants. Within the theme of defining players, four design heuristics were created. Table 4.5 shows the four design heuristics and the data resources.

Table 4.5.

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH11</td>
<td>In gamification design, users should always be referred to as players in order to emphasize that players should have fun, while the term users implies only a need to have required tasks be efficient and accurate.</td>
<td>P1's response to Question 1</td>
</tr>
<tr>
<td>DH12</td>
<td>Defining the target players' profile by understanding who they are and what motivates their engagement is critical.</td>
<td>P3's response to Question 1, P4's response to Question 7-Yes, P6's response to Question 1, P9's response to Question 1, P12's response to Question 1</td>
</tr>
<tr>
<td>DH13</td>
<td>The following research methods can be used for defining players:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DH13-a Sampling the potential players who have the largest expected impact.</td>
<td>P6's response to Question 2</td>
</tr>
<tr>
<td></td>
<td>DH13-b Direct observation.</td>
<td>P1's response to Question 1, P13's response to Question 6-Yes</td>
</tr>
<tr>
<td></td>
<td>DH13-c Interviews.</td>
<td>P1's response to Question 2, P6's response to Question 2, P8's response to Question 1, P8's response to Question 3, P13's response to Question 4</td>
</tr>
<tr>
<td></td>
<td>DH13-d Focus groups.</td>
<td>P10's response to Question 2, P10's response to Question 3, P14's response to Question 2</td>
</tr>
</tbody>
</table>
Table 4.5 (continued).

*Design Heuristics Related to Defining Players Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH13-e</td>
<td>Surveys.</td>
<td>P3’s response to Question 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P3’s response to Question 8-Yes</td>
</tr>
<tr>
<td></td>
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<td>P10's response to Question 2</td>
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<td></td>
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<td>P10's response to Question 3</td>
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<tr>
<td></td>
<td></td>
<td>P15's response to Question 2</td>
</tr>
<tr>
<td>DH13-f</td>
<td>Workshops</td>
<td>P3’s response to Question 8-Yes</td>
</tr>
<tr>
<td>DH14</td>
<td>The following analysis methods can be used for defining players:</td>
<td></td>
</tr>
<tr>
<td>DH14-a</td>
<td>Bartle's Player Types</td>
<td>P5's response to Question 2</td>
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<tr>
<td></td>
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<td>P8's response to Question 2</td>
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<tr>
<td></td>
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<td>P9's response to Question 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P15's response to Question 2</td>
</tr>
<tr>
<td>DH14-b</td>
<td>Amy Jo Kim's Player Theory</td>
<td>P8's response to Question 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P15's response to Question 2</td>
</tr>
<tr>
<td>DH14-c</td>
<td>Andrzej Marczewski's Player Theory</td>
<td>P15's response to Question 2</td>
</tr>
<tr>
<td>DH14-d</td>
<td>Octalysis Frameworks of Motivational Drivers</td>
<td>P3’s response to Question 3</td>
</tr>
<tr>
<td>DH14-e</td>
<td>Standard Demographic</td>
<td>P9's response to Question 2</td>
</tr>
<tr>
<td>DH14-f</td>
<td>Personality Test.</td>
<td>P9's response to Question 2</td>
</tr>
<tr>
<td>DH14-g</td>
<td>Playing Preferences Test</td>
<td>P9's response to Question 2</td>
</tr>
<tr>
<td>DH14-h</td>
<td>IT and Professional Skills</td>
<td>P7's response to Question 2</td>
</tr>
</tbody>
</table>

DH11 demonstrated the difference between using the terms "players" and "users" in gamification design. Based on the response from P1, the term "player" reveals a gamification design's specialty in creating motivation and interests for its users. Referring to "users" as "players" could benefit the design group while bearing the mission in mind. P1 said:
Differences are that I refer to users as players, which is a huge difference. If I refer to a user as a user, I never am interested in the motivations and interests of the user, just how to make life/tasks/etc. easier to do and with less errors. When I refer to the user as player, I always have to keep in mind: is this still fun for them? Are they still motivated and interested? This creates a huge mental shift...I call them players, not users.

DH12 demonstrated two important aspects of defining players in gamification design namely, who are the players and what are their motivations. As P4 said, "It is critical one knows what motivates users in order to know how to design a system." Getting a solid understanding of players' motivations plays an indispensable role in gamification design.

DH13 and DH14 listed research and analysis methods for defining players. Gamification designers need to collect various data about target players and then analyze the collected data in order to understand who the players are and to discover what their motivations are.

4.2.3.3 Play Testing

Play testing is the third theme developed through analysis of the responses from participants in the pre-Delphi survey. In order to facilitate a gamification design with feedback from players, gamification designers mentioned that they conducted play testing iteratively in their working experiences. Usually prototypes are created and used in play testing while a project is under development. The collected feedback from play testing may benefit designers with understanding how the design works, how to improve the design, and what the potential defects are, etc. There are seven design heuristics within the theme of play testing. These are coded as DH 15-21. Table 4.6 shows these seven design heuristics and their data resources.
Table 4.6.

*Design Heuristics Related to Play Testing Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH15</td>
<td>Play testing with prototypes is important as it reveals player behavior and motivation as well as unforeseen cheating strategies.</td>
<td>P1's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P6's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P10's response to Question 7-Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P11's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P11's response to Question 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P11's response to Question 6-Yes</td>
</tr>
<tr>
<td>DH16</td>
<td>Feedback from the play tests helps assess players’ reasoning and motivation behind their actions, the impact of design decisions, and to identify where updates are needed to better address user needs.</td>
<td>P1's response to Question 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P2's response to Question 7-Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P6's response to Question 7-Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P9's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P9's response to Question 7-No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P10's response to Question 6-Yes</td>
</tr>
<tr>
<td>DH17</td>
<td>A good design approach is to make quick, low-fidelity prototypes, play test them with a selected small pilot player group, analyze the feedback, return to the drawing board, modify the design, and play test again.</td>
<td>P6's response to Question 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P6's response to Question 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P15's response to Question 1</td>
</tr>
<tr>
<td>DH18</td>
<td>Play testing should be done quickly and iteratively until the designer feels the product is ready.</td>
<td>P1's response to Question 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P1's response to Question 8-Yes</td>
</tr>
<tr>
<td>DH19</td>
<td>Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback.</td>
<td>P14's response to Question 8-Yes</td>
</tr>
</tbody>
</table>
Table 4.6 (continued).

*Design Heuristics Related to Play Testing Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH20</td>
<td>A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, &quot;would you use this platform if it were in other colors?&quot; or &quot;what else would you include?&quot;</td>
<td>P10's response to Question 8-Yes</td>
</tr>
<tr>
<td>DH21</td>
<td>The following methods can be used for play testing:</td>
<td></td>
</tr>
<tr>
<td>DH21-a</td>
<td>Direct observation</td>
<td>P13's response to Question 6-Yes</td>
</tr>
<tr>
<td>DH21-b</td>
<td>Survey</td>
<td>P3's response to Question 8-Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P10's response to Question 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P13's response to Question 4</td>
</tr>
<tr>
<td>DH21-c</td>
<td>Interview.</td>
<td>P8's response to Question 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P13's response to Question 4</td>
</tr>
<tr>
<td>DH21-d</td>
<td>Game interaction test</td>
<td>P13's response to Question 4</td>
</tr>
<tr>
<td>DH21-e</td>
<td>Usability test</td>
<td>P13's response to Question 4</td>
</tr>
<tr>
<td>DH21-f</td>
<td>Cognitive walkthrough</td>
<td>P13's response to Question 4</td>
</tr>
<tr>
<td>DH21-g</td>
<td>Heuristic review</td>
<td>P13's response to Question 4</td>
</tr>
</tbody>
</table>

DH15 and DH16 emphasize the importance and benefit of play testing with prototypes in gamification design. Play testing is very helpful in understanding players' feedback toward a design and guiding further development. For example, P11 mentioned this idea as, "Prototype and testing reveals elements that are interesting to the user." P10 also made a statement about the significance of play testing. He said, "...if we never measured or tested or prototype with user-focus-groups, we would never realize about how the users will use the tool - not always 100% exactly as you designed it."

DH17 and DH18 present gamification play testing techniques. First, the prototypes used in play testing should be of a low-fidelity type as P6 said, "I use the
information collected in the previous stage and test in low fidelity prototype." Play testing should also be conducted iteratively with small pilot groups. For example, P3 described the play testing process as:

After the first choices are made and the first version goes live, then the iterative review process starts. For most of my clients we have started with a small pilot group before making the tools available to everyone.

P1 made similar comment about play testing iteratively. He also indicated that the process can be a quick iteration till gamification designers "are comfortable enough to implement it."

DH19 and DH20 are about sampling players for participating in play testing. An error about DH20's presentation was realized by the author after the pre-Delphi survey was launched. Because the question "would you use this platform if it were in other colors?" is not an open-ended question, the adjective, "open-ended" in DH20 should be removed and whole design heuristic should be corrected as "A good play testing user group can act as consultancy-users in which they can be asked questions such as, 'would you use this platform if it were in other colors?' or 'what else would you include?'". In order to keep the consistency of the design heuristic items in all the Delphi rounds, this error remained in the following three surveys. The validity of the responses to DH20 could be influenced by this error. However, the error doesn't greatly influence the expression of semantic meaning of the sentence and no complaint about the confusion of DH20 was received. The author believes that this error would not impact the participants' understanding of the entire DH20. Therefore, the responses of DH20 were kept as valid data for data analysis through the study.

Based on the data collected for DH19 and DH20, designers should try to recruit the participants who could provide useful feedback including constructive comments about project development. As P14 said, "...no one better than your users to know what they felt when trying your experience". Play testing can be very helpful for gamification design, but designers also should be careful about all the feedback. For example, P14 said, "sometimes users are wrong so you have to make sure you know when they say
something that is meaningful and when not." P10 suggested that players can serve as consultants in play testing as he said:

My suggestion is to have a testing / user group that can be solicited as consultancy-users: a group to which you could ask open questions as "would you use this platform if it were in black or grey or green or pink?" as well as "what else would you include I didn't?" type of questions.

DH21 lists methods that can be used in gamification play testing. Some methods are similar to the ones used for defining users such as direct observation, survey, and interview, since they are generic methods for communicating with players. Other methods that are widely used in a regular UCD design project include usability testing, and cognitive walkthrough, etc.

4.2.3.4 Gamification Evaluation

Gamification evaluation is the fourth theme that emerged from the data. Participants expressed the idea that effectiveness of a gamification design needs to be properly evaluated through the design process. The focus of gamification evaluation is mainly on the criteria of a good gamification design, the significance of gamification evaluation, and evaluation methods. Four design heuristics have been developed within the theme of gamification evaluation. Table 4.7 presents the four design heuristics and their data resources.

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH22</td>
<td>A good gamification design should always give players meaningful choices and purpose, allowing them to explore their hidden potential.</td>
<td>P5's response to Question 8-Yes</td>
</tr>
</tbody>
</table>

Table 4.7. Design Heuristics Related to Gamification Evaluation Theme
Table 4.7 (continued).

*Design Heuristics Related to Gamification Evaluation Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH23</td>
<td>Even if players are playing the game as hoped, a design cannot be considered successful without addressing the initial business-related problem.</td>
<td>P3's response to Question 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P11's response to Question 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P12's response to Question 4</td>
</tr>
<tr>
<td>DH24</td>
<td>Without effectively measuring player engagement, gamification design is close to useless.</td>
<td>P4's response to Question 4</td>
</tr>
<tr>
<td>DH25</td>
<td>The following methods can be used for evaluating gamification design:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a Measuring player behaviors before and after the gamification implementation for a certain period.</td>
<td>P8's response to Question 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P15's response to Question 4</td>
</tr>
<tr>
<td></td>
<td>b Measuring player usage and the satisfaction rate.</td>
<td>P5's response to Question 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P10's response to Question 4</td>
</tr>
<tr>
<td></td>
<td>c Measuring player Key Performance Indicators (KPIs) compared to the desired indicators.</td>
<td>P10's response to Question 4</td>
</tr>
</tbody>
</table>

DH22 and DH23 specify the criteria that can be used for evaluating a gamification design. In order to get players engaged and motivated, players should be provided with multiple meaningful choices and opportunities so that they can be used to explore their potential. Besides satisfying players, a good gamification design should address the initial business-related problems from clients. For example, P12 said:

Even when the users (players) are playing and behaving as expected, the indicators which leads the gamification design to success or not are the business related ones, the goals we defined at the first stage of the process. Gamification is only effective when it has been able to solve the initial problems.
DH24 indicates the method of evaluating gamification design by measuring players' engagement effectively. It also emphasized the importance of gamification evaluation. This design heuristic is mainly from the responses of P4 as he said:

Without effectively measuring engagement, gamification design evaluation is close to useless. Once you have this, what is going to be needed is to know what results are going to be desired by users.

DH25 describes three methods to evaluate gamification design. Basically, players' performance and experience are main factors that are considered by designers. Multiple Key Performance Indicators (KPIs) of a player can be created for a certain period throughout the entire process of gamification product usage, including before and after the gamification implementation. This data can be compared with some desired indicator for evaluating the effectiveness of the design. Also, players experience and satisfaction are very valuable for gamification evaluation.

4.2.3.5 User Participation

The last theme emerging from the responses of the pre-Delphi survey participants is user participation. This theme summarizes the general issues from participants' feedback involving the importance of user participation in the gamification design process. Based on the participants' responses, user participation is very important and should be conducted on several occasions throughout the design phase of a gamification project. User participation can lead to player satisfaction and can help designers gain understanding of players' intrinsic motivation. Designers should be aware of the type and method of inquiry used during the interaction process with players, especially under different gamification design projects. Eight design heuristics were developed for this theme. Table 4.8 shows these eight design heuristics and their data resources.
### Design Heuristics Related to User Participation Theme

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH26</td>
<td>User participation is one of the most important processes and should be conducted through the entire gamification project.</td>
<td>P1's response to Question 6-Yes, P1's response to Question 7-Yes, P1's response to Question 8-Yes, P2's response to Question 6-Yes, P6's response to Question 7-Yes, P7's response to Question 7-Yes, P8's response to Question 7-Yes, P10's response to Question 7-Yes, P15's response to Question 7-Yes</td>
</tr>
<tr>
<td>DH27</td>
<td>When users are involved in a gamification design project, designers should not directly ask users &quot;what do I have to do to change your behavior?&quot;</td>
<td>P12's response to Question 7-Yes</td>
</tr>
<tr>
<td>DH28</td>
<td>The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal.</td>
<td>P12's response to Question 3</td>
</tr>
<tr>
<td>DH29</td>
<td>Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players.</td>
<td>P15's response to Question 3, P4's response to Question 8-Yes</td>
</tr>
<tr>
<td>DH30</td>
<td>User participation is essential to understand the intrinsic motivators of players.</td>
<td>P10's response to Question 6-Yes</td>
</tr>
</tbody>
</table>
Table 4.8 (continued).

*Design Heuristics Related to User Participation Theme*

<table>
<thead>
<tr>
<th>ID</th>
<th>Design Heuristics</th>
<th>Data Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH31</td>
<td>User participation can give players the sense that this is not something done to</td>
<td>P5's response to Question 6-Yes</td>
</tr>
<tr>
<td></td>
<td>them but something they have created for themselves.</td>
<td></td>
</tr>
<tr>
<td>DH32</td>
<td>In business gamification designs, user participation should involve not only</td>
<td>P15's response to Question 8</td>
</tr>
<tr>
<td></td>
<td>important users inside a business, but also all kinds of users at every level.</td>
<td></td>
</tr>
<tr>
<td>DH33</td>
<td>In educational gamification designs, user participation creates curiosity, which</td>
<td>P3's response to Question 7-Yes</td>
</tr>
<tr>
<td></td>
<td>is a great driver for learning, as participants are interested in seeing the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>project's end result and their individual impact on it.</td>
<td></td>
</tr>
</tbody>
</table>

DH26 emphasizes the significance of user participation in a gamification design process. This idea was shared by many participants of this study. They expressed their opinions by using words like "essential" (from P7's response to Question 7-Yes), "decisively" (from P6's response to Question 7-Yes), and "brilliant" (from P8's response to Question 7-Yes). Based on the previous four themes presented in the study, user participation can be used in multiple phases of gamification design including activities such as defining players, co-design, play testing, and project evaluation. As P15 said:

(User participation) is one of the most important processes about the implementation of gamification in any project. Could be like a test session, or like a beginning phase, or whatever... but for sure if you want to implement a right gamificated project and want it to be success you have to count with the users likes.
For example, P1 explained the importance of user participation from the perspective of play testing as he said, "It is crucial. If you never play test it with the users, you never know what motivates them and how they try to cheat, or what activities they will do to..."

DH27 is directed at the nature of communication between designers and players. Being inquirers, gamification designers should be careful about the type of questions they ask users during the design process. For example, "what do I have to do to change your behavior?" would not be considered an appropriate question to ask a player participant.

DH28-31 describe how user participation might help designers understand players' intrinsic motivation and benefit the design. In order to maintain player participation, constant motivating and engaging should be used. Designers should consider working more on players' intrinsic motivation rather than relying on their extrinsic motivation. P15 proposed the suggestion by saying, "Trying to put intrinsic motivators inside the project, not only PBLs." Also, the co-creation of the design process gives players the sense that the project is not something done to them but something they have created for themselves.

DH32 and DH33 described user participation used in business and educational gamification design respectively. For example, P15 indicated that when players are involved in a business gamification project, participants from multiple fields should be considered:

For a specific project for a specific business, the best is choosing different users to help you designing the project. Not only important users inside a business, you have to choose all kind of users. Then for sure your project will be known in every level inside the business.

And P3 described the experience of involving players in educational gamification design, she said:

... (In educational gamification design), it is essential, without active participation the design would have been solely based on my preferences, which is representing only 1 learner. By having various learners in the room, we had a more rounded view and also saw it through their eyes. The participants also were more
interested to see the end result and how their impact is on the end product. So it creates curiosity which for learning is a great driver.

4.3 First Delphi Round Data

After Phase A data was collected and analyzed, the first Delphi round survey was sent to all the 15 participants through Purdue Qualtrics system. In this survey, the 33 design heuristics of five themes identified from the pre-Delphi round was used in 33 survey items. Each item asked participants to indicate their agreement levels with a design heuristic using a five-item Likert scale method. Participants were also encouraged to comment on each item and to freely express their concerns and ideas. The Likert scale collected quantitative data and the comment box collected qualitative data. In the end, two open-ended questions were added to collect participants suggestions to beginner gamification designers and challenges of gamification design for supplementing the design heuristics developed in the pre-Delphi round.

