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Chapter 8

User Experience Design for Inexperienced Gamers: GAP – Game Approachability Principles

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Abstract Game Approachability Principles (GAP) is proposed as a set of useful guidelines for game designers to create better tutorials and first learning levels – especially for the casual gamer. Developing better first learning levels can be a key step to ease the casual gamer into play proactively – at the conceptual design phase – before it is too costly or cumbersome to restructure the tutorials, as would be the case later in the development cycle. Thus, Game Approachability, in the context of game development, is defined as making games initially more friendly, fun, and accessible for those players who have the desire to play, yet do not always follow through to actually playing the game. GAP has evolved through a series of stages assessing accessibility¹ as a stand-alone, heuristic-based approach versus one-on-one usability testing. Outcomes suggest potential for GAP as (1) effective Heuristic Evaluation, (2) adjunct to Usability Testing, and (3) proactive checklist of principles in beginning conceptual and first learning level tutorial design to increase Game Approachability – for all levels of gamers.

8.1 Introduction

User experience (UX) has become one of the most central concepts in the research of interaction design. In general, it focuses on the high-quality use of some kind of interactive technology (cf. Forlizzi and Battarbee 2004, Hassenzahl and Tractinsky 2006, Hassenzahl et al. 2006, McCarthy and Wright 2004). User Experience design in the context of computer games is likewise highly relevant. User Experience in this context includes aspects such as Flow (cf. Csikszentmihalyi 2008) as well as a narrower concept specifically for use in gaming – GameFlow (Sweetser and

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¹ NB Approachability and Accessibility are used interchangeably throughout this chapter

Wyeth 2005, Jegers 2007). The latter aspect was further developed into frameworks of normative principles for evaluation and design (*ibid*). The approach of normative lists, for example as a list of heuristics, is highly influenced by early works in usability research. It is noteworthy that the first published article of usability and heuristics in the field of Human Computer Interaction (HCI) was about Computer Games and Learning (Malone 1982). However, perhaps the most famous work here was the design of the method of Heuristic Evaluation by Nielsen (1993).

Today, game design includes a focus on traditional usability such as creating clear terminology and a non-intrusive, easy-to-use user interface, as well as the game play aspects such as fun and immersion. A small number of studies have been published that address usability-related issues in gaming. Other principles specific to games include pace and adequate challenge, i.e., offering a game that is neither too difficult nor too easy (cf. Desurvire et al. 2004, Desurvire and Chen 2006, Federoff 2002, 2003, Korhonen and Koivisto 2006). The boundaries between what is addressed as "usability" and what is labeled UX are to some extent blurred. It is clear that the UX for games includes principles beyond usability that make games fun, immersive, challenging, and, frankly, addictive, such as collections found in the 400 Project (Falstein and Barwood), Heuristics for Evaluating Playability (HEP), and Principles of Game Playability (PLAY) (Desurvire et al. 2004).

Recently, video game designers and publishers have been shifting their focus from meeting the desires of hardcore gamers, to serving the less savvy and sophisticated casual gamer. The trend is clear – the crowd of gamers is becoming more heterogeneous. The focus is no longer only on hardcore gamers. There is a distinct shift toward a world where the general player is an inexperienced or casual gamer. Additionally, with the advent of new game mechanics and genre-breaking game play, teaching gamers to play this new style of game becomes a major concern for designers. Players are fickle and easily distracted. They are also easily bored, resulting in their abandoning of the game. In this chapter, the focus is on the initial stages of the UX of games, which is the first time someone learns how to play the game. The players at the initial stages of the game need to learn the tools of the game in order to perceive that they have the possibility to master it. While they are learning these tools, the players must be sufficiently motivated, whether it is through game play challenge, story, emotional connection with the character, pressure from their peers, or all of these. The game needs to unfold for the user in a way that he or she understands well enough to continue to explore the game, without giving away too much, while also motivating the player to investigate and continue to play. This concept is called Game Approachability.

With the strong emphasis expected in the future on casual and/or inexperienced players, the concept of Game Approachability is fast becoming as crucial an aspect of gaming fun and entertainment as "engagement" has been historically. Casual or inexperienced gamers, as their name implies, frequently lack extensive prior game play experience. The casual game player's more occasional or periodic exposure to games, in contrast to their hardcore counterparts, often means that casual gamers require more guidance in playing video games. This, in turn, suggests a challenge to support the casual gamer in getting started with game play without divulging the

secrets of the game itself – that is, to provide the tools to play games so casual game players have the potential to be confident in their mastering of the game as well. Therefore, the needs of casual gamers who are now being included in the mix of targeted people for whom games are designed, requires specific methodology and approaches in game design.

