

# The Effect of Age, Gender, and Previous Gaming Experience on Customization activities within games

Mona Erfani, Magy Seif El-Nasr, David Milam, Bardia Aghabeigi, Beth Aileen Lameman, Bernhard E. Riecke, Hamid Maygoli<sup>1</sup>, Sang Mah<sup>2</sup>

Simon Fraser University  
Surrey, BC

{ mea16, magy, dma35, baa17, ber1 }@sfu.ca, beth@bethailen.com,  
tonymaygoli@yahoo.com

<sup>2</sup>Bardel Entertainment, sang@badel.ca

## ABSTRACT

Understanding players and their game playing behavior is a growing area of research that is currently being explored by many game companies, including Electronic Arts, Hobbo Entertainment, and XEO Design. In this paper, we report on a study we conducted to understand the influence of age, gender, and previous gaming experience on customization activities of game players in the younger age group within games. We note that player behavior in such scenarios can be used to improve game design and maybe lead to new player models. The results show significant differences between genders within our sample and the type of activities and items used within character and level customizations. We also found some correlations between previous gaming experience and strategies users take to customize their levels, as well as the type of customization activities they engage in. These results will be discussed in this paper as they contribute several design lessons for designs of games or virtual worlds that involve customizations.

## General Terms

Play styles, player modeling, game design

## Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## 1 INTRODUCTION

Understanding player behavior and motivations are among some of the important factors that can influence the design and production of next generation games. As Bateman and Boon describe, there are different approaches to game design—an entertainer develops his/her product based on audience understanding, while an artist develops his/her product to express their own artistic goals [1]. Thus taking the entertainment approach, in particular customization for this study which is important for creation and thriving of a game's community, developers and designers need to model and understand their players.

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Game designers, for a long time, have developed games based on their own preferences. This resulted in the stereotypical image of a game player, being male, 18 to 20 years old, and thus, quite similar to the designers themselves [2, 3, 16]. Klimmt and Hartmann found that boys and girls prefer different games—females don't like games that have little or no social interaction or violent content [8]. This is similar to Williams et al.'s results showing that female players in Massively Multiplayer games often conform to activities that fit within their gender role [10] as discussed in gender role theory [17]. Furthermore, Lucas and Sherry [9] discussed the gender-gap between boys and girls and why they react differently to different kinds of games. "Girls, for example, like puzzle, quiz, and board games, while boys prefer sports, fighting, action, or FPS games. Both sexes equally enjoy racing, simulation, and MMOG (Massively Multiplayer Online Games) games [9]." Recently, the game industry started to push for games that target different groups, with the introduction of the Wii that attracted different markets, including retirees, female gamers, and kids. In addition, games like *Pogo* (Electronic Arts, 2007), *The Sims* (Maxis, 1999), and *World of Warcraft* (Blizzard, 2004) have successfully attracted female gamers of different ages [4, 5]. Large companies, such as Electronic Arts, Sony, and Microsoft, have already formed groups within their companies, whose mission is to understand players' behaviors, habits, motivations, and play styles. Play styles is a term coined by the game industry and discussed in many sessions at the Game Developers Conferences. We use this term to mean the type of activities that players tend to do in games or virtual worlds, such as social activities, hunting, collecting, or goal achievement.

The idea of player modeling and understanding play styles is not new; several researchers have already done some groundwork within this area. Richard Bartle developed one of the first player models by studying people playing MUDs (Multi-User Dungeons). He categorized players as Socializers, Killers, Adventurers, and Achievers [6]. His model has influenced many designers of virtual worlds and sandbox games. Bateman and Boon [1] present another interesting model where they correlate players' personalities, computed based on Myer Briggs' personality Model [7], to play styles within different types of games. Some researchers also explored the role of gender in determining play styles. In particular, they argued that gender is one of the factors affecting play style; for example, they stated that female players often engage in socialization activities or puzzle solving in games [8-10]. In addition, although our work does not explore culture or social groups within virtual worlds, it is worth

noting that there are several researchers who have done considerable work within this area, specifically looking at social groups and group behavior within Massively Multiplayer games, such as *World of Warcraft* [11-13].

Most of the games and virtual worlds today are adding several customization elements, such as character and level-based customizations. There are many researchers exploring the social dimension of such games and virtual worlds, but there is almost no research that explores customization-based activities in games or virtual worlds. In particular, no research has explored how players differ in what they customize and what kind of customization tools are needed, and for what audience.

There are several researchers who work with game companies to evaluate players' behaviors using gameplay metrics [14, 15]. Additionally, there are several companies that gather such metrics to evaluate and determine what their players are doing, such as Zynga, Three Rings, Blizzard, and others. Most of these metrics are concerned only with gameplay data. Thus, they do not collect real-world parameters of players, such as gender, personality, or age. In this paper, we advocate studies that look for correlations between users' age, gender, or previous gaming experience, and their play styles. This is a direction of research that requires extensive data collection, as data collected by game or virtual worlds companies do not contain all required variables.