4.3.1 Participant Description

In the first Phase B Delphi round portion of this study, thirteen out of 15 participants completed the survey. The response rate was 86.67%, which is higher than the response rate experienced in the pre-Delphi round. P1 and P5 dropped out of the study without providing any feedback after three reminders were sent. Both participants, according to the demographic information provided, were CEOs and possibly were too busy to continue participating in the study. Thank you letters were sent to them after this round survey was closed.

Among the 13 participants that were left (n=13), two were female and 10 were males. Two participants were between the ages of 20 and 30, five participants were between the ages of 31 and 40, five participants were between the ages of 41 and 50, and one participant was between the ages of 51 and 60. Because the two participants who dropped off from this round were CEOs, three of the remaining participants were CEOs in their gamification design companies. They all had more than one year of professional experience, and designed or participated in the design of at least two gamification projects. Eleven out of 13 participants (84.6%) worked in gamification for one to five
years. Two outliers in the data set had working experience of 12 years and 15 years, which was the same as in the previous round. In the aspect of education, one participant had a doctoral degree and 10 had master's degrees, and two participants had bachelor's degrees as their highest level of education.

4.3.2 Data Presentation

According to the data analysis methods presented in Chapter 3, survey data from the first Delphi round was analyzed to see if any consensus was reached. After calculating the percentage of agreement and Inter Quartile Range (IQR) of the data set, thirteen out of 33 design heuristics reached full consensus based on the two pre-defined criteria (agreement percentage > 75% and IRQ <1.5). Four design heuristics with multiple components reached partial consensus, because some components reached consensus and some did not reach consensus. All the design heuristics and statements that didn't reach consensus were used in the second Delphi round.

4.3.2.1 Design Heuristics Reaching Consensus

Seventeen design heuristics reached full or partial consensus status in the first Delphi round. Among these 17 design heuristics, DH10, DH14, DH11, DH25 reached partial consensus. The statistical data for all seventeen design heuristics is presented in Table 4.9. This table shows the number of participants who strongly agree (SA), agree (A), neutral (N), disagree (D), strongly disagree (SD) and not applicable (NA) for each design heuristic. Based on these numbers, the agreement percentage (AP), disagreement percentage (DP), neutral percentage (NP) of the design heuristics are calculated using the equations 4.1, 4.2, and 4.3:

$AP = \frac{SA + A}{n_1}$  \hspace{1cm} (Eqn. 4.1)

$DP = \frac{SD + D}{n_1}$  \hspace{1cm} (Eqn. 4.2)

$NP = \frac{N}{n_1}$  \hspace{1cm} (Eqn. 4.3)

Besides the percentage calculations, IQR values and consensus results are presented in Table 4.9.
Table 4.9.
Design Heuristics Reaching Consensus in the First Round
(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH1</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>92%</td>
<td>0%</td>
<td>8%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH4</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>92%</td>
<td>0%</td>
<td>8%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH5</td>
<td>4</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>85%</td>
<td>8%</td>
<td>8%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH6</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH8</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>85%</td>
<td>8%</td>
<td>8%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH10-c</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85%</td>
<td>0%</td>
<td>15%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH10-e</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>92%</td>
<td>0%</td>
<td>8%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH10-f</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH14-c</td>
<td>3</td>
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Table 4.9 (continued).

**Design Heuristics Reaching Consensus in the First Round**

(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

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From the above table, DH6, DH10-f, DH15, DH21-d, DH21-e, DH25-a, and DH25-c got 100% level of agreement and a value of IQR of one. Besides the above design heuristics with 100% agreement, the remaining design heuristics in Table 4.9 satisfy the criteria of reaching consensus by having a more than 75% agreement and an IQR less than 1.5. Except for no comment for DH10, DH14, and DH16, the comments received for the rest of the design heuristics showed consistency in the participants' responses. A list of DH items and the comments received for each item is now presented:

Comments of DH1 (i.e., Understanding the business objectives of the client regarding which problems to solve and which player behaviors to change is the most important aspect of designing for gamification):

P2: Although I agree that these elements are important, the MOST important aspect of game design is creating a fun game with interesting characters and plots that will "hook" players.
P8: If this is not done well, then the gamification will be short lived and unable to measure ROI. Don't forget the WHY.
P9: Without understanding and setting up business objectives any gamification attempt is nothing else than money thrown out the window.
P14: It’s where you start, if this fails all will fail.
Comments of DH4 (i.e., Designers should propose brief gamification solutions to the main stakeholders to get approval before further development):

P2: Yes, outlining a synopsis and/or a proposed plan is essential when working with others. It keeps everyone on the same page from the get-go.
P3: I would tend to propose the whole project for approval and build in several approval points before development starts.
P8: It is important that they build for short term and quick wins, with small incremental budgets that increase based on success and learning.
P14: At some point yes, mainly because it's all an iterative process, so don’t develop the whole thing before being "approved".

Comments of DH5 (i.e., When a gamification development project reaches the Minimum Viable Product (MVP) stage, designers need to start testing the MVP on a small testing group selected from the target audience):

P2: Yes, getting feedback is important throughout the process of game design. That way, if something does not work, the project can be altered to make it more successful.
P3: Feedback of target audience is crucial.
P8: I think that it depends on the behaviors that require changing.
P14: Testing should be done almost since the beginning, when the MVP is ready you should already have a lot done of the second MVP.

Comments of DH6 (i.e., Designers need to measure and analyze the results of the play testing and adjust the design iteratively):

P2: Absolutely. Player's feedback has to be listened to because chances are good that their reactions will mirror a lot of the public.
P8: This is progressive! showing immediate ROI successes and further areas for development.
P14: YES!!! all the time!!! :-)

Comments of DH8 (i.e., One effective way of gamification design is to involve the users into the process, making a collaborative environment to co-create the product):

P2: Yes, in certain games this kind of interaction works wonderfully.
P3: If transparency is also a corporate value I would agree, although more often I would design with input of people but not full collaboration.
P4: At the least, this can help generate buy-in as the users feel they are part owners of the content being created.
P8: But not as the designers more as the narrators as to WHY they like and don't like.
P14: "Yes, always good."

Comments of DH15 (i.e., Play testing with prototypes is important as it reveals player behavior and motivation as well as unforeseen cheating strategies):

P2: "Yes, this is very important before a game is finalized and released."

Comments of DH17 (i.e., A good design approach is to make quick, low-fidelity prototypes, play test them with a selected small pilot player group, analyze the feedback, return to the drawing board, modify the design, and play test again):

P2: "In most cases this plan works, but there are always exceptions."
P3: "In an ideal situation this is true, however not always the case in practice due to time or budget constraints to deliver sooner."
P9: "Kind of yes, big companies might have a difficulty in this though, but basically yes."

Comments of DH21 (i.e., The methods that can be used for play testing: a. direct observation, b. survey, c. interview, d. game interaction test, e. usability test, f. cognitive walkthrough, g. heuristic review):

P2: All of these methods can be very useful.

Comments of DH23 (i.e., Even if players are playing the game as hoped, a design cannot be considered successful without addressing the initial business-related problem):

P2: Yes. If you have been hired to design a game for a certain business then it only truly works if that business is pleased with the results.
P8: ROI.
P14: Depends on the context, too general to say yes or no, haha.

Comments of DH24 (i.e., Without effectively measuring player engagement, gamification design is close to useless):
P2: Yes, you need to know how engaged players are to understand if you are having a successful impact.
P8: Not necessarily - depends what you designed for.
P14: Pretty much yes if you have zero data.

Comments of DH25 (i.e., The methods that can be used for evaluating gamification design: a. Measuring player behaviors before and after the gamification implementation for a certain period, b. Measuring player usage and the satisfaction rate, c. Measuring player Key Performance Indicators (KPIs) compared to the desired indicators):

P2: All of these elements are important to figuring out if a game "works".

Comments of DH26 (i.e., User participation is one of the most important processes and should be conducted through the entire gamification project):

P2: Yes, it is important to note if players get involved with the game enough to truly want to keep playing.
P14: Yes and no, sometimes users don’t know what they want.

Comments of DH30 (i.e., User participation is essential to understand the intrinsic motivators of players):

P2: Yes, unless you know how players are using and reacting to a game you do not know how successful said game is.
P4: Such participation can be simply watching how users respond.

Comments of DH33 (i.e., In educational gamification designs, user participation creates curiosity, which is a great driver for learning, as participants are interested in seeing the project’s end result and their individual impact on it):

P2: True, successful educational games should make people curious and desire to play more.
P3: It may also spoil the surprise, so always have something new they haven't seen yet for curiosity retention.
P8: The challenge is that they design GAMES rather than gamification processes.
P4: It can. However, mapping close to a current environment users deal with may not have the desired generated curiosity effect (familiarity breeds contempt it is said).
4.3.2.2 Design Heuristics that Did Not Reach Consensus

Table 4.10 lists the design heuristics that did not reach consensus in the first Delphi round. They were retained for successive round survey.

Table 4.10.
**Design Heuristics That Did Not Meet Consensus in the First Delphi Round**

(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

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Table 4.10 (continued).

*Design Heuristics That Did Not Meet Consensus in the First Delphi Round*

(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

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<td>0%</td>
<td>31%</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>DH29</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85%</td>
<td>0%</td>
<td>15%</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>DH31</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>69%</td>
<td>0%</td>
<td>31%</td>
<td>1</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 4.10 (continued).

*Design Heuristics That Did Not Meet Consensus in the First Delphi Round*

(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH32</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>62%</td>
<td>8%</td>
<td>31%</td>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

According to the criteria of reaching consensus in this round, agreement percentage > 75% and IQR <1.5 should be satisfied at the same time. From the above table, DH3, DH10-a, Dh10-d, DH12, and DH29's agreement percentages were more than 85%, but their IQRs were not less than 1.5. This means the spread of scores was large enough to eliminate consent. Therefore, these design heuristics were saved for the second Delphi round to see if the results would be more uniform, stay the same, or be more spread out. There are also some design heuristics that meet the criteria of IQR<1.5, but agreement percentage is less than 75%, such as DH2, DH7, DH11, DH13-c, DH13-e, DH14-b, DH14-e, DH14-g, DH14-h, DH18, DH21-g, and DH31. The results of these design heuristics were not very spread out from the middle 50%, but the majority of feedback didn't reach 75%. The remaining design heuristics neither satisfied the agreement percentage criterion nor the IQR criterion in the first Delphi round. These design heuristics were DH9, Dh10-b, DH13-a, DH13-b, DH13-d, Dh13-f, Dh14-a, Dh14-d, Dh14-f, DH19, Dh20, Dh21-b, DH21-f, Dh22, Dh25-b, Dh27, Dh28, and DH32. Therefore, these still needed to be re-evaluated in the second Delphi round. Comments for all the design heuristics that did not reach consensus in the first Delphi round survey are as follows:

Comments of DH2 (i.e., Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals):
P2: Yes, budgets and goals need to be considered when you are planning the scope of your game.
P3: Not sure what you mean with this question. I would say if progress indicators are relevant to achieve the goals then they would be budgeted for, if not not.
P9: Transparency of progress is a key element of any gamification solution.
P14: Progress HUDs are just another mechanic, it does depend on budget and goals but it's not so important as to focus all your efforts on them.

Comments of DH3 (i.e., It is important to study what motivators have already worked for players and how players have been motivated in the past):

P2: It is always good to look into past research to see what has worked and what has not. However, if there is truly a new idea it might be worth implementing just to see how audiences react.
P4: This can be beneficial, but if a system totally ignores other possible motivation factors, then this isn't as effective.
P8: Providing the behaviour you want to encourage is still aligned with past behaviour and motivation.
P14: Totally agree.

Comments of DH7 (i.e., Designers may train some key players as “game masters” to use and generate continuous activities on the desired gamification platform):

P2: It depends on the game/company. In some cases this could be very beneficial.
P4: Players are not designers. Such can be useful for input, but may miss key aspects of what works as far as design goes.
P8: I think that the "game masters" should be organic and that they will rise the occasion on their own... if the solution is designed well, they will have trained themselves.
P14: Depending on the users and clients.

Comments of DH9 (i.e., The gamification design workflow should always follow the classic User-Centered Design approach):

P2: Not always. There are a lot of different types of games and ways to engage those games. One model does not always need to be followed in order for the game to work.
P10: An User-Centered Design is an ideal, because you don’t always have user feedback....
P14: Yes, it is like video games, they are for users.
Comments of DH11 (i.e., In gamification design, users should always be referred to as players in order to emphasize that players should have fun, while the term users implies only a need to have required tasks be efficient and accurate):

P2: True. Games are supposed to be fun so the term "user" doesn't fit as well as "player".
P3: Whatever is most appropriate to the company culture.
P4: Context may dictate that another name for what a user is, in order to generate engagement.
P9: One must be careful with the use of the word player, there are certain cultures where 'playing' at the office is considered a bad thing.
P14: Nah, not really, tags don't make a difference, your design does.

Comments of DH12 (i.e., Defining the target players' profile by understanding who they are and what motivates their engagement is critical):

P2: In some cases yes, in others no. It entirely depends on the kind of game. For example, some games like "Candy Crush" can be popular among any number of players of various backgrounds.
P8: This too needs to be progressive! not a once off assessment, but rather a leveling up.
P14: As with any video game.

Comments of DH13 (i.e., The research methods that can be used for defining players: a. sampling the potential players who have the largest expected impact, b. direct observation, c. interviews, d. focus groups, e. surveys, f. workshops):

P2: It depends on the kind of game. Some feedback should be in person while some can be conducted online.
P14: Best is by observing and focus groups.
P15: For big groups of players the most easy and effective is to prepare a survey with a psychologist focused on any user segmentation type. For example Bartle, Marczwesky, Ami Jo Kim or You Kai Chou."

Comments of DH14 (i.e., The analysis methods that can be used for defining players: a. Bartle's Player Types, b. Amy Jo Kim's Player Theory, c. Andrzej Marczewski's Player Theory, d. Octalysis Frameworks of Motivational Drivers, e. Standard Demographic, f. Personality Test, g. Playing Preferences Test, h. IT and Professional Skills):
P2: I have not researched these methods.
P4: Different play environments can end up calling for different models for defining and analyzing players.
P14: Use your own methodology or the one that works best with you, but Bartle never (as he even says).

Comments of DH18 (i.e., Play testing should be done quickly and iteratively until the designer feels the product is ready):

   P2: In some cases this might work, in others not.

Comments of DH20 (i.e., A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"):  

   P8: When using a control group methodology you are not getting accurate data of the players, the REAL valuable data is when the entire player population are engaging. This is why the PRE-design engagement is VITAL.
   P3: I would always include these kinds of questions regardless of kind of group.
P2: Yes, open-ended questions are the way to get the best feedback in most cases.

Comments of DH21 (i.e., The methods that can be used for play testing: a. direct observation, b. survey, c. interview, d. game interaction test, e. usability test, f. cognitive walkthrough, g. heuristic review):

   P2: All of these methods can be very useful.

Comments of DH22 (i.e., A good gamification design should always give players meaningful choices and purpose, allowing them to explore their hidden potential):

   P2: In most cases this is true. However, there are always exceptions.
P4: While harmonizing purpose with a player's purpose helps, meaningful choices would depend on context. Some onboarding, for example could end up providing very little in choices.

Comments of DH25 (i.e., The methods that can be used for evaluating gamification design: a. Measuring player behaviors before and after the gamification implementation for a certain period, b. Measuring player usage and the satisfaction rate, c. Measuring player Key Performance Indicators (KPIs) to compared to the desired indicators):
P2: It is important to figuring out if a game "works".

Comments of DH27 (i.e., When users are involved in a gamification design project, designers should not directly ask users "what do I have to do to change your behavior?"): 

P2: It depends on the game and the situation.
P4: Rephrasing the question, however, can provide useful feedback into user motivation and reasons for resistance to change.
P8: They need to use more creative methods to establish this.
P14: Never ask that.

Comments of DH28 (i.e., The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal):

P2: In most cases this will work, but there are always exceptions.
P3: As a player becomes more experienced what motivates may change also, so be cognizant of this.
P4: Failure to connect with the internal purposes of a user can also be a big challenge.
P9: Kind of yes, but don’t go crazy delivering new updates every day.

Comments of DH29 (i.e., Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players):

P2: In most cases yes but not all.
P4: Extrinsic rewards that connect with the internal purposes of a user, need not erode intrinsic motivation, but can serve as feedback. Erosion can happen when purposes are not harmonized between a company and users, and people then attempt to game a system to get such rewards.
P14: THE ONE I MOST AGREE WITH, PBLs NEVER LAST FOR MORE THAN A MONTH OR SO.

Comments of DH31 (i.e., User participation can give players the sense that this is not something done to them but something they have created for themselves):

P8: And something that they are creating as well.
P4: Users feeling they built something, is useful for appealing to an autonomy drive. For other motivation types, this is not important, but a system that helps them meet their drives is.
P2: Yes, notably when customization elements are involved.

Comments of DH32 (i.e., In business gamification designs, user participation should involve not only important users inside a business, but also all kinds of users at every level):

P2: Absolutely. A game that starts out being intended for a business can branch out to the mainstream.
P4: Stakeholder impact is questionable here, particularly if the stakeholders are very loosely connected to an organization, and only impacted by externalities.

4.3.2.3 Supplemental Questions

In order to collect more information that may benefit beginners in the gamification design field, participants were asked two supplemental questions. Participants' responses are provided below.

Supplemental Question 1 (i.e., What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?):

P2: My main focus in Entertainment-Education so I'm always following organizations that promote it including things as classic and basic as the "Sesame Street" organization. There are many books and articles about EE that can be found online. "Games for Change" is also an interesting event/conference that I hope to attend next week.

P3: Octalysis framework, Mario Herger books, Gabe Zicherman courses and books, Hooked by Eye Niyal, Coursera and diversity courses, Weinschenk on user centred design on udemy, etc...

P4: Loyalty 3.0, Reality is Broken.