There are currently no standardized normative lists or set of principles for creating useful and well-designed tutorials or first learning levels in games. Typically, game designers create the first level and tutorials last, basing them on how the game has developed. Further, the designs are often poorly conceptualized because of scheduling practices that put them at the end of an already rushed design schedule. Even if there is enough time, designers have no clear guidelines or principles, and there are typically prolonged feedback loops between designers and the detailed results of user research, making it too late to make substantial changes for ideal designs for fun and learning.

In order to find guidance when it comes to learning, research from the pedagogical field is introduced. There is a substantial body of research from interactive learning found in learning theories in psychology and education (cf. Bandura 1994, 1977, Bruer 2000, Gee 2003, 2004). The principles for Game Approachability were developed from, and subsequently validated by, the research findings in these fields as well as good game design principles. This chapter covers the purpose of the most related work in these fields in order to show how the theoretical ground of the GAP list was developed.

The objective of this chapter is to present the findings reached in the development of an inspection method for evaluating and improving the level of Game Approachability. This term is defined as the level of helpfulness in a computer game for new and inexperienced players to be able to initiate and continue to play the game. This issue is highly relevant to the game industry. A large number of inexperienced gamers need to be enticed into entering and exploring a game. In order to get these new player groups to experience a game as fun, entertaining, and enjoyable, they need a gentle push over the threshold into the game. Hence, the problem is to help new players just enough without giving away too much of the plot.

8.2 Game Approachability

Inexperienced gamers are likely to start and continue to play games if these games are more easily approachable. That is, the game needs a high level of Game Approachability. So far, research on Game Approachability has been derived from educational research and includes aspects such as Social Learning Theory, Self-efficacy, and Cognitive Learning Theory. There are many systems and artifacts where approachability is highlighted as central, such as online learning, productivity software, and hardware. However, games have not been one of them. We need to ask ourselves how approachability research can apply to games and what needs to be revised and redesigned in concepts and methods? How will these methods help

designers include better approachability to their games? In the following section, some related work is discussed in order to contextualize the work presented in this chapter.

8.2.1 Learning as a Means to Approachability

There is no global theory of learning. Learning can be understood in numerous ways. However, some learning theories could be applicable to game design. Theories of learning often highlight aspects such as motivation, helping behaviors, ensuring the tools become second nature, and engagement, which are central for gaming. While these ideas have been applied in educational settings to improve student learning, they can also provide a starting point for describing how game design can improve the accessibility of games for casual gamers.

Some applicable theories are (1) Social Learning Theory (cf. Bandura 1977), which emphasizes the importance of observation and modeling in the learning process; (2) Cognitive Learning Theory (cf. Bruer 2000), which emphasizes the active construction of knowledge and is most commonly associated with the ideas of Piaget; (3) Self-Efficacy is another term used in education and learning (Ormond 1999, Bandura 1994) and refers to people's beliefs about their own capabilities or their beliefs about their ability to reach a goal; and (4) John Paul Gee's research in the current educational field uses good game design to develop principles for designing educational materials and curriculum that are both motivating and fun for students (Gee 2003, 2004). The following are a subset of the elements identified by Gee that are applicable to accessibility: (1) Identity, (2) Co-Design, (3) Customization, (4) Manipulation and Perception, (5) Information On Demand And In Time, (6) Sandbox, and (7) System Thinking (for a more thorough description of the points discussed above, see earlier publications (cf. Desurvire 2007, Desurvire and Wiberg 2008)).

With the knowledge that there are Usability and Game Design Principles, there is a need to identify and utilize approachability principles in order to round out the gaming UX for use as both evaluation and design purposes. There is a need, therefore, to identify and validate the approachability principles for games.

8.3 Design of the Study: Comparison of Empirical Usability Evaluation and Heuristic Evaluation by GAP

The most common way of identifying the areas of games that need to be improved is through game usability testing. Usability testing has been found to be quite successful in improving the design of games, via relying on observing the players' experience. The need to design games in a way that makes them more accessible to casual gamers has also added to the need to define and utilize a set of principles for conceptualizing the design, as well as to utilize usability research to refine the design.