In this paper, we build on related works by reporting on a study we conducted with 60 participants between the ages of 6 and 16. However the major difference of this study with other works is the nature of the player pairs and the implications of playing in groups. As the industry realizes the value of cooperative patterns, co-op games increased and playing in groups encouraged more than playing alone. In the past year alone, several AAA titles, such as *Resident Evil 5* (Capcom, 2008) and *Left4Dead* (Valve, 2008), included cooperative specific set of design choices concerning rules or mechanics within their game designs. Additionally these young target audiences usually play with siblings, parents or friends which made us to choose this setup. Results of our background questionnaire reveal 55% of participants preferred cooperative games and 77% of them stated that they would like to play games that embed both cooperative and competitive patterns. Before the study, we identified over 215 co-op games, analyzing core mechanics and concepts including the sharing of resources, controls (user interface), outcomes, and failure conditions for 10 games. However for customization activities within games we chose *Little Big Planet* as a game that deserve further exploration specifically the level customization aspect of the game, since it gives participants a wide variety of level customization and character customization tools. As the study was developed to explore correlations between age, gender, and previous gaming experience on the one hand and customization activities within games or virtual worlds on the other hand, we looked at what participants spent their time doing and how strategic they were in developing their own levels and characters. We then ran several statistical analyses to find correlations between these measures and age, gender, and previous gaming experience.

While work is beginning on many interesting fronts, we found no prior research work that explored customization activities within games or virtual worlds and the impact of age, gender, and previous gaming experience on users' play activities. This paper discusses a study that attempts to investigate this issue.

## 2 THE STUDY

For each session participants were asked to sign a consent form. They were then interviewed. During this interview we asked them about their background, playing habits, and previous gaming experience. After a quick overview of the game and controllers then they were asked to engage in game play for around 15 minutes. All play sessions were videotaped front and back as shown in Figure 1. Also, during play sessions, 2-4 researchers, including a professional psychologist, took observational notes. After game play participants were interviewed using a structured questionnaire to gauge their perception of their play sessions. Observation notes, videos of the sessions, as well as interviews, were analyzed to deduce relationships between age, gender, previous gaming experience, and play styles.

For *Little Big Planet*, we did not ask the participants play the game from the beginning as the designers intended. Instead, in preparation for this study, we played the game for several hours to unlock the level editing part of the game. We also unlocked several character and level customization items to enable several customization possibilities. Within the sessions, we asked participants to play the level customization part of the game. Within this part, players can dress up their avatars and apply stickers to decorate their houses. Players are also able to gesture and emote with their avatars, which added a new dimension to their game play. Furthermore, simple tools allow players to assemble and modify the level and modify character attributes to make their own story worlds. We gave participants a quick tutorial to show them how to do all of these activities within the game and then they were given the controllers and asked to play.



Figure 1. Two shots from two video cameras used to video tape the play sessions

### 2.1 Participants

We had a total of 60 participants: 18 females (average age=9.81), 42 males (average age=10.4). Participants were 6-16 years old, with majority being between 8-12 years old. It was difficult to find kids (2-3 friends or family) within the exact age group we wanted (8-12), who were willing to devote time to come to our sessions and play games. Often, parents brought other family members (siblings) beyond our age range who also wanted to play. As a result, we expanded our target age range to include 6 and 7 year olds and 16-year olds. We ran a total of 26 sessions, 11 were made up of participants who were friends, 11 were made up of family, and 4 were mixed.

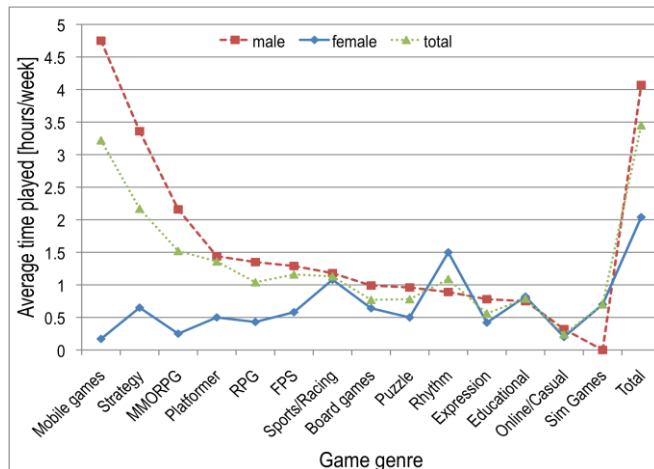
Since we had several participants in the age range of 6 and 7, there were several developmental issues that we needed to take into consideration while interviewing as well as when evaluating and coding the interactions. Difficulty with the controller was an issue that came up with some of the younger participants. Additionally, many of the interview questions had to be explained and the parents were involved in the interview sessions, with an exception of one participant. For all older participants (8 and older), parents were asked to leave for the interview session.