P6: Drive (Daniel Pink), Flow (Mihaly Csikszentmihalyi), 4keys2fun (Nicole Lazzaro), Coursera Mooc Gamification Design (Kevin Werbach), Gamification Workshop (Gabe Zichermann).
P7: CHI, PETRA, EICS, ASSETS.


P9: The Multiplayer Classroom, Glued to Games.

P10: Gamification by Design.


P12: http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world / https://www.youtube.com/watch?v=5jSzwSJmzRY


P14: Any great game design book: Schell, Rogers, Schreiber, Radoff, etc.


Supplemental Question 2 (i.e., What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible):

P2: I am just starting to get into game design but the hardest part is when I am trying to make a game that will appeal to all audiences. It can be difficult to figure out the balance between the kind of game play and how much character and plot (if any) are needed. Generally, the more "instructors" you get for required content, targeted age, game play, budget, etc., the easier it is to design a game by following those guidelines.

P3: Getting the client to agree to observation, focus groups and surveys as well as several rounds of play testing. Often the client thinks they can get there super-quick and don't want to invest in several essential steps.
P4: Trying to get users to be motivated enough to participate, without use of punitive measures.

P6: Find effective ways to reward players and keep them engaged along the experience.

P7: Getting enough users not familiar with the previous iteration.

P8: People design GAMES rather than UX focus.

P9: The most critical aspect (and often missed) is defining the right target group.

P10: The main challenge is that you don’t always have user data, confinable and reliable for decision making purposes. That’s the main reason why interaction is critical for a good design.

P11: Understanding and examining the intrinsic motivation of the players. A focus on intrinsic motivators begins to reveal not only how to engage players in the game, but why and how their behaviors are changed through that interaction. Finding congruence between the intrinsic desires and the enterprise goal helps to focus on the activities and game elements that influence both.

P12: Stakeholders or managers who are asking for a gamification design, usually think about the user experience before thinking about the business goals. First, one of the most difficult things is to determine the behaviour changes required to achieve the business objectives. Secondly, to find out what really motivates users.

P13: UCD is not about listening to what users want/say/say they need, but to see what they actually do and feel. That I believe that is the most important challenge.

P14: I wouldn't be able to tell them all in some lines, mainly: design problems (balance, cheating, pacing, fun enough), art (2D/3D, optimisation, textures, bakes, etc), tech (clean code, bugs, team, etc) and production (budget and timings) And many more! Gamification is full of problems, the fun in it is to solve them all!

P15: I think de most important challenge is to accomplish with the project design for all kind of users types equally. I mean, to finally design a gamification project that can be understood and played equally, with the same elevated estate of flow. When you design a game using doing user-centered design you focused on a specific type of player or a specific type of game playing. But when you have to design a gamification user-centered project, most of times there're all types of users with different hobbies or different skills.
4.4 Second Delphi Round Data

After the first Delphi round data was collected and analyzed, the second Delphi round survey was sent to all 13 participants through the Purdue Qualtrics system. The design heuristics that didn't reach consensus in the first round were used in this round. The inquiry methods were the same as in the first round. The five-item Likert scale was used to collect quantitative data about participants' agreement levels. Comment texts boxes below each question and two supplemental questions at the end were used to collect participants' qualitative responses.

4.4.1 Participant Description

In the second Delphi round, ten out of 13 participants completed the survey. The response rate was 76.92%, which is lower than the response rate in the first Delphi round. P3, P14 and P15 dropped off this round. They provided no feedback after three reminders were sent. Thank you letters were sent to them after this survey round was closed.

Among the active 10 participants (n=10), one was female and nine were males. One participant was between the ages of 20 and 30, five participants were between the ages of 31 and 40, four participants were between the ages of 41 and 50, and one participant was between the ages of 51 and 60. Two of the participants who dropped off this round were gamification designers, and the other was chief of an Elearning department. The 10 remaining participants all had more than one year of professional experience, designed or participated in the design of at least two gamification projects. Nine out of 10 (90.00%) of the participants worked in gamification for one to five years. One outlier in the data set had a working experience of 12 years. In the aspect of education, one participant had a doctoral degree (10.00%) and eight had master's degrees (80.00%), and one participant had a bachelor's degree as the highest degree (10.00%).

4.4.2 Data Presentation

After calculating the percentage of agreement and IQR value of the data set, eleven out of 20 design heuristics fully reached consensus based on the two pre-defined criteria (percentage >80% and IRQ <1.5). With the same criteria, four design heuristics
(DH10, DH13, DH14, and DH21) having multiple components partially reached consensus, because some components met consensus and some did not. All the design heuristics and statements for which consensus was not reached, were used in the third Delphi round. Three design heuristics and statements were found to be too stable to potentially have different results according to the stability calculation. Data from the two open-ended questions were also collected.

4.4.2.1 Design Heuristics Reaching Consensus

There are 15 design heuristics in total that reached or partially reached consensus in the second Delphi round. The statistical data for all 15 design heuristics is presented in Table 4.11.

Table 4.11.

*Design Heuristics Reaching Consensus in the Second Delphi Round*

(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH2</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>0%</td>
<td>0%</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>DH3</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>0%</td>
<td>0%</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>DH9</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>80%</td>
<td>10%</td>
<td>10%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH10-a</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>90%</td>
<td>0%</td>
<td>10%</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>DH10-b</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>80%</td>
<td>0%</td>
<td>20%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH12</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>90%</td>
<td>0%</td>
<td>10%</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>DH13-a</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>0%</td>
<td>0%</td>
<td>0</td>
<td>Yes</td>
</tr>
</tbody>
</table>
From Table 4.11, DH2, DH3, DH13-a, DH14-a, and DH14-b got 100% level of agreement and an IQR value of one or zero, satisfying both consensus criteria. The remaining of the design heuristics in Table 4.14 didn't reach a strong level of consensus, but they all satisfied the defined criteria of consensus in the study (agreement percentage >80% and IQR value <1.5). In the qualitative data portion, participants didn't provide any comment for items DH21, DH22, DH25, and DH31. The comments about the remaining
design heuristics supplemented participants' quantitative responses and showed consistency in the participants' opinions. All the comments of the design heuristics that reached consensus in the second round are provided below:

Comments of DH2 (i.e., Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals):

P8: The budget will ultimately dictate the professionalism of the progress indicator. I.e. there can be a static JPEG ($)... Or there can be a "magic fairy" floating around the screen that needs to be caught... ($$$$$)
P10: Progress indicators are key elements, and should be present on any gamification initiative, despite budget and time.

Comments of DH3 (i.e., It is important to study what motivators have already worked for players and how players have been motivated in the past):

P2: For the most part I agree with this. However, there are always exceptions to the rule, however rare, such as when trying out an entirely new and innovative format.
P10: A study of past motivators, and them influence in the new design is a good starting point. At least, we will avoid what does not worked in the past.

Comments of DH9 (i.e., The gamification design workflow should always follow the classic User-Centered Design approach):

P2: Although I like the idea of user-centered games and think they work most of the time I do not think you can say something is "always" right in terms of format.
P8: Remembering that we are designing a game, we are designing a behavior change / increased engagement strategy...
P10: Totally agree.

Comments of DH10 (i.e., The design activities that can be used in a gamification design process: a. select the most appropriate product platforms, b. create player personas, d. design the narrative and aesthetics (game story and audio/visual elements that will touch and engage players)):
P2: Although all of these elements are important, they do vary from game to game. For instance, a game like "Tetris" does NOT need player personas to work effectively.

Comments of DH12 (i.e., Defining the target players' profile by understanding who they are and what motivates their engagement is critical):

P2: For the most part this is critical. However, there are always exceptions such as the "Candy Crush" example.
P8: Remembering that we are not designing a game. A Gamification strategy is to be progressive to keep the user continually engaged! I agree with point one above.

Comments of DH13 (i.e., The research methods that can be used for defining players: a. sampling the potential players who have the largest expected impact, b. direct observation, c. interviews, d. focus groups, e. surveys, f. workshops):

P2: Again, it depends on the kind of game and audience.

Comments of DH14 (i.e., The analysis methods that can be used for defining players: a. Bartle's Player Types, b. Amy Jo Kim's Player Theory, d. Octalysis Frameworks of Motivational Drivers, e. Standard Demographic, f. Personality Test, g. Playing Preferences Test, h. IT and Professional Skills):

P8: The last point is valid if the Gamification strategy is technological. If you applying a non tech strategy then the platform for the mechanics needs to be tested if the users are able to apply.

Comments of DH27 (i.e., When users are involved in a gamification design project, designers should not directly ask users "what do I have to do to change your behavior?"):  

P10: Why not? Probably is too direct, but if at least one good idea comes from this approach, is good enough!

Comments of DH28 (i.e., The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal):
P2: For the most part I agree since if nothing ever changes then the game becomes boring and players will not engage it.
P10: That has more difficulty is the players base if huge.... How to keep engaging old users while engaging new users? That's a problem...

Comments of DH29 (i.e., Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players):

P4: The bulk of gamification has centered around PBL. More work needs to be done in the area of intrinsic motivators. PBL would be best suited now for mastery internal motivation.

Comments of DH32 (i.e., In business gamification designs, user participation should involve not only important users inside a business, but also all kinds of users at every level):

P10: Participation on all type of users gives a broader view!

4.4.2.2 Design Heuristics that Did Not Reaching Consensus

Table 4.12 lists the design heuristics that did not reach consensus in the second Delphi round. They were retained for the third round survey.

Table 4.12.

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
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<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH7</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>50%</td>
<td>10%</td>
<td>40%</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>DH10-d</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>DH11</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>50%</td>
<td>10%</td>
<td>40%</td>
<td>1</td>
<td>No</td>
</tr>
</tbody>
</table>
According to the criteria for reaching consensus in this round, agreement percentage > 80% and IQR < 1.5 should be satisfied at the same time. From Table 4.12, it can be seen that all the design heuristics failed to achieve 80% agreement percentage. However, their IQRs met the criterion that was less than 1.5. This outcome suggests that the spread of scores was not large enough to eliminate consent, but the agreement percentage level was not high enough to reach consensus for a design heuristic. Except for no comment from DH21, the other comments are listed below:

Comments of DH7 (i.e., Designers may train some key players as "game masters" to use and generate continuous activities on the desired gamification platform):
P2: This entirely depends on the game and company. I do understand how it could work in some cases.
P8: When designing games, however when designing a Gamification strategy, there needs to be a different perspective.
P10: I would not train key players, I would prefer to recognize them and give the status of "game master" based on user activity analysis.

Comments of DH11 (i.e., In gamification design, users should always be referred to as players in order to emphasize that players should have fun, while the term users implies only a need to have required tasks be efficient and accurate):

P2: I believe I "strongly agreed" in the last round but, after reading what some other respondents said, I changed to "Agree." I still like the term "player" more than "user" but the wording used does depend on the game, its purpose, and the culture of the organization which it is a product of.
P10: "Naming players in some context may confuse users. As example: employees are players that play or that work?"

Comments of DH18 (i.e., Play testing should be done quickly and iteratively until the designer feels the product is ready):

P2: "Play testing is the core of gaming. However, sometimes it needs to be done slowly rather than quickly. It depends on the game and audience."
P8: "It should be iterative, and will never be perfect until the users are engaging."
P13: "Should be continuous."

Comments of DH19 (i.e., Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback):

P8: Not to limit to a few... engage with all.
P10: If the user does not provide feedback, probably the tool is not good enough for that user.....

Comments of DH20 (i.e., A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"):  

P4: It is preferable to SHOW, rather than ask.
P12: Better to let players play and see how they behave, than asking them how would they behave.
4.4.2.3 Stability Calculation

After Round 1 and Round 2 data was collected, stability of the design heuristic responses that did not achieve consensus was calculated to determine the stability of experts' opinions between successive rounds in the study. A large stability score indicates the possibility of change occurring between the previous rounds for each design heuristic. In this study, a cutoff score of stability is 0.2. If stability is greater than 0.2, the Delphi item needs to be retained and evaluated in the next round. If the result is less than or equal to 0.2, the item will not be included in the next round survey.

The stability of each design heuristic that did not reach consensus in the second Delphi round was calculated. To ensure that the number of participants in the two Delphi rounds were the same, the response data of P3, P14, and P15 in the first Delphi round was removed from the data set for calculating stability, since the three did not participate in the second Delphi survey round. Also, P4 didn't indicate his agreement level with DH14-e and DH21-g in the second Delphi survey round. So, P4's data from the first Delphi round was not included for evaluating these two design heuristics.

Table 4.13 to 4.15 show stability calculation results for design heuristics DH11, DH14-4, and DH21-g. The results show that the three design heuristics might not have different consensus outcomes in the third Delphi round with stability scores of 0.1, 0.1667, and 0, respectively. Because they did not meet full consensus in the second Delphi round, the three items were not included in the third Delphi round. However, the remaining design heuristics that didn't reach consensus were used in the third Delphi round. They include DH7, DH10-d, DH13-d, DH13-f, DH14-f, DH14-g, DH14-h, DH18, DH19, and DH20.

Table 4.13.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Round 2</th>
<th>Round 1</th>
<th>Units of Change</th>
<th>Absolute Value of Total Units of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4.13 (continued).

*Stability Calculations for DH11*

<table>
<thead>
<tr>
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<th>Round 1</th>
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<th>Absolute Value of Total Units of Change</th>
</tr>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> 2</td>
</tr>
</tbody>
</table>

Divide the above value by number of rounds \((n=2)=1\)

Divide the above value by the number of participants \((N=10)=0.1\)

---

Table 4.14.

*Stability Calculations for DH14-e*

<table>
<thead>
<tr>
<th>Scale</th>
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<th>Round 1</th>
<th>Units of Change</th>
<th>Absolute Value of Total Units of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1</td>
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<td>3</td>
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<td>0</td>
</tr>
<tr>
<td>4</td>
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<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total=3</strong></td>
</tr>
</tbody>
</table>

Divide the above value by number of rounds \((n=2)=1.5\)

Divide the above value by the number of participants \((N=9)=0.166667\)
Table 4.15.

*Stability Calculations for DH21-g*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Round 2</th>
<th>Round 1</th>
<th>Units of Change</th>
<th>Absolute Value of Total Units of Change</th>
</tr>
</thead>
<tbody>
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<td>0</td>
<td>0</td>
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<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total=0

Divide the above value by number of rounds \(n=2\)=0

Divide the above value by the number of participants \(N=9\)=0

4.4.2.4 Supplemental Questions

In order to continue collecting more information that may benefit beginners in the gamification design field, participants were asked two supplemental questions. Unlike the first Delphi round survey, response to the two supplement of questions was not mandatory. Thus, fewer responses were received for the supplementary questions. Participants' responses for these are provided below:

Supplemental Question 1 (i.e., What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?):

P2: There are excellent ideas above. YouTube and TED are great resources that can be accessed online for free.
P8: How to put Gamification to work for you. Monica Cornetti, the Gamification Novice and Gamification Expert certification by Sententiagames.com, with Darryn Van den berg as the narrator / guru.
P11: Loyalty 3.0
Supplemental Question 2 (i.e., What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible):

P2: Getting feedback/data can be tough.
P8: Differentiating the differences between game design and strategic Gamification design.
P11: Focusing on the intrinsic motivators and keeping the game surprising and fun.
P10: The most difficult problem I always face is to concentrate in a pool of ideas for the first solution (first pass), while leaving other good ideas outside the first project.

4.5 Third Delphi Round Data

After the first and second Delphi survey data was collected and analyzed, the third and final Delphi round of survey, items were sent to all 10 participants through the Purdue Qualtrics system. In this portion of the survey, design heuristics that did not reach consensus in the second round were selected to allow participants to indicate their agreement levels. As before, the five-item Likert scale was used to analyze quantitative data. Participants were also encouraged to comment on each item regarding any concerns or ideas. This information made up the qualitative portion of the data collected. After responding to the design heuristic items, participants were also asked two supplemental questions.

4.5.1 Participant Description

In the third Delphi round study, nine out of 10 participants completed the survey. The response rate was increased to 90.00%, which is higher than the response rate in the first Delphi round. P7 was dropped from this round for failing to provide feedback after three reminders were sent. Thank you letters were sent to him after this round survey was closed.
Among the nine remaining participants \((n=9)\), one was female and eight were males. One participant was between the ages of 20 and 30, three participants were between the ages of 31 and 40, four participants were between the ages of 41 and 50, and one participant was between the ages of 51 and 60. One participant was a gamification designer and CEO. The nine participants all had more than one year of professional experience, designed or participated in the design of at least two gamification projects. As for education, eight participants had master's degrees (88.89%), and one participant had a bachelor's degree as the highest degree (11.11%).

4.5.2 Data Presentation

After calculating the percentage of agreement and IQR of the data set, one out of 10 design heuristics reached full consensus based on the two pre-defined criteria (percentage >80% and IRQ <1.5). One out of 10 design heuristics reached partial consensus. Consensus was not reached on the remaining eight design heuristics. A review of the responses to the two supplemental questions and a summary of the chapter are presented.

4.5.2.1 Design Heuristics Reaching Consensus

All the IQR values of the design heuristics in the third Delphi round satisfied the criterion of being smaller than 1.5. However item DH13-d and DH18 did not meet the agreement percentage criterion of being larger than 80%. Table 4.16 shows the statistical results. Comments for these two design heuristics are presented below.

Comments of DH13 (i.e., The research methods that can be used for defining players: d. focus groups, f. workshops):

P10: How you define the players is how the game mechanics are going to align to them players.
P12: Let players play and let's what actions motivate them more than others.

Comments of DH18 (i.e., Play testing should be done quickly and iteratively until the designer feels the product is ready):
P10: As more testing, better outcome.

Table 4.16.
*Design Heuristics Reaching Consensus in the Third Delphi Round*

(\(SA=\text{Strongly Agree}, \ A=\text{Agree}, \ N=\text{Neutral}, \ D=\text{Disagree}, \ SD=\text{Strongly Disagree}, \ NA=\text{Not Applicable}, \ AP=\text{Agreement Percentage}, \ DP=\text{Disagreement Percentage}, \ NP=\text{Neutral Percentage}\))

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH13-d</td>
<td>0</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>89%</td>
<td>0%</td>
<td>11%</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>DH18</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>89%</td>
<td>0%</td>
<td>11%</td>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

4.5.2.2 *Design Heuristics that Did Not Reaching Consensus*

As noted above, two design heuristic items DH13 and DH18 reached consensus. The remaining eight items in the third Delphi survey did not reach consensus. Table 4.17 shows the results of the design heuristics that did not reach consensus. The comments for these design heuristics are provided below, except comments for DH13 which were presented in the previous section.