The learning of skills and techniques in a video game is similar to the way that people learn anything else. It follows, therefore, that learning theories must be considered when determining how to design games in such a way that players learn the needed skills while they are having fun. In this research, a set of principles and heuristics has been developed that describe the types of activities necessary to promote learning within a game. Usability testing is enhanced with the use of these heuristics when evaluating issues of accessibility within a game. Heuristics can also be used as a checklist during refinement of game design. In addition, and most important, the accessibility principles can be used to design a good tutorial from the onset of game design. In many cases, lack of accessibility results in the failure of a game, which occasionally leads to the failure of studios that would otherwise have produced successful games.

The current study compares the results from Usability Testing as a benchmark of all usability methods with an evaluation performed using the approachability principles to identify what types of issues each method found in the same games. Both the GAP heuristic evaluator and the usability evaluator had the same knowledge of the games. Did both Usability Testing and the Heuristic Evaluation identify the same issues in the games? Did one method find more accessibility issues or playability and usability issues than the other? How do the different methods complement each other?

8.3.1 The Games

This study includes data from four games to identify the differences and similarities between a Heuristic Evaluation based on Game Approachability Principles (GAP) and usability testing. In order to obtain a breadth of popular game styles and consoles, we studied two games still in development, a shooter and a strategy game, both for the Xbox 360 console. The other two games were racing games also still in the development stage, one that was played using a Nintendo Wii and one that was played using a PlayStation3.² The beginning, learning stages of the games were studied, since it is their goal to provide easy access to learning how to play the game, while having fun, and most important, being excited about and addicted to continuing to play.

8.3.2 Heuristic Evaluation Based on GAP

The principles in the GAP list were developed from previous research and based on current literature in relation to learning (Bandura 1977, 1994, Gee 2003, 2004, Ormond 1999). Usability/playability evaluation was performed using the Heuristic

²The names of the games cannot be revealed due to confidentiality agreements

Evaluation, focusing on how each accessibility heuristic was supported or violated, and then defining the issue. Another usability/playability researcher performed Usability Testing in a one-on-one, think-aloud method, identifying any usability/playability and approachability issues. The following is the list of GAP utilized in both methods of evaluation.

8.3.2.1 The GAP List

1. Amount and Type of Practice
 - Game allows opportunities for sufficient practice of new skills/tools
2. Amount and Type of Demonstration
 - Game play modeled in more than one way
3. Reinforcement
 - Game provides feedback of player's actions
4. Self-Efficacy
 - Player competent with learned skills and tools after initial training
5. Scaffolding - Failure prevention where help is at first general then more specific as needed
 - Help provided as needed within the game
6. Gee: In control; co-identify, manipulation, perception, and Sandbox
 - Player identifies with game character
 - Player could affect the game world
 - Results of feedback appropriate
7. HEP- and PLAY-Based Guidelines (Desurvire et al. 2004, Desurvire and Chen 2006, Desurvire and Wiberg 2009)
 - Good game design guidelines in the categories of Game Usability, Game Mechanics, Game Story, and Game Play. This comprises areas such as players not being penalized repetitively for the same failure, defining the right challenge and balance, varying activities, and pacing during the game to minimize fatigue or boredom.
 - Player able to succeed at meeting goals
8. Goals of Game Clear
 - Player able to succeed at meeting goals
 - Coolness and entertainment
 - Game attracts player's interest
 - Game retains player's interest

9. Information On Demand and In Time, System Thinking
 - Actions and skills learned are useful throughout game
10. Self-Mastery
 - Player learned new skills and tools to play the game