Comments of DH7 (i.e., Designers may train some key players as "game masters" to use and generate continuous activities on the desired gamification platform):

P8: I think that this could help but is not necessarily the best way forward.
P10: To train game masters is a good idea, if these game masters are not the only ones. There should be others, based on their own success criteria.

Comments of DH10 (i.e., The design activities that can be used in a gamification design process: d. design the narrative and aesthetics (game story and audio/visual elements that will touch and engage players)):

P9: Just because it is not visible to the "player" that does not mean a persona should not be designed.
P10: This technique, is a great tool in case the project requires to pursue for immersive experiences.

P12: Storytelling, themes, are a key to generate intrinsic motivation and add a difference with any other similar project.

Table 4.17.

*Design Heuristics That Did Not Meet Consensus in the Third Delphi Round*

*(SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, NA=Not Applicable, AP=Agreement Percentage, DP=Disagreement Percentage, NP=Neutral Percentage)*

<table>
<thead>
<tr>
<th>ID</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>AP</th>
<th>DP</th>
<th>NP</th>
<th>IQR</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH7</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>56%</td>
<td>22%</td>
<td>22%</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>DH10-d</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>78%</td>
<td>11%</td>
<td>11%</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>DH13-f</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56%</td>
<td>0%</td>
<td>44%</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>DH14-f</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>44%</td>
<td>0%</td>
<td>56%</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>DH14-g</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56%</td>
<td>0%</td>
<td>44%</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>DH14-h</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>33%</td>
<td>22%</td>
<td>44%</td>
<td>1</td>
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</tr>
<tr>
<td>DH19</td>
<td>1</td>
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<td>2</td>
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<td>0</td>
<td>67%</td>
<td>22%</td>
<td>11%</td>
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<tr>
<td>DH20</td>
<td>1</td>
<td>4</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>56%</td>
<td>11%</td>
<td>33%</td>
<td>1</td>
<td>No</td>
</tr>
</tbody>
</table>

Comments of DH14 (i.e., The analysis methods that can be used for defining players: f. Personality Test, g. Playing Preferences Test, h. IT and Professional Skills):

P10: If you can analyze the way in which the players play during the game, direct observation and preferences tests are great analysis methods.

Comments of DH19 (i.e., Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback):

P10: Any feedback has to be taken into consideration, even silence.
Comments of DH20 (i.e., A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"):

P10: Playtesting users are great resources to ask for additional input, around different topics.
P13: This is giving up the meaning of design. I strongly disagree with asking for colors and draw expressions.

4.5.2.3 Stability Calculation

Stability calculations were conducted for all design heuristic items that did not reach consensus. According to the results, DH19 was the only item that had a stability value less than 0.2, the specified threshold for stability and removal from the next Delphi round if there is any. Table 4.18 shows stability calculation result for DH19.

Table 4.18.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Round 2</th>
<th>Round 1</th>
<th>Units of Change</th>
<th>Absolute Value of Total Units of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total=3

Divide the above value by number of rounds (n=2)=1.5

Divide the above value by the number of participants(N=9)=0.15

The results of stability calculations for the remaining design heuristics were all found to be larger than 0.2, as listed in Table 4.19. A stability score larger than 0.2
indicates that the item was not considered to be stable and likely to change if more Delphi rounds are provided. However, considering the potential for fatigue of participants, the experience of researchers in previous Delphi studies as noted in Chapter 3, and the consulting results from Delphi study experts, this Delphi study was terminated after the third round of surveys.

Table 4.19.

*Table with the Stability Score Larger Than 0.2*

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>DH7</td>
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</tr>
<tr>
<td>DH10-d</td>
<td>0.45</td>
</tr>
<tr>
<td>DH13-f</td>
<td>0.25</td>
</tr>
<tr>
<td>Dh14-f</td>
<td>0.33</td>
</tr>
<tr>
<td>Dh14-g</td>
<td>0.22</td>
</tr>
<tr>
<td>DH14-h</td>
<td>0.33</td>
</tr>
<tr>
<td>DH20</td>
<td>0.25</td>
</tr>
</tbody>
</table>

4.5.2.4 Supplemental Questions

The following responses to the two supplemental questions were collected in the last survey round:

Supplemental Question 1(i.e., What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?):

P8: Accelerated Learning for Breakthrough Results: Debbie Craig.
P10: Gamification by Design, For the Win, Coursera Mooc Gamification Design (Kevin Werbach), Gamification Workshop (Gabe Zichermann).

Supplemental Question 2(i.e., What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible):
P10: The most difficult for me is to get the right balance in between user engagement and business indicators that measures engagement.
P12: Sometimes you are designing gamification assuming that users have a certain player profile, but users do not exist yet and will not show their player profile until they start participating in the chosen mechanics.

4.5.3 Summary

This chapter presented the research data for the entire study. The pre-Delphi round collected qualitative data about gamification designers' opinions on using UCD in gamification design. After analyzing this data, thirty-three design heuristics were created and used in three Delphi survey rounds. Participants were asked to indicate their agreement levels with the 33 design heuristics and make comments. Both quantitative and qualitative data were collected and analyzed using three survey rounds. Stability calculations were performed to determine if consensus on the level of agreement of design heuristic items was reached in successive rounds. Also, the responses to two supplementary questions were presented.

The final results and conclusions reached in this Delphi study are presented in Chapter 5, the next and final chapter. The chapter also provides recommendations for future work.
CHAPTER 5. RESEARCH FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter contains a presentation of the research findings based on the analysis of the data in chapter 4. This chapter then provides a conclusion of this study involving the study's purpose, methods used, data collected, and the findings achieved. Recommendations for future work are also provided.

5.1 Research Findings

After three Delphi rounds were conducted, four design heuristics or statements (DH11, DH14-e, and DH21-f in Round 2 and DH19 in Round 3) were removed and 7 design heuristics or statements (DH7, DH10-d, DH13-f, DH14-f, g, h, and DH20) did not reach consensus based on a series of stability calculations. Except for these design heuristics, all the others reached consensus. Initially research findings based on consensus results and text comments are presented and discussed for each of the five themes developed in the study. This is followed by a summary of responses to the supplemental questions.

5.1.1 UCD Workflow

Table 5.1 presents a summary of the process for reaching consensus of the 10 design heuristics for Theme 1 - UCD Workflow in the three survey rounds used. Among all these design heuristics and statements, DH7 and DH10-d did not reach consensus until the final Delphi survey round, while all the others reached consensus. Based on the results obtained, the following findings were identified.

Even though UCD has been widely used in the gamification design industry, the study shown that the UCD process can be described by the following activities. First, it
is very important for a designer to understand a client's business objective about which problems to solve and which player behaviors to change. Second, progress indicators of the product are determined with consideration of the client's budget. Third, existing motivators for players in similar or related areas should be reviewed in order to avoid those that have not worked in the past. Lastly, brief gamification goals and solutions should be proposed to the main stakeholders to get approval. These proposals should be made using small incremental budgets that can increase based on success and learning.

Table 5.1.

*Process for Reaching Consensus of Design Heuristics in Theme 1*

<table>
<thead>
<tr>
<th>ID</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH1</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH2</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH3</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH4</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH5</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH6</td>
<td>Consensus Reached</td>
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<td>N/A</td>
</tr>
<tr>
<td>DH7</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH8</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH9</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH10-a</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH10-b</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH10-c</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH10-d</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH10-e</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH10-f</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
When gamification development starts, play testing should be conducted with a small testing group selected from the target audience based on the Minimum Viable Product (MVP) concept. Designers need to measure and analyze the results of play testing and adjust the design to make it more successful. The testing and modification of the design should be conducted iteratively throughout the entire process. The players' reactions in the testing phase may mirror public acceptance of the design and may benefit further development.

Besides play testing, another activity in gamification design is to involve users in the design process. Successful user involvement should be made in a collaborative environment where players feel they are part owners of the product content being created. Designers need to be careful about the relation with the participants. Because players are not designers, the degree of player involvement will depend on many factors including the skill and experience of the players, clients, or the product itself. In some cases designers should consider training some key players as "game masters" to use and generate continuous activities on the desired gamification platform. Where use of game masters is not possible, designers may want to just recognize them and give these individuals the title of "game master" based on their contribution.

In general, the gamification design workflow does not have to follow the classic UCD approach all the time, but it is a good option for gamification designers to use. The design activities that gamification designers can use include selecting the most appropriate product platforms, creating player personas for determining gamification dynamics, mechanics, and other game element components, designing the narrative (game story) and aesthetics (audio/visual elements) that will touch and engage players, creating game levels and progress, and brainstorming creative elements related to making the game fun.

5.1.2 Defining Players

Table 5.2 presents a summary of the process for reaching consensus of the four design heuristics for Theme 2- Defining Players in the three survey rounds used. Among all these design heuristics and statements, DH13-f, DH14-f, DH14-g, and DH14-h did not
reach consensus until the final Delphi survey round. DH11 and DH14-e were removed because their stability calculation results indicated a low possibility to reach consensus if more rounds were provided. Besides the design heuristics and statements mentioned above, all the others reached consensus. Based on this result for Theme 2, the following findings were identified.

Table 5.2.

*Process for Reaching Consensus of Design Heuristics in Theme 2*

<table>
<thead>
<tr>
<th>ID</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH11</td>
<td>No Consensus</td>
<td>Removed after Stability</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculation</td>
<td></td>
</tr>
<tr>
<td>DH12</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH13-a</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH13-b</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH13-c</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH13-d</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
</tr>
<tr>
<td>DH13-e</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH13-f</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH14-a</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH14-b</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH14-c</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH14-d</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH14-e</td>
<td>No Consensus</td>
<td>Removed after Stability</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculation</td>
<td></td>
</tr>
<tr>
<td>DH14-f</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH14-g</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH14-h</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
</tbody>
</table>
Defining players is a significant activity in the process of understanding the entire gamification project, especially when the UCD approach is adopted. One difference between users in classic UCD and in gamification UCD is that the former implies a need to have tasks that are efficient and accurate and the latter emphasizes that players should have fun. But in the gamification design practices, users can be referred to as either "users" or "players" based on a specific situation for generating engagement. For example, "player" may not be appropriate to be used on an employee gamification project because "playing" at the office is considered to be something to be avoided in a work environment. But as long as emphasizing creating engagement with fun is performed successfully, user tags do not make much difference in the design itself.

Defining the target player profile by gaining an understanding of who the player is and what motivates the player's engagement is critical. This process can be progressive instead of a onetime assessment. In order to define players, designers can sample potential players to determine who will have the largest impact on the design and then conduct research activities such as direct observation, interviews, focus groups, surveys, and workshops. These research activities can be made in person or online. For example, international players are sometimes hard to contact by face to face, so online communication is a better option in that case.

Besides players' standard demographic data, sources of player information like personality tests or playing preferences tests can be used for collecting more data about players. After the data about the players is collected, gamification designers should analyze the data to get a clearer idea of how to define players. Some popular player data analysis models include Bartle's Player Types (Bartle, 1996), Amy Jo Kim's Player Theory (Kim, 2012), Andrzej Marczewski's Player Theory (Marczewski, 2013), Octalysis Frameworks of Motivational Drivers (Chou, 2010). Different play environments can end up calling for different data collection methods and data analysis models for defining and analyzing players. For example, if gamification design involves technological areas, IT and professional skills tests as well as the player data analysis models mentioned above can be used.
5.1.3 Play Testing

Table 5.3 presents a summary of the process for reaching consensus of the 7 design heuristics for Theme 3 - Play Testing in the three survey rounds used. Among all these design heuristics and statements, DH20 did not reach consensus until the final Delphi survey round. DH19 was removed because its stability calculation result indicated a low possibility to reach consensus if more rounds were provided. Besides these two design heuristics, all the others reached consensus. Based on this result for Theme 3, the following findings were identified.

Table 5.3.

<table>
<thead>
<tr>
<th>ID</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH15</td>
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<td>N/A</td>
</tr>
<tr>
<td>DH16</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH17</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH18</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
</tr>
<tr>
<td>DH19</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>Removed after Stability Calculation</td>
</tr>
<tr>
<td>DH20</td>
<td>No Consensus</td>
<td>No Consensus</td>
<td>No Consensus</td>
</tr>
<tr>
<td>DH21-a</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-b</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-c</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-d</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-e</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-f</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH21-g</td>
<td>No Consensus</td>
<td>Removed after Stability Calculation</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Throughout the design process, the use of play testing with prototypes is important as it reveals player behavior, motivation, and can possibly detect unforeseen cheating strategies. The feedback collected from play testing can help designers understand players' reasoning and motivation behind their actions. This can help designers to better address players' needs and to modify the design with greater potential for success.

Play testing should be iterative in the gamification design process. Ideally, a good design approach would be to make quick, low-fidelity prototypes, play test them with a small pilot player group, gather and analyze the feedback, return to the drawing board, modify the design, and play test again. Play testing is at the core of gamification design and should be adopted as much as possible. The benefits of play testing are pointed out repeatedly by many gamification design experts in this study. However, extensive use of play testing is not always possible due to time or budget constraints. In practice, play testing can be conducted either slowly or quickly as long as its functionality is achieved.

Designers should be careful in selecting participants for play testing. If a player does not provide meaningful feedback, it probably means the design is not challenging enough for that player or the player was sampled from a wrong pool. Gamification play testing can take on different forms or it can focus on different aspects such as game interaction or usability. Play testing can use multiple methods to collect player feedback including direct observation, survey, or interview. Some gamification designers believe observation is preferred to asking questions, while others prefer the use of open-ended questions to get the best feedback. Finally, all types of player feedback should be taken into consideration, even silence.

5.1.4 Gamification Evaluation

Table 5.4 presents a summary of the process for reaching consensus of the four design heuristics for Theme 4 - Gamification Evaluation in the three survey rounds used. All the design heuristics reached consensus after three Delphi rounds. Based on this result for Theme 4, the following findings were identified.
After a gamification design project is developed, it should be appropriately evaluated before it is launched. A good gamification design should accomplish two important goals. On the one hand, a good design should give players customized and meaningful choices, and purpose such as allowing them to explore their hidden potential. On the other hand, a successful gamification design must address a client’s initial business-related goals, even if players are enjoying the product as hoped. For example, when a designer has been hired to design a project for a certain business, then it can be considered a success if that business is pleased with the results.

For evaluating the effectiveness of a gamification design, designers can measure player behaviors for a certain period before and after the gamification implementation. Also, designers should consider measuring players' usage and satisfaction rate. In addition, designers can use multiple Key Performance Indicators (KPIs) of players' performance and compare these to the desired indicators in multiple stages throughout the design process.

5.1.5 User Participation

Table 5.5 presents a summary of the process for reaching consensus of the eight design heuristics for Theme 5 - User Participation in the three survey rounds used. All the
design heuristics reached consensus after three Delphi rounds. Based on this result for Theme 5, the following findings were identified.

One of the most important activities conducted throughout the entire gamification development process is player participation. Because of time and budget constraints, its use should be made wisely. When players are involved in a gamification design project, designers should be careful how to communicate with them in order to gain maximum benefit from their feedbacks. For example, designers should try to avoid asking questions like "what do I have to do to change your behavior?" and use more creative methods such as context inquiry or observation to make player participation more comfortable.

Table 5.5.

*Process for Reaching Consensus Design Heuristics in Theme 5*

<table>
<thead>
<tr>
<th>ID</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>N/A</td>
</tr>
<tr>
<td>DH27</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH28</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH29</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH30</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DH31</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH32</td>
<td>No Consensus</td>
<td>Consensus Reached</td>
<td>N/A</td>
</tr>
<tr>
<td>DH33</td>
<td>Consensus Reached</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

In the gamification design field, one of the biggest challenges for holding player interest is keeping the design fresh by constantly introducing new challenges and elements that feature surprise, luck and renewal, especially for the experienced player. If the design lacks variety then the gamification project becomes boring and players will not engage it. However, if a gamification design relies heavily on bribing players with incentives like points, badges, and leaderboards (PBLs), the design may end up eroding
the intrinsic motivation of the players in the long term. Therefore, getting to know how to connect with the players' internal purpose and motivating them intrinsically is very important. Also, players’ participation in the design process can give players the sense that the design is not something done by others but something they have created for themselves. This is especially useful for a project that appeals to autonomous motivation of players. When recruiting players for participating in a gamification design, the designer should be aware of potential bias from the participants. For example, in a business gamification project, designers should not only involve the potential individuals targeted to use the product, but other all kinds of users at every skill level as well.

5.1.6 Challenges of Using UCD in Gamification

In general, using UCD in gamification design is not an easy task. Two main challenges that deserve the designers' attention were identified from participant responses to a supplemental question on the subject.

One of the biggest challenge as using UCD in gamification is to get the stakeholder to agree with this type of design approach. Interactions between designers and players in activities involving observation, focus groups and surveys as well as several rounds of play testing usually cost extra in terms of its time and budget compared with a gamification design approach without user participation. Sometimes, clients think they can complete a design quickly and don't want to invest in a more comprehensive approach, such as UCD. However, designers need to discuss this with clients and arrive at the best solution. Then, working with stakeholders, designers need to determine the best behavior changes required to achieve the business objectives and a great product.

Another challenge for the designer is conducting appropriate interactions with players to collect reliable data for decision making purposes. UCD is not always about listening to what users want, but more about seeing what they actually do and feel. However, getting quality feedback from players can be a true challenge, especially the task of understanding and examining the intrinsic motivation of the players. Designers need to work hard in focusing on intrinsic motivators and keeping the game both
surprising and fun. With the valuable information collected from the experts, designers can find effective ways to reward players and keep them engaged along the experience.

5.1.7 Suggested References for Gamification Beginners

There are various resources available for beginners to help them become familiar with using UCD in gamification design. These include books, articles, publications, conferences, and online materials as provided by experts who participated in the study. Here is a list of recommended books for gamification design:


Here is a list of articles recommended articles by the gamification design experts:


The experts also recommended conferences where people in UCD or gamification share their knowledge and discoveries that can be helpful. These include the ACM Conference on Human Factors in Computing Systems (CHI), International Conference on Pervasive Technologies Related to Assistive Environments (PETRA), ACM SIGCHI Symposium on Engineering Interactive Computing Systems (EICS), and International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS) are focused on UCD and gamification area. Also, a community called "Game for Change" holds interesting events and conferences that may be helpful too. Its website is http://www.gamesforchange.org/.

Online and offline courses about gamification were also recommended. For example, the online course "Gamification" by Kevin Werbach on Coursera (https://class.coursera.org/gamification-002/lecture), the online course "User Experience (UX): The Ultimate Guide to Usability" by David Travis on Udemy (https://www.udemy.com/ultimate-guide-to-ux/). Also, gamification guru Gabe Zicherman provides offline workshops that people can learn about gamification and get gamification certified. Information about that resource is on the website
http://www.gamification.co/workshops/. In addition, people can get Gamification Novice and Gamification Expert certification through Sententiagames.com with Darryn Van Den Berg as the narrator/guru. Some gamification gurus have their own websites where they constantly upload gamification news and research results. For example, http://www.yukaichou.com/ by Yukai Zhou and http://www.blogtalkradio.com/gamificationtalkradio by Monica Cornett are good resources for beginners to keep up with the gamification design community.

People can learn about gamification on TED talks. For example,

- "Gamification" by Catherine Aurelio (https://www.youtube.com/watch?v=5jSzwSJmzRY),
- "Gaming can make a better world" by Jane Mcgonigal (http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world).

5.2 Conclusions

As noted, one of the main questions in this research was: what opinions do experienced gamification designers have in using the UCD method as they develop and design gamification products? This research question was expanded as the study was conducted to include research questions such as how the UCD method work in gamification design, how well does it work, and suggestions on how to use it.

In order to answer these research questions, the Delphi method was used in this study. To the best of the author's knowledge, use of the Delphi method used in the field of gamification study is a first time event. As expected, this method was found to be very suitable for the research topics that are not fully developed such as the one in this study. The method is helpful for collecting opinions about complex topics from the industry experts and can be used to build a bridge connecting practical problems with academic study. However, as noted in the chapter on literature review, one of the challenges of using the Delphi method is maintaining a good participant response rate because the method is time consuming and requires multiple rounds of participation. This study originally set the data collection cycle at two weeks based on existing studies reviewed in Chapter 2. However the response rate did not turn out to be as expected. Additional
reminders were sent to participants who did not reply and the data collection cycle was extended to three weeks or four weeks in different rounds. Figure 5.1 shows the responses of the four study rounds and Figure 5.2 shows the changes of the responses rate of the four study rounds.

![Responses](image1.png)

**Figure 5.1. Responses of Four Data Collection Rounds.**

![Response Rate](image2.png)

**Figure 5.2. Responses Rates of the Four Study Rounds.**

Based on the above two figures, user participation dropped off throughout the study, but the drop-off rates of different survey rounds were not the same. As the study proceeded, the response rate increased. Future Delphi researchers should be aware of the possibility of losing participants throughout the multiple data collection processes and be
prepared to have sufficient participants recruited in advance. Also, activities for maintaining a solid response rate should be conducted including sending out multiple reminder emails before and after a survey is due, sending out thank you emails immediately after a participant submits a survey, and removing survey items that have already reached consensus in previous rounds to shorten a survey and lighten participants' fatigue.

Through about six months of data collection, both qualitative and quantitative data was collected in one pre-Delphi round and three Delphi rounds. Thirty-three design heuristics within five themes about the use of UCD in gamification were developed from the pre-Delphi data and used in the following Delphi rounds. In each Delphi round, participants were asked to indicate their agreement levels with the design heuristics using a five-point Likert scale. Participants were also encouraged to provide comments about the design heuristics. The design heuristics for which consensus was reached would be removed from the following Delphi round and the ones that did not reach consensus would be rated again. Each Delphi round also contained two supplemental questions for participants. Eventually, research findings were gained according to the statistical and comment results of the design heuristics and feedback from the supplemental questions.

Based on the research findings, UCD work flow is widely adopted by gamification design experts in their working routine. Before the design starts, designers should communicate with the clients to identify the target goal of the project. Then, player research should be conducted for defining players by understanding their motivations for engagement. Throughout the design process, designers should conduct play testing iteratively with prototypes for getting feedback from players to facilitate the design development. Before a project is completed and ready to be released, designers should evaluate the gamification design with player's involvement if it is possible. Gamification designers should be aware of the potential challenges of the use of UCD in gamification design such as getting the stakeholder to agree with this design approach and design appropriate player participation scenarios.

There are some conditional factors that may influence the designers' decisions for using UCD in a gamification design project. Time and budget are two important factors
that can constrain the scope of players' involvement. Designers should also be aware that a bigger sample size of participants in play testing will require more time and money for data collection and data analysis. Therefore, limited time and financing should be considered thoroughly before participant recruitment for a gamification design project. Also, because gamification can be applied in a variety of areas such as education, business, or behavior modification, the methods used to involve different types of players will be different. For example, communication methods for collecting feedback from players in a gamification evaluation activity vary between a project involving education gamification of primary school students and a project of business gamification for training employees. In general, this study shows that UCD can be used successfully by the gamification design industry, but there are still some questions that remain unanswered and need to be considered in the future.

5.3 Recommendations for Future Studies

In future studies, researchers may try to develop more studies about the relation between gamification designers and participants when UCD approach is used in the design process. Such studies should focus on factors such as players, clients, project type, etc. In this study, the design heuristic: "Designers may train some key players as 'game masters' to use and generate continuous activities on the desired gamification platform" (DH7) didn't get eventual consensus. Among the comments for this design heuristic, some participants pointed out that players are not designers, therefore designers should not over-use the players' participation even though the designers claim they are using a UCD approach in gamification design. Other participants suggested that the level of involvement of players in gamification design really depends on the nature of different projects.

Another design heuristic that did not reach final consensus was DH20, which said:" A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, 'would you use this platform if it were in other colors?' or 'what else would you include?' ". Participants were not able to provide consensus for this statement because they had a similar argument with the discussion of
DH7: how straightforward a designer could communicate with a player in a gamification design activity. Further studies to determine how to provide a clearer and more systematic understanding for working with players is recommended.

Another potential research direction in this area is conducting future research about gamification in different genres. Research about how to cope with different player genres when players are involved in gamification design may make additional contributions to the gamification design community by providing instructions or design heuristics.

5.4 Summary

This chapter provides the research findings, conclusions, and recommendations for future study. Firstly, research findings are presented according to the five themes that emerged from the research data analysis. These research findings were summarized as design heuristics based on responses from Delphi participants.

Secondly, conclusions for this study are provided. This section describes how this study met the research goals using the Delphi method through data collection and data analysis. The conclusions answer the research question that asks about how UCD should be used in gamification design.

Lastly, recommendations for future study are presented. Research about relationships between designers and players in the gamification design process are recommended based on feedback collected in the study. More studies about gamification design with players' participation according to different project genres are also suggested.
LIST OF REFERENCES
LIST OF REFERENCES


APPENDICES
Appendix A. Example Letter for Participant Recruitment

Dear [participant’s name],

My name is Yang Chen and I’m a doctoral student at Purdue University in West Lafayette, Indiana. I’m conducting a study that explores the design process that experienced gamification designers apply as they design gamification products. I think you may be a good candidate for this study.

The study will invite experienced gamification designers from multiple design organizations to participate. Each participant will be asked to complete an email interview and the interview data will be collected and analyzed. Following the interview, participants will be asked to complete three short online surveys. Participants will be emailed a copy of the research report, gain insight into the thinking of their colleagues, and help novice designers create more effective gamification products. The study may require a total up to 2 hours of participation time between the months of February and May, 2015.

There are a few qualifying criteria to participate in the study:
1. Have 1 or more years of professional experience as a gamification designer.
2. Working currently in the gamification design/Human-Computer Interactive Design field.
3. Designed or participated in the design of at least two gamification products.
4. Earned an undergraduate degree

If you meet these criteria and are willing to participate, please contact me before February the 25th, Email: yang484@purdue.edu, to get more information about this study for participating and I am glad to answer any questions you may have.

If you would like to forward this email to some other people who might be qualified with the above criteria and willing to participant, which is also very appreciated!

Thank you so much for your time and considerations. Look forward to hearing from you.

Best Regards,
--
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix B. Example Letter to the Interested Candidates

Dear [participant’s name],
I’d like to thank you very much for your willingness to participate in this research. Your time and contribution to advancing the gamification design field are very much appreciated.

There will be two phases in this DELPHI study:

1. Phase A
   - Read the Informed Consent form
   - Fill in the Participants’ Qualifying and Demographics Form
   - Answer open-ended interview questions relating to gamification design
   - The entire Phase A may takes you about 30-60 minutes to complete.

2. Phase B
   - Complete 3 follow-up surveys after all participants’ Phase A.
     - The length of these surveys will be dependent upon the results of the Phase A data analysis. Probably, each of the three surveys may takes you about 15 minutes to complete.
     - A new survey will be administered about every ten days, and will therefore be completed in one month.
     - You may not be invited to participate in Phase B. De-selection is not a reflection of a given participant’s qualifications or expertise, but rather is related only to variables of interest in our study.
Upon conclusion of the study, a copy of the completed research report will be available to all study participants.

Follow this link to the Survey:

\$(l://SurveyLink?d=Take the Survey)

Or copy and paste the URL below into your internet browser:
\$(l://SurveyURL)

Follow the link to opt out of future emails:
\$(l://OptOutLink?d=Click here to unsubscribe)

It will be very much appreciated if you could complete Phase A before March 14th.

If you have any questions, please contact me by email: yang484@purdue.edu.

Again, thank you very much.

Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix C. Research Participant Consent Form

RESEARCH PARTICIPANT CONSENT FORM
Examining the gamification development process using the Delphi Method
Computer Graphics Technology
Purdue University

What is the purpose of this study?
The purpose of this research is to explore the gamification design process that experienced gamification designers apply in their work. We believe you would be a good candidate for this study.

What will I do if I choose to be in this study?
There will be two phases in this DELPHI study:
- Phase A
  - Read the Informed Consent form
  - Fill in the Participants’ Qualifying and Demographics Form
  - Answer open-ended interview questions relating to gamification design
- Phase B
  - Complete three follow-up surveys after all participants’ Phase A.
    - The length of these surveys will be dependent upon the results of the Phase A data analysis.
    - A new survey will be administered each week, and will therefore be completed in three weeks
    - You may not be invited to participate in Phase B. De-selection is not a reflection of a given participant’s qualifications or expertise, but rather is related only to variables of interest in our study. Upon conclusion of the study, a copy of the completed research report will be available to all study participants.

How much of my time will this require of me?
Phase A: 30-60 minutes
Phase B
  - Survey 1 – 15 minutes
  - Survey 2 – 15 minutes
  - Survey 3 – 15 minutes
Total time investment: approximately 2 hours.

What are the possible risks or discomforts?
The potential risk of participating in this study will not be greater than everyday life. Participation is completely voluntary. Participants can refuse to answer any questions during the interview or surveys. You may withdraw from the study at any time.

Are there any potential benefits?
There are no direct benefits to you from participating in this study. However, your responses may help us learn more about the field of gamification design, and how to
better design gamification products. The results of this study will be submitted for publication to an academic journal; as such your participation in this study will help further human knowledge. As this work is part of a doctoral dissertation, you may receive a copy of the completed dissertation upon request.

**Will information about me and my participation be kept confidential?**

The project’s research records may be reviewed by departments at Purdue University responsible for regulatory and research oversight. Any collected personal information will be anonymized via assignment of an id number. All information will be securely stored. If your responses are referred to specifically in the results of the study, an id number will be used in lieu of identifying personal information. Any association relating an id number to an individual will be destroyed. Once all responses have been collected, participants will be referenced only by their id. The data will be stored in a locked container in the primary investigator’s office. The data may be stored indefinitely. Only the primary investigator and co-investigator will have access to these data. This data will be used for other purposes in the future. Also, this data will be used for publication in academic papers.

**What are my rights if I take part in this study?**

Your participation in this study is voluntary. You may choose not to participate or, if you agree to participate, you can withdraw your participation at any time without penalty or loss of benefits to which you are otherwise entitled.

**Who can I contact if I have questions about the study?**

If you have any questions about this study, please feel free to contact Yang Chen (email: yang484@purdue.edu), the person mainly responsible for this research. You can also contact Dr. David Whittinghill (email: dmwhittinghill@purdue.edu), the principal investigator, or Dr. James Mohler (email: jlmohler@purdue.edu), the co-investigator.

**Documentation of Informed Consent**

I have read this form and understand the research study as explained. I have had the opportunity to ask questions about the research study, and my questions have been answered. I am prepared to participate in the research study described above. I am free to retain a copy of this consent form after signing.

- [ ] Yes, I'd like to participate!
- [ ] No, I'll skip this time.
Appendix D. Participant Qualification Checklist and Demographics Information Form

**Participant Qualifying and Demographic Information Form**

1. Participant Qualifying Criteria Checking List
   - [ ] Working in the gamification design area
   - [ ] Have more than 1 years of professional experience
   - [ ] Designed or participated in the design of at least 2 gamification projects
   - [ ] Earned an undergraduate degree

2. Gender
   - [ ] Male
   - [ ] Female

3. Age
   - [ ] 20-30
   - [ ] 31-40
   - [ ] 41-50
   - [ ] 51-60
   - [ ] 60+

4. Current Position / Title:

5. Organization / Company:

6. Highest degree obtained:

7. How many years have you been involved in gamification design?

8. How many articles have you authored or co-authored relating to gamification design?
An Interview on Gamification Design Process

1. Could you please list the steps in the common gamification design process you have used in your career experience? Please provide as much detail as possible.

2. How do you define target users and their preferences in a gamification design project?

3. During the design process, what do you do to make the gamification products fit users’ demand?

4. How do you evaluate the effectiveness of gamification design?

5. Is there any user participation in your gamification design process?
   - Yes
   - No
Appendix F. Conditional Questions to Participants Who Answered “Yes” in Question 5 of the Interview on Gamification Design Process

6. Could you please describe one design experience that involved user participation?

7. How well do you think the user participation contributed to the gamification design?

8. What suggestions do you have for involving users appropriately in gamification design?
Appendix G. Conditional Questions to Participants Who Answered “No” in Question 5 of the Interview on Gamification Design Process

6. What are the reasons that you do not involve user participation in gamification design?

7. What do you think about the idea of involving user participation in gamification design?
Appendix H. Example Reminder Letter in Phase A

Dear [Participant's name],

This is just a reminder to the email I sent last week. I'd like to thank you very much for your willingness to participate in this research. Your time and contribution to advancing the gamification design field are very much appreciated.

There will be two phases in this DELPHI study:

1. Phase A
   - Read the Informed Consent form
   - Fill in the Participants' Qualifying and Demographics Form
   - Answer open-ended interview questions relating to gamification design
     - The entire Phase A may take you about 30-60 minutes to complete.

2. Phase B
   - Complete 3 follow-up surveys after all participants' Phase A.
     - The length of these surveys will be dependent upon the results of the Phase A data analysis. Probably, each of the three surveys may take you about 15 minutes to complete.
     - A new survey will be administered about every ten days, and will therefore be completed in one month.
     - You may not be invited to participate in Phase B. De-selection is not a reflection of a given participant's qualifications or expertise, but rather is related only to variables of interest in our study. Upon conclusion of the study, a copy of the completed research report will be available to all study participants.

Follow this link to the Survey:
$://SurveyLink?d=Take the Survey

Or copy and paste the URL below into your internet browser:
$://SurveyURL

Follow the link to opt out of future emails:
$://OptOutLink?d=Click here to unsubscribe

It will be very much appreciated if you could complete Phase A within two weeks, which is before March 30th.

If you have any questions, please contact me by email: yang484@purdue.edu.

Again, thank you very much.

Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix I. Example Letter to Participants Who Dropped off in Phase A

Dear [participant’s name],

Thank you very much for your willingness of participating this study. But the survey is closed now according to the study schedule. Looking toward to work with you next time.

Again, thank you!

Best Regards,
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix J. Example Letter to Participants Completed the Phase A Survey

Dear Claudiu,

Thank you very much for participating in the Phase A for our study. Your input has been invaluable!

The data from your Phase A will be compiled with the data of all other participants and analyzed. The product of this analysis will be a categorized list about using User-Centered Design approach in gamification design. This list will be used in Phase 2, which will be send to you about one week later.

Again, thank you!

Best Regards,
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix K. Example Letter of the Phase B Round 1 Survey

Dear [Participant's name],

Thank you very much for completing the Phase A of this study. Your input has been invaluable. The data from your Phase A interview has been aggregated and analyzed with the data of all other interviewees. The product of this analysis is a categorized list of statements about using User-Centered Design in gamification.

The list will be used now (Phase B) for collecting the expert panel’s consensus by asking you to indicate your level of agreement with each statement. Each statements is followed by a 5-point Likert-scale ranging from Strongly Agree to Strongly Disagree. You may also make comments to justify your rating, to question or clarify the statements in the text box below each statement. If for some reason, a question is not applicable to you, please select Not Applicable and comment below.

This survey consists of 33 6-point Likert-scale questions, and 2 open-ended questions, which are grouped into 6 sections. The entire survey will take approximately 20-30 minutes to complete. It would be very much appreciated if you could finish this survey by Friday, May 1st, 2015. This survey will maintain your progress if you accidentally lose connection or close the browser window.

The key point of A DELPHI technique is your continues participation, therefore, your continued participation is very much appreciated and critical to the successful completion of the study.

Follow this link to the Survey:

${l://SurveyLink?d=Take the Survey}$

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}$

Follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}$

If you have any questions, please contact me directly by email: yang484@purdue.edu.
Again, thank you very much for your continued participation.
Yang Chen
Appendix L. Phase B Round 1 Survey

**Welcome to Phase B_Round 1 Survey**

In this survey, you will be asked to *indicate your level of agreement with the statement* that are analyzed and organized from the previous Phase data. Each statement is followed by a 5-point Likert-scale ranging from *Strongly Agree* to *Strongly Disagree*. You may also make comments to justify your rating, to question or clarify the statements. If for some reason, a question is not applicable to you, please select *Not Applicable* and make comments in the text box below.