8.3.3 Empirical Usability Evaluation

After completion of Heuristic Evaluation and Empirical usability/playability laboratory testing with the four games, the results were compared. Heuristic Evaluation was analyzed first, followed by the empirical Usability Testing sessions. During the empirical usability evaluation of the four games, 32 players engaged in usability/playability sessions. For one game, eight players were observed, for another game 12 players were observed, and for two of the games, six players were observed.³ The majority of the players were male, with only two players being female. All were between the ages of 8 and 35. Forty-nine percent of the players were considered casual players, 25% were considered moderate players, and the rest were considered hardcore players. Each session was organized as a one-on-one, think-aloud evaluation session, in an environment similar to the one where they would actually play the game. Participants were given instructions to begin the game and asked to think "out loud" during the session, except when it interrupted their game play. They were asked several probing questions while using the game prototype. The players were then thanked, debriefed, and asked to fill out a satisfaction questionnaire. The evaluator recorded a log of the players' actions, comments, failures, and missteps and then coded each of these as a positive player experience or a negative player experience. A positive experience was defined as anything that increased their pleasure, immersion, and/or the challenge of the game. A negative experience was defined as any situation where the player was bored, frustrated, or wanted to quit the game. The probing questions and the players' comments were used to verify any assumptions made by the evaluator. GAP was utilized during the sessions by the evaluator as a checklist to assist in identifying and categorizing accessibility issues observed. After the sessions were complete, any issues that were considered hindrances to learning how to play the game and having fun were identified, analyzed, and documented.

8.3.4 Comparison of Results

After both the Heuristic Evaluation and the Usability Testing were completed, the results were compared to identify what types of issues each method found in the

³ An uneven sample size was necessary due to the needs of the game development and was accounted for in the analysis, since this is formative research a small sample size is typical.

same games. The issues found for each evaluation were categorized either as an accessibility/approachability issue or as a playability/usability issue. As noted earlier, the terms accessibility and approachability are used interchangeably depending upon which of two communities one inhabits. In academia, the term accessibility would be associated with disabilities of one kind or another and therefore the use of the term approachability. The gaming community is more familiar with the term accessibility. The accessibility issues were then categorized as one or more of the accessibility heuristics. The accessibility issues in the games were compared to see what issues the Heuristic Evaluation found that usability did not, what issues usability testing found that the Heuristic Evaluation did not, and what issues both methods found. In addition, the GAP Heuristic Evaluation and the Usability Testing results were compared to determine the number of accessibility issues identified in each, as well as the overall number of issues found by both methods. Finally, the descriptions of the issues identified by both methods were compared to determine any similarities or differences in the granularity of each method's description of the issues.

8.4 Results of the Heuristic Evaluation by GAP Heuristic Counts

The GAP Heuristic Evaluation identified a higher percentage of accessibility issues as well as more types of accessibility issues than the Usability Testing, while the Usability Testing found more issues relating to playability/usability. For the four games, the Heuristic Evaluation identified 90 issues, 48% (or 43 issues) relating to accessibility and 52% (or 47 issues) relating to playability/usability (see Table 8.1). The Usability Testing found 207 issues in total, 11% (or 22 issues) relating to accessibility and 89% (or 185 issues) that were issues of playability/usability. In addition, the Heuristic Evaluation found more types of accessibility issues than in the usability study. The issues found in the Heuristic Evaluation incorporated ideas across six categories of accessibility heuristics, as compared to four categories in the usability study.

The following quotations and screenshots provide examples for the types of accessibility issues found only in the Usability Testing, only in the Heuristic Evaluation, and those shared in both the Usability Testing and the Heuristic Evaluation.

8.4.1 Examples of Approachability Found in Data

8.4.1.1 GAP as Heuristic Evaluation Not Found in Usability Testing

The GAP principle of Amount and type of demonstration occurred twice in the Heuristic Evaluation and not at all in the Usability Testing. An example of this Amount and Type of Demonstration was identified in the Shooter game, where the player was unable to win against the Artificial Intelligence (AI) opponent, even when not making any mistakes. The players did not recognize they could get extra

Table 8.1 Accessibility heuristics identified

Principle	Usability testing	Heuristic evaluation
<i>Amount of practice:</i> player provided with opportunities to practice new skills so as to commit skills to memory	–	5
<i>Amount and type of demonstration:</i> player given opportunity to model correct behavior and skills	–	2
<i>Demonstrate actions and reinforcement:</i> player able to demonstrate and practice new actions without severe consequences. Player knows what actions to take	2	7
<i>Self-efficacy:</i> player able to succeed at playing game after training period, i.e., first level or tutorial	–	3
<i>Gee: Identity:</i> player identifies with character	–	9
<i>Co-design:</i> player affects the game world		
<i>Customization:</i> player able to use preferred style		
<i>Manipulation and perception:</i> player given increased capabilities/tools to use		
<i>Information on demand and in time:</i> player has access to answers regarding the game whenever needed and when first coming across new material		
<i>Sandbox:</i> player feels rewards and punishments for game play action were appropriate		
<i>Information presented on demand and in time, system thinking:</i> actions and skills learned were important for playing the game not just for a single event in the game	1	–
<i>Scaffolding-failure prevention:</i> player provided with help to meet goals of game	1	–
<i>Build on prior knowledge:</i> games similar to others in same genre allowing new skills to be built on previous knowledge	–	–
<i>HEP and PLAY:</i> player able to succeed at game's goals and found their expectations fulfilled	17	12
<i>Entertainment and coolness:</i> player was entertained and enjoyed playing the game	–	–
<i>Self-mastery:</i> player able to master game using skills and tools provided	–	–
<i>Total</i>	22	43