This survey consists of 33 5-point Likert-scale questions, and two open-ended questions, which are grouped into 6 sections. The entire survey will take approximately 20-30 minutes to complete. This survey will maintain your progress if you accidentally lose connection or close the browser window. It would be very much appreciated if you could finish this survey by Friday, April 24th, 2015.

Again, thank you very much for your continued participation.
Yang Chen

**Section 1: User-Centered Design Workflow**

*Please indicate your level of agreement with the following statement*

<table>
<thead>
<tr>
<th>Please indicate your level of agreement with this statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

**1. Understanding the business objectives of the client regarding which problems to solve and which player behaviors to change is the most important aspect of designing for gamification.**

**2. Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals.**

**OPTIONAL:** Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
3. It is important to study what motivators have already worked for players and how players have been motivated in the past.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

4. Designers should propose brief gamification solutions to the main stakeholders to get approval before further development.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

5. When a gamification development project reaches the Minimum Viable Product (MVP) stage, designers need to start testing the MVP on a small testing group selected from the target audience.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

6. Designers need to measure and analyze the results of the play testing and adjust the design iteratively.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
7. Designers may train some key players as “game masters” to use and generate continuous activities on the desired gamification platform.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

8. One effective way of gamification design is to involve the users into the process, making a collaborative environment to co-create the product.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

9. The gamification design workflow should always follow the classic User-Centered Design approach.

<table>
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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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</table>

Please indicate your level of agreement with this statement

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

10. Please indicate your agreement level with using the following design activities in a gamification project.

(a) Select the most appropriate product platforms.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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</table>

(b) Create player personas.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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(c) Determine dynamics, mechanics, and game element components according to the profile described in the personas.

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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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(d) Design the narrative and aesthetics (game story and audiovisual elements that will touch and engage players).

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<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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(e) Create game levels and progress, as well as sharing possibilities (define how the player will grow in the experience and how it might go “viral”).

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<th>Strongly Agree</th>
<th>Agree</th>
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<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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</table>

(f) Brainstorm creative elements related to making the game fun (mechanics, dynamics, aesthetics, etc.).

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<th>Strongly Agree</th>
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<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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Section 2. Defining Players

Please indicate your level of agreement with the following statement

11. In gamification design, users should always be referred to as players in order to emphasize that players should have fun, while the term users implies only a need to have required tasks be efficient and accurate.

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<th>Please indicate your level of agreement with this statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
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<th>Not Applicable</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

12. Defining the target player profile by understanding who they are and what motivates their engagement is critical.

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<th>Please indicate your level of agreement with this statement</th>
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<th>Not Applicable</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

13. Please indicate your agreement level with using the following research methods for defining players:

(a) Sampling the potential players who have the largest expected impact

(b) Direct observation

(c) Interviews

(d) Focus groups

(e) Surveys

(f) Workshops

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<th>Strongly Agree</th>
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OPTIONAL: Please indicate other research methods for defining players, make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
14. Please indicate your agreement level with using the following analysis methods for defining players:

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<th>Method</th>
<th>Strongly Agree</th>
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<td>Bartle's Player Types</td>
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<td>Amy Jo Kim’s Player Theory</td>
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<td>Andrzej Marczewski’s Player Theory</td>
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<td>Personality Test</td>
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<td>Playing Preferences Test</td>
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<td>IT and Professional Skills</td>
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Optional: Please indicate other analysis methods for defining players, make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

Section 3. Play Testing

Please indicate your level of agreement with the following statement

15. Play testing with prototypes is important as it reveals player behavior and motivation as well as unforeseen cheating strategies.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
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<td>Play testing with prototypes is important as it reveals player behavior and motivation as well as unforeseen cheating strategies.</td>
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Optional: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

16. Feedback from the playtests helps assess players’ reasoning and motivation behind their actions, the impact of design decisions, and to identify where updates are needed to better address user needs.

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<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
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<th>Disagree</th>
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<td>Feedback from the playtests helps assess players’ reasoning and motivation behind their actions, the impact of design decisions, and to identify where updates are needed to better address user needs.</td>
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17. A good design approach is to make quick, low-fidelity prototypes, playtest them with a selected small pilot player group, analyze the feedback, return to the drawing board, modify the design, and playtest again.

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<tr>
<th>Strongly Agree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

18. Play testing should be done quickly and iteratively until the designer feels the product is ready.

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<tr>
<th>Strongly Agree</th>
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<th>Disagree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

19. Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback.

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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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20. A good play testing user group can act as a consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"

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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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<td>Please indicate your level of agreement with this statement</td>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
21. Please indicate your agreement level with using the following methods for play testing:

<table>
<thead>
<tr>
<th>Method</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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<tbody>
<tr>
<td>(a) Direct Observation</td>
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<tr>
<td>(b) Survey</td>
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<tr>
<td>(c) Interview</td>
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<td>(d) Game interaction test</td>
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<tr>
<td>(e) Usability test</td>
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<tr>
<td>(f) Cognitive walkthrough</td>
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<tr>
<td>(g) Heuristic review</td>
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OPTIONAL: Please indicate other methods for play testing, make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

Section 4. Gamification Evaluation

Please indicate your level of agreement with the following statement

22. A good gamification design should always give players meaningful choices and purpose, allowing them to explore their hidden potential.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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<tr>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
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<td>Not Applicable</td>
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</tbody>
</table>

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

23. Even if players are playing the game as hoped, a design cannot be considered successful without addressing the initial business-related problem.

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<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tr>
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<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td>Not Applicable</td>
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</table>

OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
24. Without effectively measuring player engagement, gamification design is close to useless.

Please indicate your level of agreement with this statement

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

25. Please indicate your agreement level with using the following methods for evaluating gamification design:

(a) Measuring player behaviors before and after the gamification implementation for a certain period.

(b) Measuring player usage and the satisfaction rate.

(c) Measuring player Key Performance Indicators (KPIs) to compared to the desired indicators.

Please indicate your level of agreement with this statement

<table>
<thead>
<tr>
<th>Strongly Agree</th>
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OPTIONAL: Please indicate other methods for evaluating gamification design, make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

Section 5. User Participation

Please indicate your level of agreement with the following statement

26. User participation is one of the most important processes and should be conducted through the entire gamification project.

Please indicate your level of agreement with this statement

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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
27. When users are involved in a gamification design project, designers should not directly ask users “what do I have to do to change your behavior?”

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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</table>

Please indicate your level of agreement with this statement

Optional: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

28. The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
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<th>Neutral</th>
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<th>Not Applicable</th>
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</table>

Please indicate your level of agreement with this statement

Optional: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

29. Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players.

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<thead>
<tr>
<th>Strongly Agree</th>
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<th>Neutral</th>
<th>Disagree</th>
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<th>Not Applicable</th>
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</table>

Please indicate your level of agreement with this statement

Optional: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

30. User participation is essential to understand the intrinsic motivators of players.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
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<th>Not Applicable</th>
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</thead>
</table>

Please indicate your level of agreement with this statement

Optional: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.
31. User participation can give players the sense that this is not something done to them but something they have created for themselves.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

32. In business gamification designs, user participation should involve not only important users inside a business, but also all kinds of users at every level.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
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<th>Disagree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

33. In educational gamification designs, user participation creates curiosity, which is a great driver for learning, as participants are interested in seeing the project’s end result and their individual impact on it.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
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OPTIONAL: Make comments to justify your ratings, to question or clarify the statement above, or to elaborate on any concept you feel necessary.

Section 6. Open Ended Questions

**Please answer the following questions**

1. What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?

2. What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible.
Appendix M. Example Thank You Letter in Phase B Round 1

Dear [Participant's name],

Thank you very much for completing the Round 1 survey. We have about 1 or 2 more rounds survey to go. Your input is greatly appreciated. The results of this survey will now be combined with that of all other participants and analyzed. The result of this analysis will be the survey for Round 2 survey.

You can expect an email from me within two or three weeks with a link to the next survey. It will be similar to the one you have just completed; however, some items may be changed to provide clarification, or removed entirely if no longer needed.

Thanks again for your participation.

--
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix N. Example Reminder Letter in Phase B Round 1

Dear [Participant's name],

This is just a reminder to the email I sent two weeks ago:

Thank you very much for completing the Phase A of this study. Your input has been invaluable.

The key point of A DELPHI technique is your continues participation, therefore, your continued participation is very much appreciated and critical to the successful completion of the study.

The data from your Phase A interview has been aggregated and analyzed with the data of all other interviewees. The product of this analysis is a categorized list of statements about using User-Centered Design in gamification.

The list will be used now (Phase B) for collecting the expert panel’s consensus by asking you to indicate your level of agreement with each statement. Each statements is followed by a 5-point Likert-scale ranging from Strongly Agree to Strongly Disagree. You may also make comments to justify your rating, to question or clarify the statements in the text box below each statement. If for some reason, a question is not applicable to you, please select Not Applicable and comment below.

This survey consists of 33 6-point Likert-scale questions, and two open-ended questions, which are grouped into 6 sections. The entire survey will take approximately 20-30 minutes to complete. It would be very much appreciated if you could finish this survey by Friday, April 24th, 2015. This survey will maintain your progress if you accidentally lose connection or close the browser window.

Follow this link to the Survey:  
$\{l://SurveyLink?d=Take the Survey\}$

Or copy and paste the URL below into your internet browser:  
$\{l://SurveyURL\}$

Follow the link to opt out of future emails:  
$\{l://OptOutLink?d=Click here to unsubscribe\}$

If you have any questions, please contact me directly by email: yang484@purdue.edu.

Again, thank you very much for your continued participation.  
Yang Chen
Appendix O. Example Letter to Participants Who Dropped off in Phase B Round 1

Dear [participant’s name],

Thank you very much for your willingness of participating this study. But the survey is closed now according to the study schedule. Looking forward to work with you next time.

Again, thank you!

Best Regards,
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix P. List of Design Heuristic Reached Consensus in Phase B Round 1

**DELPHI study of using User-Centered Design in Gamification**

The group consensus has been reached for the following statements:

**Section 1. User-Centered Design Workflow**

1. **Understanding the business objectives of the client regarding which problems to solve and which player behaviors to change is the most important aspect of designing for gamification.**

   Results from the previous round:
   
   ![Chart](chart1.png)

   Comments:
   
   - If this is not done well, then the gamification will be short lived and unable to measure ROI. Don't forget the WHY.
   - Although I agree that these elements are important, the MOST important aspect of game design is creating a fun game with interesting characters and plots that will "hook" players.
   - It's where you start, if this fails all will fail.
   - Without understanding and setting up business objectives any gamification attempt is nothing else than money thrown out the window.

2. **Designers should propose brief gamification solutions to the main stakeholders to get approval before further development.**

   Results from the previous round:
   
   ![Chart](chart2.png)

   Comments:
   
   - It is important that they build for short term and quick wins, with small incremental budgets that increase based on success and learning.
   - I would tend to propose the whole project for approval and build in several approval points before development starts.
   - Yes, outlining a synopsis and/or a proposed plan is essential when working with others. It keeps everyone on the same page from the get-go.
   - At some point yes, mainly because it's all an iterative process, so don't develop the whole thing before being "approved"
3. When a gamification development project reaches the Minimum Viable Product (MVP) stage, designers need to start testing the MVP on a small testing group selected from the target audience.

Results from the previous round:

Comments:
- I think that it depends on the behaviors that require changing
- Feedback of target audience is crucial
- Yes, getting feedback is important throughout the process of game design. That way, if something does not work, the project can be altered to make it more successful.
- Testing should be done almost since the beginning, when the MVP is ready you should already have a lot done of the second MVP.

4. Designers need to measure and analyze the results of the play testing and adjust the design iteratively.

Results from the previous round:

Comments:
- This is progressive! showing immediate ROI successes and further areas for development
- Absolutely. Player's feedback has to be listened to because chances are good that their reactions will mirror a lot of the publics.
- YES!!! all the time!!! :-(

5. One effective way of gamification design is to involve the users into the process, making a collaborative environment to co-create the product.

Results from the previous round:

Comments:
Not as the designers more as the narrators as to WHY they like and don't like
If transparency is also a corporate value I would agree, although more often I would design with input of people but not full collaboration.
At the least, this can help generate buy-in as the users feel they are part owners of the content being created.
Yes, in certain games this kind of interaction works wonderfully.
yes, always good

5. Please indicate your agreement level with using the following design activities in a gamification project.

a) Select dynamics, mechanics, and game element components according to the profile described in the personas.
Results from the previous round:

b) Create game levels and progress, as well as sharing possibilities (define how the player will grow in the experience and how it might go “viral”).
Results from the previous round:

c) Brainstorm creative elements related to making the game fun (mechanics, dynamics, aesthetics, etc.).
Results from the previous round:
Section 2. Defining Players

6. Please indicate your agreement level with using the following analysis methods for defining players:

   a) Andrzej Marczewski's Player Theory

   Results from the previous round:

   

Section 3. Play Testing

7. Play testing with prototypes is important as it reveals player behavior and motivation as well as unforeseen cheating strategies.

   Results from the previous round:

   Comments:
   - Yes, this is very important before a game is finalized and released.

8. Feedback from the playtests helps assess players’ reasoning and motivation behind their actions, the impact of design decisions, and to identify where updates are needed to better address user needs.

   Results from the previous round:
9. A good design approach is to make quick, low-fidelity prototypes, playtest them with a selected small pilot player group, analyze the feedback, return to the drawing board, modify the design, and playtest again.

Results from the previous round:

Comments:
- In an ideal situation this is true, however not always the case in practice due to time or budget constraints to deliver sooner
- In most cases this plan works, but there are always exceptions.
- Kind of yes, big companies might have a difficulty in this though, but basically yes

11. Please indicate your agreement level with using the following methods for play testing:

(a) Direct observation
(b) Interview
(c) Game interaction test
(d) Usability test

Results from the previous round:

Comments:
- All of these methods can be very useful.
Section 4. Gamification Evaluation

12. Even if players are playing the game as hoped, a design cannot be considered successful without addressing the initial business-related problem.

Results from the previous round:

Comments:
- Yes. If you have been hired to design a game for a certain business then it only truly works if that business is pleased with the results.
- Depends on the context, too general to say yes or no haha

13. Without effectively measuring player engagement, gamification design is close to useless.

Results from the previous round:

Comments:
- Not necessarily - depends what you designed for
- Yes, you need to know how engaged players are to understand if you are having a successful impact.
- Pretty much yes if you have zero data

14. Please indicate your agreement level with using the following methods for evaluating gamification design:

a) Measuring players’ behaviors before and after gamification implementation.

(b) Measuring players’ Key Performance Indicators (KPIs) to compare to the desired indicators.

Results from the previous round:
All of these elements are important to figuring out if a game "works."

Section 5. User Participation

15. User participation is one of the most important processes and should be conducted through the entire gamification project.

Results from the previous round:

Comments:
- Yes, it is important to note if players get involved with the game enough to truly want to keep playing.
- Yes and no, sometimes users don’t know what they want.

16. User participation is essential to understand the intrinsic motivators of players.

Results from the previous round:

Comments:
- Such participation can be simply watching how users respond.
- Yes, unless you know how players are using and reacting to a game you do not know how successful said game is.

17. In educational gamification designs, user participation creates curiosity, which is a great driver for learning, as participants are interested in seeing the project's end result and their individual impact on it.
Results from the previous round:

- The challenge is that they design GAMES rather than gamification processes.
- It may also spoil the surprise, so always have something new they haven't seen yet for curiosity retention.
- It can. However, mapping close to a current environment users deal with may not have the desired generate curiosity effect (familiarity breeds contempt it is said).
- True, successful educational games should make people curious and desire to play more.
Dear [Participant's name],

Thank you for completing the Round 1 survey. Again, your input is invaluable and appreciated. The results from the previous round's survey have been analyzed and the next survey has been developed for Round 2 - the current round.

During this round you will complete an online survey. This survey presents 20 statements in which a clear consensus has not been reached within the study's expertise pool. After viewing the results from the responses from the previous Round, you are prompted to rate your level of agreement. This entire survey should take no more than 20 - 30 minutes to complete - possibly less. This survey will maintain your progress if you accidentally lose connection or close the browser window.

It would be very much appreciated if you could finish this survey by Friday, May 29th, 2015.

If you have any questions about this survey, please contact me directly, by email: yang484@purdue.edu.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Again, thank you very much for your continued participation!
Yang Chen
Purdue University
Computer Graphics Technology
Appendix R. Phase B Round 2 Survey

Welcome to Phase B_Round 2 Survey

Thanks again for your continued support.
Following the last survey round, responses were analyzed and 13 statements about how to use User-Centered Design in gamification were removed due to group consensus being reached.

During this round you will be asked to rate the remaining 20 statements again, after viewing the results of the previous round. You may use the data from the previous round to better inform your answers during this round.

Also, you may comment on the answers of the 2 open-ended questions from the previous round. This entire survey will take approximately 20-30 minutes to complete. This survey will maintain your progress if you accidentally lose connection or close the browser window. It would be very much appreciated if you could finish this survey by Friday, May 29th, 2015.

If you have any questions about this survey, please contact me directly, by email: yang484@purdue.edu
Again, thank you very much for your continued participation.
Yang Chan

Section 1: User-Centered Design Workflow
Please indicate your level of agreement with the following statement

1. Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals.

Comments from previous round:
- If progress indicators are relevant to achieve the goals then they would be budgeted for, if not not.
- Yes, budgets and goals need to be considered when you are planning the scope of your game.
- Progress HUDs are just another mechanic, it does depend on budget and goals but it’s not so important as to focus all your efforts on them.
- Transparency of progress is a key element of any gamification solution.

Numbers in parenthesis below show results from previous round

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<th>Strongly Agree (17%)</th>
<th>Agree (58%)</th>
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<th>Strongly Disagree (0%)</th>
<th>Not Applicable (0%)</th>
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</table>

Please indicate your level of agreement with this statement

Optional: Comments based on the information provided above
2. It is important to study what motivators have already worked for players and how players have been motivated in the past.

Comments from previous round:
- Providing the behaviour you want to encourage is still aligned with past behaviour and motivation.
- This can be beneficial, but if a system totally ignores other possible motivation factors, then this isn’t as effective.
- It is always good to look into past research to see what has worked and what has not. However, if there is truly a new idea it might be worth implementing just to see how audiences react.
- Totally agree

Numbers in parenthesis below show results from previous round

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<th>Agree (%)</th>
<th>Agree (%)</th>
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Please indicate your level of agreement with this statement

OPTIONAL: Comments based on the information provided above

3. Designers may train some key players as “game masters” to use and generate continuous activities on the desired gamification platform.