points by doing combination moves, required in order to win, as these were not obvious from playing the game. Having AI Non-Player Characters doing these moves would demonstrate to the player that this is both possible and an option. Furthermore, demonstrating the controller buttons and thumbsticks using a controller image and an increased health meter would demonstrate exactly how to do this. Usability Testing did not find this GAP principle.

Finding that Self-efficacy was a violated GAP principle found via Heuristic Evaluation, but not Usability Testing has implications for using GAP in design. Since this is an issue that was found when called out by using GAP as a checklist in the Heuristic Evaluation, but not found in Usability Testing, alludes to it being a more subtle issue not easily discovered from players' comments and from observing their experience. Self-efficacy was found to be violated, for example, when the evaluator determined the players would be expected to know how to perform several button combinations, along with timing in competing against challenging AI opponents in the Shooter game. In the Racing game (see Fig. 8.1), the evaluator determined the players would not know certain moves, such as a special 180 that would help them beat the AI opponents. Without these moves, they would be unlikely to continue to try to win without considerable motivation to continue. They would likely not feel confident they could continue and that would undoubtedly cause the players to feel incapable of making it through the first level. The rest of the levels would therefore be too difficult. There is a considerable likelihood this player would be one to drop out of playing this game. Increasing Self-efficacy would give the players confidence that they would be able to continue and be successful. This would require giving the player some of the basic GAP principles, such as Demonstration, Practice, Reinforcement, Scaffolding, and Sandbox. The specifics would depend on the type of issue identified. In this case, the player needed to have the fighting techniques Demonstrated, then have a chance to Practice, be given Reinforcement (positive feedback), and Scaffolding help if they could not kill all the opponents before the end of the level, since the first level needs to be a successful experience. This has implications for initial concept design, since the designers could plan for Self-efficacy and have the design refined based on real-user testing (Usability Testing).



Fig. 8.1 GAP: Self-Efficacy found in Heuristic Evaluation in racing game



Fig. 8.2 GAP: Gee: Sandbox without consequence, lack of Sandbox in Shooter game

The GAP Gee (Identify, Co-Design, Customization, Manipulation, Information On Demand and in Time, Sandbox) was found in Heuristic Evaluation, but not with the Usability Testing. Observing the users playing the beginning learning levels, it was identified that there was a need for the GAP Gee: Sandbox without consequence. In the Shooter game, players were taught how to use a combination of buttons for attacking their enemies. They were taught three new moves and then were required to use these attacks in game play. Due to the Heuristic Evaluation, players would need to practice any new moves successfully and would otherwise likely lose their characters' lives. Many players would not have enough time to play and master the new skills without consequences, as per the approachability principle Gee: Sandbox without consequence. When the players have the time to practice, they can combine the new skills in an open play format without the risk of losing. When they have learned these skills via the Sandbox, the players would continue to first level with preparation, and thus be able to fairly defend themselves (see Fig. 8.2).

The GAP Heuristic Evaluation assisted the evaluator to notice and design for the consequence of not having enough practice via a Sandbox, thus adding a Sandbox.

8.4.1.2 GAP Found in Usability Testing Not Found in GAP Heuristic Evaluation

Usability Testing found issues related to GAP Scaffolding not found in the GAP Heuristic Evaluation. The GAP Scaffolding was found to be missing when the player was supposed to cut some chains down from a fort in order to release a



Fig. 8.3 Example of GAP, scaffolding needed in Shooter game via usability testing

bridge; the player was stuck (see Fig. 8.3). They did not know what to do in this learning level and could not continue the game. Had this occurred in a real-world play session life, the player would likely quit the game. Scaffolding was violated, and had it been added, would have assisted the player in continuing the game. Scaffolding would be useful because, if the player still did not understand after being offered a small parcel of assistance, other and more varied parcels would be offered. Usability Testing offered this insight, since the players were stuck without this information.