Comments from previous round:
- Players are not designers. Such can be useful for input, but may miss key aspects of what works as far as design goes.
- It depends on the game/company. In some cases this could be very beneficial.
- Depending on the users and clients.
- I think that the “game masters” should be organic and that they will rise the occasion on their own... if the solution is designed well, they will have trained themselves.

Numbers in parenthesis below show results from previous round

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<th>Agree (%)</th>
<th>Agree (%)</th>
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Please indicate your level of agreement with this statement

OPTIONAL: Comments based on the information provided above
4. The gamification design workflow should always follow the classic User-Centered Design approach.

Comments from previous round:
- An User-Centered Design is an ideal, because you don’t always have user feedback....
- Not always. There are a lot of different types of games and ways to engage those games. One model does not always need to be followed in order for the game to work.
- Yes, it is like video games, they are for users.

Numbers in parenthesis below show results from previous round

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<tr>
<th>Please indicate your level of agreement with this statement</th>
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<th>Strongly Disagree (0%)</th>
<th>Not Applicable (0%)</th>
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**OPTIONAL:** Comments based on the information provided above

5. Please indicate your agreement level with using the following design activities in a gamification project.

Numbers in parenthesis below show results from previous round

(a) Select the most appropriate product platforms.

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<th>Strongly Agree (31%)</th>
<th>Agree (54%)</th>
<th>Neutral (8%)</th>
<th>Disagree (0%)</th>
<th>Strongly Disagree (8%)</th>
<th>Not Applicable (0%)</th>
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(b) Create player personas.

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<th>Strongly Agree (23%)</th>
<th>Agree (45%)</th>
<th>Neutral (31%)</th>
<th>Disagree (0%)</th>
<th>Strongly Disagree (0%)</th>
<th>Not Applicable (0%)</th>
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(c) Design the narrative and aesthetics (game story and audio/visual elements that will touch and engage players).

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<th>Strongly Agree (62%)</th>
<th>Agree (23%)</th>
<th>Neutral (15%)</th>
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<th>Strongly Disagree (0%)</th>
<th>Not Applicable (0%)</th>
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**OPTIONAL:** Comments based on the information provided above
Section 2. Defining Players

Please indicate your level of agreement with the following statement

6. In gamification design, users should always be referred to as players in order to emphasize that players should have fun, while the term users implies only a need to have required tasks be efficient and accurate.

Comments from previous round:
- Whatever is most appropriate to the company culture.
- Context may dictate that another name for what a user is, in order to generate engagement.
- True. Games are supposed to be fun so the term “user” doesn’t fit as well as “player.”
- Nah, not really, tags don’t make a difference, your design does.
- One must be careful with the use of the word player, there are certain cultures where “playing” at the office is considered a bad thing.

Numbers in parenthesis below show results from previous round

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<th>Agree (31%)</th>
<th>Neutral (38%)</th>
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OPTIONAL: Comments based on the information provided above

7. Defining the target player profile by understanding who they are and what motivates their engagement is critical.

Comments from previous round:
- This too needs to be progressivist not a once off assessment, but rather a leveling up.
- In some cases yes, in others no. It entirely depends on the kind of game. For example, some games like “Candy Crush” can be popular among any number of players of various backgrounds.
- As with any video game.

Numbers in parenthesis below show results from previous round

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OPTIONAL: Comments based on the information provided above
8. Please indicate your agreement level with using the following research methods for defining players:

Comments from previous round:
- For big groups of players the most easy and effective is to prepare a survey with a psychologist focused on any user segmentation type. For example Bartle, Marczewsky, Ami Jo Kim or You Kai Chou.
- It depends on the kind of game. Some feedback should be in person while some can be conducted online.
- Best is by observing and focus groups.

Numbers in parenthesis below show results from previous round

<table>
<thead>
<tr>
<th>Method</th>
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<tr>
<td>(a) Sampling the potential players who have the largest expected impact</td>
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<td>(c) Interviews</td>
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<td>(f) Workshops</td>
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Optional: Comments based on the information provided above


9. Please indicate your agreement level with using the following analysis methods for defining players:

**Comments from previous round:**
- Different play environments can end up calling for different models for defining and analyzing players.
- Use your own methodology or the one that works best with you, but bartle never (as he even says).
- I have not researched these methods.

**Numbers in parenthesis below show results from previous round**

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<td>Amy Jo Kim’s Player Theory</td>
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<td>Octalysis Frameworks of Motivational Drivers</td>
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<td>IT and Professional Skills</td>
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**OPTIONAL: Comments based on the information provided above**


Section 3. Play Testing

Please indicate your level of agreement with the following statement

10. Play testing should be done quickly and iteratively until the designer feels the product is ready.

Comments from previous round:
• In some cases this might work, in others not.

Numbers in parenthesis below show results from previous round

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (15%)</th>
<th>Agree (31%)</th>
<th>Neutral (38%)</th>
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OPTIONAL: Comments based on the information provided above

11. Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback.

Numbers in parenthesis below show results from previous round

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<thead>
<tr>
<th></th>
<th>Strongly Agree (8%)</th>
<th>Agree (46%)</th>
<th>Neutral (8%)</th>
<th>Disagree (31%)</th>
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<tr>
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OPTIONAL: Comments based on the information provided above
12. A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"

Comments from previous round:
- When using a control group methodology you are not getting accurate data of the players, the REAL valuable data is when the entire player population are engaging. This is why the PRE-design engagement is VITAL.
- I would always include these kinds of questions regardless of kind of group.
- Yes, open-ended questions are the way to get the best feedback in most cases.

Numbers in parenthesis below show results from previous round

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<tr>
<th>Please indicate your level of agreement with this statement</th>
<th>Strongly Agree (15%)</th>
<th>Agree (31%)</th>
<th>Neutral (23%)</th>
<th>Disagree (8%)</th>
<th>Strongly Disagree (23%)</th>
<th>Not Applicable (0%)</th>
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</thead>
</table>

OPTIONAL: Comments based on the information provided above

13. Please indicate your agreement level with using the following methods for play testing:

Comments from previous round:
- All of these methods can be very useful.

Numbers in parenthesis below show results from previous round

(a) Survey

<table>
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<tr>
<th>Strongly Agree (15%)</th>
<th>Agree (54%)</th>
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(b) Cognitive walkthrough

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<th>Disagree (0%)</th>
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(c) Heuristic review

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<th>Disagree (23%)</th>
<th>Strongly Disagree (0%)</th>
<th>Not Applicable (0%)</th>
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OPTIONAL: Comments based on the information provided above
Section 4. Gamification Evaluation

Please indicate your level of agreement with the following statement

14. A good gamification design should always give players meaningful choices and purpose, allowing them to explore their hidden potential.

Comments from previous round:
- While harmonizing purpose with a player’s purpose helps, meaningful choices would depend on context. Some onboarding, for example could end up providing very little in choices.
- In most cases this is true. However, there are always exceptions.

Numbers in parenthesis below show results from previous round

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<tr>
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Please indicate your level of agreement with this statement

OPTIONAL: Comments based on the information provided above

15. Please indicate your agreement level with using the following method for evaluating gamification design:

Comments from previous round:
- It is important to figuring out if a game “works.”

Numbers in parenthesis below show results from previous round

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<thead>
<tr>
<th></th>
<th>Strongly Agree (31%)</th>
<th>Agree (46%)</th>
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<th>Disagree (0%)</th>
<th>Strongly Disagree (0%)</th>
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</table>

Measuring player usage and the satisfaction rate.

OPTIONAL: Comments based on the information provided above
Section 5. User Participation

Please indicate your level of agreement with the following statement

16. When users are involved in a gamification design project, designers should not directly ask users “what do I have to do to change your behavior?”

Comments from previous round:
- They need to use more creative methods to establish this.
- Rephrasing the question, however, can provide useful feedback into user motivation and reasons for resistance to change.
- It depends on the game and the situation.
- Never ask that.

Numbers in parenthesis below show results from previous round

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<thead>
<tr>
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<th>Strongly Agree</th>
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<tr>
<td>Please indicate your level of agreement with this statement</td>
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OPTIONAL: Comments based on the information provided above

17. The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal.

Comments from previous round:
- As a player becomes more experienced what motivates may change also, so be cognisant of this.
- Failure to connect with the internal purposes of a user can also be a big challenge.
- In most cases this will work, but there are always exceptions.
- Kind of yes, but don’t go crazy delivering new updates every day.

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<tr>
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<th>Strongly Agree</th>
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<td>Please indicate your level of agreement with this statement</td>
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<td>(23%)</td>
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OPTIONAL: Comments based on the information provided above
18. Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players.

Comments from previous round:
- Extrinsic rewards that connect with the internal purposes of a user need not erode intrinsic motivation, but can serve as feedback. Erosion can happen when purposes are not harmonized between a company and users, and people then attempt to game the system to get such rewards.
- In most cases yes but not all.
- THE ONE I MOST AGREE WITH, PBLs NEVER LAST FOR MORE THAN A MONTH OR SO.

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<th>Strongly Disagree (0%)</th>
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OPTIONAL: Comments based on the information provided above

19. User participation can give players the sense that this is not something done to them but something they have created for themselves.

Comments from previous round:
- And something that they are creating as well.
- Users feeling they built something, is useful for appealing to an autonomy drive. For other motivation types, this is not important, but a system that helps them meet their drives is.
- Yes, notably when customization elements are involved.

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<th>Strongly Disagree (0%)</th>
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OPTIONAL: Comments based on the information provided above

20. In business gamification designs, user participation should involve not only important users inside a business, but also all kinds of users at every level.

Comments from previous round:
- Stakehold impact is questionable here, particularly if the stakeholders are very loosely connected to an organization, and only impacted by externalities.
- Absolutely. A game that starts out being intended for a business can branch out to the mainstream.

Numbers in parenthesis below show results from previous round

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<tr>
<th>Please indicate your level of agreement with this statement</th>
<th>Strongly Agree (31%)</th>
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OPTIONAL: Comments based on the information provided above
Section 6. Open Ended Questions

Please answer the following questions

1. What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?

Answers from previous round:

- CHI, PETRA, EICS, ASSETS
- Loyalty 3.0, Reality is Broken.
- Gamification by Design
- The Multiplayer Classroom, Glued to Games
- Any great game design book, Schell, Rogers, Schreiber, Radoff, etc.
- Octalysis framework, Mario Herger books, Gabe Zicherman courses and books, Hooked by Eye Niyat, Coursera and diversity courses, Weinschenk on user centered design on udemy, etc...
- Drive (Daniel Pink), Flow (Mihaly Csikszentmihalyi), 4keys2fun (Nicole Lazzaro), Coursera Mooc Gamification Design (Kevin Werbach), Gamification Workshop (Gabe Zichermann).
- My main focus in Entertainment Education so I always follow organizations that promote it including things as classic and basic as the "Sesame Street" organization. There are many books and articles about EE that can be found online. "Games for Change" is also an interesting event/conference that I hope to attend next week.
- Loyalty 3.0 (Rajat Panahia)
  Amy Jo Kim
gamification.co
Bunchball, and Bersin / Deloitites articals, Gartner
www.blogtalkradio.com/gamificationtalkradio
www.incidentpage.net
http://www.yukaichou.com/

http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world
https://www.youtube.com/watch?v=5JSwSmzRy

OPTIONAL: Comments based on the information provided above
2. What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible.

Answers from previous round:

- Getting enough users not familiar with the previous iteration.
- Finding effective ways to reward players and keep them engaged along the experience.
- Trying to get users to be motivated enough to participate, without use of punitive measures.
- People design GAMES rather than UX focus.
- The most critical aspect (and often missed) is defining the right target group.
- UCD is not about listening to what users want/say/say they need, but to see what they actually do and feel.
- That I believe that is the most important challenge.
- The main challenge is that you don’t always have user data, confiable and reliable for decision making purposes. That’s the main reason why interaction is critical for a good design.
- Getting the client to agree to observation, focus groups and surveys as well as several rounds of play testing. Often the client thinks they can get there super-quick and don’t want to invest in several essential steps.
- Stakeholders or managers who are asking for a gamification design, usually think about the user experience before thinking about the business goals. First, one of the most difficult things is to determine the behaviour changes required to achieve the business objectives. Secondly, the find out what really motivates users.
- I think the most important challenge is to accomplish with the project design for all kinds of users types equally. I mean, to finally design a gamification project that can be understood and played equally, with the same elevated estate of flow. When you design a game using doing user-centered design you focused on a specific type of player or a specific type of game playing. But when you have to design a gamification user-centered project, most of times there’re all types of users with different hobbies or different skills.
- I am just starting to get into game design but the hardest part is when I am trying to make a game that will appeal to all audiences. It can be difficult to figure out the balance between the kind of game play and how much character and plot (if any) are needed. Generally, the more "instructors" you get for required content, targeted age, game play, budget, etc., the easier it is to design a game by following those guidelines.
- I wouldn’t be able to tell them all in some lines, mainly: design problems (balance, cheating, pacing, fun enough), art (2D/3D, optimisation, textures, bakes, etc), tech (clean code, bugs, team, etc) and production (budget and timings). And many more! Gamification is full of problems, the fun in it is to solve them all!
- Understanding and examining the intrinsic motivation of the players. A focus on intrinsic motivators begins to reveal not only how to engage players in the game, but why and how their behaviors are changed through that interaction. Finding congruence between the intrinsic desires and the enterprise goal helps to focus on the activities and game elements that influence both.

OPTIONAL: Comments based on the information provided above
Appendix S. Example Reminder Letter in Phase B Round 2

Dear [Participant's name],

Thank you for your time reading this email!

Your continued participation is very important to this DELPHI study, we really really need your help to go to the next step. Now, this survey is extended to Friday, June 5th, 2015. It is very much appreciated if you could take a couple minutes finishing that. Thank you very much!

Below is the original email I sent two weeks ago:

Thank you for completing the Round 1 survey. Again, your input is invaluable and appreciated. The results from the previous round's survey have been analyzed and the next survey has been developed for Round 2 - the current round.

During this round you will complete an online survey. This survey presents 20 statements in which a clear consensus has not been reached within the study's expertise pool. After viewing the results from the responses from the previous Round, you are prompted to rate your level of agreement. This entire survey should take no more than 20 - 30 minutes to complete - possibly less. This survey will maintain your progress if you accidentally lose connection or close the browser window.

If you have any questions about this survey, please contact me directly, by email: yang484@purdue.edu.

Follow this link to the Survey:
$\{l://SurveyLink?d=Take the Survey\}$

Or copy and paste the URL below into your internet browser:
$\{l://SurveyURL\}$

Follow the link to opt out of future emails:
$\{l://OptOutLink?d=Click here to unsubscribe\}$

Again, thank you very much for your continued participation!
Yang Chen
Purdue University
Computer Graphics Technology
Appendix T. Example Thank You Letter in Phase B Round 2

Dear [Participant's name],

Thank you very much for finishing the Round 2 survey! We have one more round to go and I will contact you soon. Your continued participation is very much appreciated!

Again, thank you very much for your continued participation!
Yang Chen
Purdue University
Computer Graphics Technology
Appendix U. Example Letter to Participants Who Dropped off in Phase B Round 2

Dear [participant’s name],

Thank you very much for your willingness of participating this study. But the survey is closed now according to the study schedule. Looking forward to work with you next time.

Again, thank you!

Best Regards,
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix V. List of Design Heuristic Reached Consensus in Phase B Round 2

DELPHI study of using User-Centered Design in Gamification

The group consensus has been reached for the following statements:

Section 1. User-Centered Design Workflow

1. **Designing the progress indicators of a gamification product depends on the available project budget and long-term/short-term goals.**

Results from Round 1:

Results from Round 2:

Comments:

- If this is not done well, then the gamification will be short lived and unable to measure ROI. Don’t forget the WHY.
- Although I agree that these elements are important, the MOST important aspect of game design is creating a fun game with interesting characters and plots that will “hook” players.
- It’s where you start, if this fails all will fail.
- Without understanding and setting up business objectives any gamification attempt is nothing else than money thrown out the window.

- The budget will ultimately dictate the professionalism of the progress indicator. I.e. there can be a static JPEG ($)... Or there can be a “magic fairy” floating around the screen that needs to be caught... ($$$$$)
- Progress indicators are key elements, and should be present on any gamification initiative, despite budget and time.
2. It is important to study what motivators have already worked for players and how players have been motivated in the past.

Results from Round 1:

- Providing the behavior you want to encourage is still aligned with past behavior and motivation.
- This can be beneficial, but if a system totally ignores other possible motivation factors, then this isn’t as effective.
- It is always good to look into past research to see what has worked and what has not. However, if there is truly a new idea it might be worth implementing just to see how audiences react.
- Totally agree.

Results from Round 2:

- For the most part I agree with this. However, there are always exceptions to the rule, however rare, such as when trying out an entirely new and innovative format.
- A study of past motivators, and their influence in the new design is a good starting point. At least, we will avoid what does not work in the past.

3. The gamification design workflow should always follow the classic User-Centered Design approach.

Results from Round 1:

- An User-Centered Design is an ideal, because you don’t always have user feedback....
- Not always. There are a lot of different types of games and ways to engage those games. One model does not always need to be followed in order for the game to work.
- Yes, it is like video games, they are for users.

Results from Round 2:

- Although I like the idea of user-centered games and think they work most of the time I do not think you can say something is “always” right in terms of format.
- Remembering that we are designing a game, we are designing a behavior change / increased engagement strategy...
- Totally agree.
4. Please indicate your agreement level with using the following design activities in a gamification project.

a) Select the most appropriate product platforms

Results from Round 1:

Results from Round 2:

b) Create player personas.

Results from Round 1:

Results from Round 2:

Comments:

- Although all of these elements are important, they do vary from game to game. For instance, a game like "Tetris" does NOT need player personas to work effectively.
Section 2. Defining Players

5. Defining the target player profile by understanding who they are and what motivates their engagement is critical.

Results from Round 1:

Comments:
- This too needs to be progressive! not a once off assessment, but rather a leveling up.
- In some cases yes, in others no. It entirely depends on the kind of game. For example, some games like "Candy Crush" can be popular among any number of players of various backgrounds.
- As with any video game.