Issues that were found only in Usability Testing and not in the GAP Heuristic Evaluation were more HEP and PLAY guidelines. Since Usability Testing has the advantage of real players thinking aloud their experiences in real time, the evaluator had the advantage of players' comments of their experience: "I think the tutorial is way too long. I want to be playing the game, but instead I'm doing the tutorial. I thought the stuff in the beginning was useful, but now it just seems like too much and I am not having that much fun."

This led to the identification of the GAP – HEP and PLAY, where the guidelines recommend that players have a fun and successful experience in the first 10–20 minutes. The Heuristic Evaluation did not find this. Ideally, the key for the tutorial based on GAP is a design where the player is learning the tools, while this learning is masked by their having fun through game play challenge and story motivation. This has implications for designing using GAP as a checklist of the conceptual tutorial design. However, seeing where the actual users are having a fun and successful experience seems to only be validated with real players; otherwise, it is simply a guess.

Information on demand and in time in system thinking from GAP was one that was found from Usability Testing in the Shooter game, but not in the Heuristic Evaluation. When there were instructions offered in both text and audio, the evaluator observed players still missed this information. They were on to another area of the game. Since players missed the necessary information when it was presented, they then did not have the ability to repeat the instructions to learn what they had missed. As one player said, "the instructions need to be clearer and you should have the ability to repeat instructions. It just seems like they tell you the instructions once and if you miss it you are lost". (Fig. 8.4) In addition, this instruction was teaching a skill that would be required for later play in the game. In other words, system thinking meant what the player learned would have consequences to the player's game tools later in the game. If there were repeatable and pauseable instructions, the player would then have the ability to receive the instruction when they needed it, rather than when it was offered. In addition, later on when the player may need the instruction again, they could locate this assistance. In this Shooter game, the objectives text actually disappeared after the instruction was given. It would be better for the text to stay on the screen until the players were successful and well onto the next area of the game. Having this list accessible at all times, via a button leading to a table of contents help screen, for example, would allow the players access later in the game if they should forget the instruction. Alternatively or in addition, employing the basic GAP such as Demonstration, Practice, and Sandbox would help reinforce this new skill for later use (System Thinking). This GAP was missed in the Heuristic Evaluation, as it was likely the evaluator could not predict that the skill had not been taught and offered on demand and in time. This is a good example of where the designers can make their best guess, Usability Testing will validate this



Fig. 8.4 GAP information on demand and in time, system thinking in Shooter game

principle. The GAP offered a structure for the evaluators to categorize what was missing, which will lead to potential solutions.

This explanation provides implications for both design and evaluation, since GAP can offer designers the conscious design principle that information ideally is taught on demand and in time for skills required to play the game (system thinking) and refined via Usability Testing. Heuristic Evaluation would identify this as a potential issue, but could only be validated with real representative players.

8.4.1.3 GAP Found in Both Usability Testing and Heuristic Evaluation

From both the GAP Heuristic Evaluation and Usability Testing, the GAP – HEP and PLAY were both found. There were many issues found in both methods, (17 in Usability Testing and 12 in Heuristic Evaluation). This is not surprising, since HEP and PLAY issues are related to fun and playability. These do not directly have anything to do with learning and approachability, but learning must be fun and successful. These are issues that are the focus of game usability/playability, which both methods are focused upon. The difference is that Heuristic Evaluation can identify these issues, but Usability Testing validates these with real players. The violated issues that were identified under GAP – HEP and PLAY in both Usability Testing and Heuristic Evaluation in the games were the following:

- a. The first 10–20 minutes of play was fun and successful.
- b. Players should not be penalized repetitively or for the same failure.
- c. Varying activities and pacing during the game in order to minimize fatigue or boredom.
- d. The game provides clear goals; overriding goals are presented early, and short-term goals throughout game play.
- e. The skills needed to attain goals were taught early enough to play or use later, or right before the new skill was needed.
- f. The game gave rewards that immersed the player more deeply in the game by increasing their capabilities or capacity to do things in the game.

8.4.2 Level of Detail

In addition to differences in the number of accessibility/playability issues identified by each method, there was also a difference in the level of detail that each method provided concerning the identified issues. The Usability Testing referred more to specific areas of the games where problems occurred, providing a count of the number of players that had difficulty at certain areas of the game, as well as quotations from players that indicated frustration. Conversely, the Heuristic Evaluation identified areas where a player was not given the means to master a skill set, whether by motivation to follow through, or by the actual teaching given and practicing allowed. This evaluation then indicated other areas in the game that might give players trouble since they had not learned the needed skill. This is most likely a result of Usability

Testing describing problems as they are seen while Heuristic Evaluations are predicting problems players are likely to have. The high number of HEP and PLAY issues identified by Usability Testing may also be a result of this difference (see Table 8.1). For Usability Testing, each area that a player had difficulty in was identified as an issue, such as unclear goals, and thus each separate area would be counted as an issue. For the Heuristic Evaluation, the problem was counted once but then noted that players would continue to have problems with a certain skill set because it had not been learned at the time the designers intended.

8.5 Conclusion

Our results indicated that the usability one-on-one testing and the GAP Heuristic Evaluation of the games provided information that supplemented each other. The GAP principles were useful in evaluating the game design and offering suggestions to the designers based on the principles and the associated issues found. GAP provides a structure for organizing approachability issues, so that designers can have an understanding of what is lacking, and thus what is necessary to create an optimal learning level that is also fun. The GAP Heuristic Evaluation alone provided more information about Game Approachability while the Usability Testing provided more information about playability/usability of the games. GAP with Usability Testing can be perhaps best thought of a way to validate and refine assumptions made in the initial GAP Heuristic Evaluation, with real players. This was evident especially with the GAP Scaffolding and Information on demand and in time. GAP used for Heuristic Evaluation is likely to identify more approachability issues, since that is the focus of the evaluation, whereas the Usability Testing focuses on not just approachability, but usability/playability issues that may supersede the approachability focus. Alternatively, the Usability Testing is able to provide a level of detail that is not possible in the Heuristic Evaluation, such as specific quotations from the players that validate real experience, rather than predicted experience. It is important to note that the evaluation is performed with live players and, as we know, human behavior can never be accurately predicted. More important for approachability, GAP offers the promise and ability to be proactive when used by the developers in creating a design that includes these principles prior to the design being finalized. This in fact may be one of the most valuable uses of GAP, since the conceptual design sets the foundation. If a design is used based on GAP, then it provides a built-in structure for learning while having fun. Heuristic Evaluation using the same language and structure in GAP allows a refinement, and Usability Testing with GAP uses a finer level of evaluation since real users are involved.

Further, since GAP is a novel approach to Usability Testing, evaluators may be more likely to focus on more traditional usability issues, as opposed to approachability ones. With more practice and experience with GAP, evaluators are likely to uncover more issues upon further use when testing real players. Still, Heuristic Evaluation, used as an adjunct and alternative inspection method, allows a way to uncover some issues that may be similar to evaluating real users, and some that

are beyond what is found with real users. GAP also would be a viable structure for game designers to utilize for conceptualizing and setting a good beginning level design that is based on what we know about how humans learn and also have fun.

In summary, the suggested best use of GAP and Usability Testing is to utilize GAP as a checklist to design and refine a good tutorial and entry game level. The Usability Testing can then be utilized to refine the design, and GAP as a Heuristic Evaluation can be used as an adjunct to Usability Testing between research iterations. Thus, taken together, both methods of research can help make video games more accessible to casual players. The GAP list offers a checklist for the conceptual design for approachability, while usability/playability one-on-one evaluation offers both validation and correction to the design for approachability.

8.6 Future Work

The GAP checklist has already been utilized for conceptual design with several game companies worldwide, resulting in tutorials and first entry levels that are notably improved beyond what they would be without the checklist. Utilizing Usability Testing as a refinement of the conceptual design for approachability has been found to be important in both validation and refinement of the design with real users (for which there is *no substitute*). In the process of using GAP on game tutorials and first design levels, there are several refinements and additions that could be made to GAP that could improve its usefulness for design teams. We have developed a three-step process or checklist that has been found to be quite useful. It is a tutorial design process that includes GAP for ensuring that players are having fun while learning the first level. Future work would focus on a case study, and validation of this checklist to be utilized by game designers and game evaluators to create optimal beginning game levels.

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