Results from Round 2:

Comments:
- For the most part this is critical. However, there are always exceptions such as the "Candy Crush" example.
- Remembering that we are not designing a game. A Gamification strategy is to be progressive to keep the user continually engaged. I agree with point one above.

6. Please indicate your agreement level with using the following research methods for defining players:

a) Sampling the potential players who have the largest expected impact

Results from Round 1:

Results from Round 2:

b) Direct observation

Results from Round 1:

Results from Round 2:
c) Interviews

Results from Round 1:

Results from Round 2:

---

d) Surveys

Results from Round 1:

Results from Round 2:

Comments:

- For big groups of players the most easy and effective is to prepare a survey with a psychologist focused on any user segmentation type. For example Bartle, Marczewski, Anh Jo Kim or You Kai Chou.
- It depends on the kind of game. Some feedback should be in person while some can be conducted online.
- Best is by observing and focus groups.

- Again, it depends on the kind of game and audience.
7. Please indicate your agreement level with using the following research methods for defining players:

a) **Bartle's Player Types**

Results from Round 1:

Results from Round 2:

b) **Amy Jo Kim's Player Theory**

Results from Round 1:

Results from Round 2:

c) **Octalysis Frameworks of Motivational Drivers**

Results from Round 1:

Results from Round 2:

Comments:

- Different play environments can end up calling for different models for defining and analyzing players.
- Use your own methodology or the one that works best with you, but battle never (as he even says).
- I have not researched these methods.

- The last point is valid if the Gamification strategy is technological. If you applying a non-tech strategy then the platform for the mechanics needs to be tested if the users are able to apply.
Section 3. Play Testing

8. Please indicate your agreement level with using the following methods for play testing:

a) Survey

Results from Round 1:

Results from Round 2:

b) Cognitive Walkthrough

Results from Round 1:

Results from Round 2:

Comments:

- All of these methods can be very useful.
Section 4. Gamification Evaluation

9. A good gamification design should always give players meaningful choices and purpose, allowing them to explore their hidden potential.

Results from Round 1:

Comments:
- While harmonizing purpose with a player's purpose helps, meaningful choices would depend on context. Some onboarding, for example could end up providing very little in choices.
- In most cases this is true. However, there are always exceptions.

10. Please indicate your agreement level with using the following method for evaluating gamification design: Measuring player usage and the satisfaction rate.

Results from Round 1:

Comments:
- It is important to figuring out if a game "works."
Section 5. User Participation

11. When users are involved in a gamification design project, designers should not directly ask users "what do I have to do to change your behavior?"

Results from Round 1:

Results from Round 2:

Comments:
- They need to use more creative methods to establish this.
- Rephrasing the question, however, can provide useful feedback into user motivation and reasons for resistance to change.
- It depends on the game and the situation.
- Never ask that.

12. The biggest challenge of satisfying players is keeping the design fresh by constantly introducing new challenges and elements of surprise, luck and renewal.

Results from Round 1:

Results from Round 2:

Comments:
- As a player becomes more experienced, what motivates may change also, so be conscious of this.
- Failure to connect with the internal purposes of a user can also be a big challenge.
- In most cases, this will work, but there are always exceptions.
- Kind of yes, but don’t go crazy delivering new updates every day.

- For the most part, I agree since if nothing ever changes then the game becomes boring and players will not engage it.
- That has more difficulty in the players base if huge... How to keep engaging old users while engaging new users? That's a problem...
13. Designers should always try their best to put intrinsic motivators inside the project, not only points, badges, and leaderboards (PBLs); bribing users with incentives ends up eroding intrinsic motivation in players.

Comments:
- Extrinsic rewards that connect with the internal purposes of a user, need not erode intrinsic motivation, but can serve as feedback. Erosion can happen when purposes are not harmonized between a company and users, and people then attempt to game a system to get such rewards.
- In most cases yes but not all.
- THE ONE I MOST AGREE WITH. PBLs NEVER LAST FOR MORE THAN A MONTH OR SO

14. User participation can give players the sense that this is not something done to them but something they have created for themselves.

Comments:
- And something that they are creating as well.
- Users feeling they built something is useful for appealing to an autonomy drive. For other motivation types, this is not important, but a system that helps them meet their drives is.
- Yes, notably when customization elements are involved.

The bulk of gamification has centered around PBL. More work needs to be done in the area of intrinsic motivations. PBL would be best suited now for mastery internal motivation.
15. In business gamification designs, user participation should involve not only important users inside a business, but also all kinds of users at every level.

Results from Round 1:

Comments:
- Stakeholder impact is questionable here, particularly if the stakeholders are very loosely connected to an organization, and only impacted by externalities.
- Absolutely. A game that starts out being intended for a business can branch out to the mainstream.

Results from Round 2:

Comments:
- Participation on all type of users gives a broader view!
Appendix W. Example Letter of the Phase B Round 3 Survey

Dear [Participant's name],

Thank you for completing the Round 2 survey. Your input is invaluable and appreciated. The previous round has been analyzed and Round 3 (the last round) has been developed and is ready for your input. The results of this study will be shared with you and eventually other gamification designers and your continued participation as an expert is critical in gathering the necessary data.

Round 3 has 7 statements where consensus has not yet been reached and you are asked to rate your level of agreement with each of them after viewing the results from the previous rounds. The results of Round 2 are in blue text. This entire survey will take approximately 10 - 15 minutes to complete. This survey will maintain your progress if you accidentally lose connection or close the browser window. Please try to finish this survey by Friday, August 14th, 2015.

If you have any questions about this survey, please contact me directly, by email: yang484@purdue.edu.

Follow this link to the Survey:
$\text{Follow this link to the Survey:}
\text{\{l://SurveyLink?d=Take the Survey\}}$

Or copy and paste the URL below into your internet browser:
$\text{Or copy and paste the URL below into your internet browser:}
\text{\{l://SurveyURL\}}$

Follow the link to opt out of future emails:
$\text{Follow the link to opt out of future emails:}
\text{\{l://OptOutLink?d=Click here to unsubscribe\}}$

Again, thank you very much for your continued participation!

Yang Chen
Purdue University
Computer Graphics Technology
Welcome to Phase B_Round 3 Survey

Thanks again for your continued support. This is the last round of this entire study!

During this round you are asked to rate the remaining 7 statements again, after viewing the results of the previous round. Also, You may comment on the answers of the 2 open-ended questions from the previous round.

This entire survey will take approximately 10-15 minutes to complete. This survey will maintain your progress if you accidentally lose connection or close the browser window. It would be very much appreciated if you could finish this survey by, Friday, August 14th, 2015.

If you have any questions about this survey, please contact me directly, by email: yang484@purdue.edu.
Again, thank you very much for your continued participation.
Yang Chen

Section 1: User-Centered Design Workflow
Please indicate your level of agreement with the following statement

1. Designers may train some key players as “game masters” to use and generate continuous activities on the desired gamification platform.

Comments from round 1:
- Players are not designers. Such can be useful for input, but may miss key aspects of what works as far as design goes.
- It depends on the game/company. In some cases this could be very beneficial.
- Depending on the users and clients.
- I think that the “game masters” should be organic and that they will rise the occasion on their own... if the solution is designed well, they will have trained themselves.

Comments from round 2:
- This entirely depends on the game and company. I do understand how it could work in some cases.
- When designing games, however when designing a Gamification strategy. There needs to be a different perspective...
- I would not train key players. I would prefer to recognize them and give the status of “game master” based on user activity analysis.

Numbers in parenthesis below show results from previous rounds

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
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<tbody>
<tr>
<td>(Round 1: 8%)</td>
<td>(Round 1: 46%)</td>
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<td>(Round 2: 20%)</td>
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<td>(Round 2: 40%)</td>
<td>(Round 2: 0%)</td>
<td>(Round 2: 0%)</td>
<td>(Round 2: 0%)</td>
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</tbody>
</table>

Please indicate your level of agreement with this statement

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Optional: Comments based on the information provided above

---
2. Please indicate your agreement level with using the following *design activities* in a gamification project:

- Design the narrative and aesthetics (game story and audio/visual elements that will touch and engage players).

**Comments from round 2:**
- Although all of these elements are important, they do vary from game to game. For instance, a game like *Tetris* does NOT need player personas to work effectively.

**Numbers in parenthesis below show results from previous rounds**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (Round 1: 62%)</th>
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<td></td>
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</table>

Please indicate your level of agreement with this statement:

- [ ] Strongly Agree
- [ ] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree
- [ ] Not Applicable

**OPTIONAL:** Comments based on the information provided above


Section 2. Defining Players

Please indicate your level of agreement with the following statement

3. Please indicate your agreement level with using the following research methods for defining players:

Comments from round 1:
- For big groups of players the most easy and effective is to prepare a survey with a psychologist focused on any user segmentation type. For example Barrie, Marczwesky, Amit Jo Kim or You Kai Chou.
- It depends on the kind of game. Some feedback should be in person while some can be conducted online.
- Best is by observing and focus groups.

Comments from round 2:
- Again, it depends on the kind of game and audience.

Numbers in parenthesis below show results from previous rounds

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
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<tr>
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<td>Round 2: 0%</td>
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<td>(b) Workshops</td>
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OPTIONAL: Comments based on the information provided above
4. Please indicate your agreement level with using the following *analysis* methods for defining players:

**Comments from round 1:**
- Different play environments can end up calling for different models for defining and analyzing players.
- Use your own methodology or the one that works best with you, but barrie never (as he even says).
- I have not researched these methods.

**Comments from round 2:**
- The last point is valid if the Gamification strategy is technological. If you applying a non tech strategy then the platform for he mechanics needs to be tested if the users are able to apply.

**Numbers in parenthesis below show results from previous rounds**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (Round 1: 8%)</th>
<th>Agree (Round 1: 46%)</th>
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**OPTIONAL:** Comments based on the information provided above
Section 3. Play Testing
Please indicate your level of agreement with the following statement

5. Play testing should be done quickly and iteratively until the designer feels the product is ready.

Comments from round 1:
- In some cases this might work, in others not.

Comments from round 2:
- Play testing is the core of gaming. However, sometimes it needs to be done slowly rather than quickly. It depends on the game and audience.
- Should be continuous.
- It should be iterative, and will never be perfect until the users are engaging.

Numbers in parenthesis below show results from previous rounds

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OPTIONAL: Comments based on the information provided above

6. Designers should choose participants for play testing wisely, as players do not always provide meaningful feedback.

Comments from round 2:
- Not to limit to a few... engage with all.
- If the user does not provide feedback, probably the tool is not good enough for that user.....

Numbers in parenthesis below show results from previous rounds

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OPTIONAL: Comments based on the information provided above
7. A good play testing user group can act as consultancy-users in which they can be asked open-ended questions such as, "would you use this platform if it were in other colors?" or "what else would you include?"

Comments from round 1:
- When using a control group methodology you are not getting accurate data of the players, the REAL valuable data is when the entire player population are engaging. THIS is why the PRE-design engagement is VITAL.
- I would always include these kinds of questions regardless of kind of group.
- Yes, open-ended questions are the way to get the best feedback in most cases.

Comments from round 2:
- It is preferable to SHOW, rather than ask.
- Better to let players play and see how they behave, than asking them how would they behave.

Numbers in parenthesis below show results from previous rounds

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<tr>
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<td>(Round 2: 20%)</td>
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Please indicate your level of agreement with this statement

- - - - - - -

OPTIONAL: Comments based on the information provided above
Section 4. Open Ended Questions

Please answer the following questions

8. What books/articles/publications/conferences do you suggest for doing User-Centered Design in gamification design?

Answers from round 1:

- CHI, PETRA, EICS, ASSETS
- Loyalty 3.0, Reality Is Broken
- Gamification by Design
- The Multiplayer Classroom, Glued to Games
- Any great game design book: Schell, Rogers, Schreiber, Radoff, etc
- Octalysis framework, Mario Herger books, Gabe Zichermann courses and books, Hooked by Eye Niyal, Coursera and diversity courses, Weinschenk on user centered design on udemy, etc...
- #Riel (Daniel Pink), Flow (Mihaly Csikszentmihalyi), 4keys2fun (Nicole Lazzaro), Coursera Mooc Gamification Design (Kevin Werbach), Gamification Workshop (Gabe Zichermann)
- Google Scholar, Design, User Experience, and Usability: Health, Learning, Playing..., Part 2 edited by Aaron Marcus, Advances in Affective and Pleasurable Design (Google eBook) by Yong Gu Ji, Soosnin Choi
- My main focus in Entertainment-Education so I'm always following organizations that promote it including things as classic and basic as the "Sesame Street" organization. There are many books and articles about EE that can be found online. "Games for Change" is also an interesting event/conference that I hope to attend next week.
- Loyalty 3.0 (Rajat Paharia)
  Amy Jo Kim
gamification.co
  Bunchball and Bersin / Deliotics articles, Gartner
  www.blogtalkradio.com/gamificationtalkradio
  www.incidentpage.net
  http://www.yukaiichou.com/
  http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world
  https://www.youtube.com/watch?v=8Jzsw3JzmRY

Answers from round 2:

- There are excellent ideas above. YouTube and TED are great resources that can be accessed online for free.
- How to put Gamification to work for you. Monica Cornetti, the Gamification Novice and Gamification Expert certification by Sentientgames.com, with Darryn Van den berg as the narrator / guru
- Gamification by Design, Actionable Gamification, Loyalty 3.0, Coursera Mooc Gamification Design (Kevin Werbach), Gamification Workshop (Gabe Zichermann).

OPTIONAL: Comments based on the information provided above
9. What are the challenges do you experience when doing User-Centered Design in gamification design? Please describe as specific as possible or provide examples if possible.

Answers from round 1:

- Getting enough users not familiar with the previous iteration.
- Find effective ways to reward players and keep them engaged along the experience.
- Trying to get users to be motivated enough to participate, without use of punitive measures.
- People design GAMES rather than UX focus.
- The most critical aspect (and often missed) is defining the right target group.
- UCD is not about listening to what users want (say) but what they need, but to see what they actually do and feel.
- That I believe that is the most important challenge.
- The main challenge is that you don’t always have user data, confinable and reliable for decision making purposes. That’s the main reason why interaction is critical for a good design.
- Getting the client to agree to observation, focus groups and surveys as well as several rounds of play testing. Often the client thinks they can get there super-quick and don’t want to invest in several essential steps.
- Stakeholders or managers who are asking for a gamification design, usually think about the user experience before thinking about the business goals. First, one of the most difficult things is to determine the behaviour changes required to achieve the business objectives. Secondly, to find out what really motivates users.
- I think the most important challenge is to accomplish with the project design for all kind of users types equally. I mean, to finally design a gamification project that can be understood and played equally, with the same elevated estate of flow. When you design a game using doing user-centered design you focused on a specific type of player or a specific type of game playing. But when you have to design a gamification user-centered project, most of times there are all types of users with different hobbies or different skills.
- I am just starting to get into game design but the hardest part is when I am trying to make a game that will appeal to all audiences. It can be difficult to figure out the balance between the kind of game play and how much character and plot (if any) are needed. Generally, the more “instructors” you get for required content, targeted age, game play, budget, etc., the easier it is to design a game by following those guidelines.
- I wouldn’t be able to tell them all in some lines, mainly design problems (balance, cheating, pacing, fun enough), art (2D/3D, optimisation, textures, bakes, etc), tech (clean code, bugs, team, etc) and production (budget and timings). And many more! Gamification is full of problems, the fun in it is to solve them all!
- Understanding and examining the intrinsic motivation of the players. A focus on intrinsic motivators begins to reveal not only how to engage players in the game, but why and how their behaviors are changed through that interaction. Finding congruence between the intrinsic desires and the enterprise goal helps to focus on the activities and game elements that influence both.

Answers from round 2:

- Getting feedback/data can be tough.
- Differentiating the differences between game design and strategic Gamification design.
- Focusing on the intrinsic motivators and keeping the game surprising and fun.
- The most difficult problem I always face is to concentrate in a pool of ideas for the first solution (first pass), while leaving other good ideas outside the first project.

Optional: Comments based on the information provided above.
Appendix Y. Example Thank You Letter in Phase B Round 3

Dear [Participant's name],

Thank you very much for finishing the last round survey! Your continued participation is very much appreciated! I will contact you after all the data analysis is done and the results of this study will be available upon request.

Again, thank you & have a great one!

--
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
Appendix Z. Example Reminder Letter in Phase B Round 3

Dear [Participant's name],

Thank you for your time reading this email! We really really really need your help at the last round survey.

Your continued participation is very important to this DELPHI study. It is very much appreciated if you could take a couple minutes finishing that. Thank you very much!

Below is the original email I sent two weeks ago:

Thank you for completing the Round 2 survey. Your input is invaluable and appreciated. The previous round has been analyzed and Round 3 (the last round) has been developed and is ready for your input. The results of this study will be shared with you and eventually other gamification designers and your continued participation as an expert is critical in gathering the necessary data.

Round 3 has 7 statements where consensus has not yet been reached and you are asked to rate your level of agreement with each of them after viewing the results from the previous rounds. The results of Round 2 are in blue text. This entire survey will take approximately 10 - 15 minutes to complete. This survey will maintain your progress if you accidentally lose connection or close the browser window. Please try to finish this survey by Monday, August 24th, 2015.

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Or copy and paste the URL below into your internet browser:
$\{l://SurveyURL\}$

Follow the link to opt out of future emails:
$\{l://OptOutLink?d=Click here to unsubscribe\}$

Again, thank you very much for your continued participation!
Yang Chen
Purdue University
Computer Graphics Technology
Appendix AA. Example Letter to Participants Who Dropped off in Phase B Round 3

Dear [participant’s name],

Thank you very much for your willingness of participating this study. But the survey is closed now according to the study schedule. Looking forward to work with you next time.

Again, thank you!

Best Regards,
Yang Chen
Ph. D. Student
Computer Graphic Technology Department
College of Technology
Purdue University
VITA
Yang Chen earned degrees Bachelor in Mass Communication from Communication University of China, in Beijing, China, Masters in Digital Media Art from Harbin Institute of Technology, in Harbin, China. Then she studied on Computer Graphics Technology in Purdue University for Ph. D. work under the supervision of Dr. James Mohler and Dr. David Whittinghill from August 2012.

Publications