### 2.1.1 Previous Gaming Experience

We defined ‘previous gaming experience’ as a quantitative measure associated with the types of game they play and calculated it for the 14 types of games based on the interview questions shown in Table 1 as an average of the time they spent playing games over the number of games they stated they played, assuming that they play an equal amount of time for all. There are several limitations with such a function. First, we assumed that participants spent an equal amount of time on their favorite game genres. Second, we also assumed that the reported time is correct, while it is known that participants often underestimate their time of play in surveys [10].

**Table 1. Questions related to gaming experience**

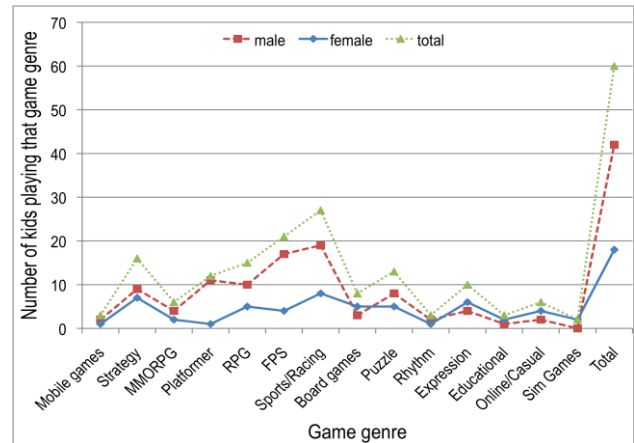
<ul style="list-style-type: none"> <li>• What kind of games do you enjoy mostly?</li> </ul> <ol style="list-style-type: none"> <li>1. First Person Shooter (FPS), e.g., <i>Unreal Tournament</i> (Epic, 1999)</li> <li>2. Role Playing Games, e.g., <i>Oblivion</i> (Bethesda Softworks, 2006)</li> <li>3. Massively Multiplayer Online Role Playing Games (MMORPG), e.g. <i>World of Warcraft</i> (Blizzard, 2004)</li> <li>4. Sports/Racing, e.g., <i>Need for Speed</i> (Electronic Arts, 1994)</li> <li>5. Strategy, e.g., <i>WarCraft</i> (Blizzard, 1994)</li> <li>6. Board games, e.g., <i>Monopoly</i></li> <li>7. Mobile games</li> <li>8. Puzzle, e.g., Tetris</li> <li>9. Platformer, e.g., <i>Super Mario Bros</i> (Nintendo, 1985)</li> <li>10. Simulation Games, e.g., <i>The Sims</i> (Maxis, 1999)</li> <li>11. Expression (i.e. Dress up), e.g., <i>Barbie Fashion Show</i> (Activision, 2008)</li> <li>12. Online/Casual, e.g., <i>Club Penguin</i> (Disney, 2005)</li> <li>13. Music/Rhythm, e.g., <i>Dance Dance Revolution</i> (Konami, 1999)</li> <li>14. Educational, e.g. <i>Carmen Sandiego series</i> (The Learning Company, 1985 on).</li> </ol> <ul style="list-style-type: none"> <li>• Name 5 examples of favorite games</li> <li>• Rate your average frequency of play/week</li> </ul>
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**Figure 2. Average time (hour/week) and number of participants for each game genre by gender distinction**

Figures 2 and 3 display the *Average Time (hour/week)* and the *Number of Participants* who played specific game types. The mean play time was 3.45 hours per week (2.04h for females and 4.07h for males). As the Figure illustrates, for most game types

males spent more time playing than females, with only few exceptions: Simulation games, Music/Rhythm games, and Educational games. The difference in average time was also noticeably large for males over females for four game types: FPS, MMORPG, Strategy and Mobile game. The average times reported by the two genders were almost the same for two game types: Sports/Racing and Online/Casual games.



**Figure 3. The number of participants for each game genre by gender distinction**

We performed individual Mann-Whitney U tests for each game to test if the time differences shown between genders were significant. The results for time differences show no significant difference between groups ( $p > .05$ ), which might be in part related to the small group sizes for each game type.

## 2.2 Measuring Play Styles

As we are interested in measuring what participants did in the game, we defined a set of quantitative metrics to analyze their play styles and where they spent their time. These metrics are shown in Table 2. We designed these metrics to allow us to explore what participants did and what they spent their time doing. These metrics are specifically beneficial for designing customization activities within virtual worlds or games. Furthermore, we also wanted to see how much time and objects are used in these types of activities as well as what types of objects were used. In the next subsections, we report these results.

**Table 2. Metrics for measuring play styles within Little Big Planet Level Customization**

1. total time
2. how many items have been tried for character customization
3. how much time was spent for character customization
4. how much time was spent for gesture, dancing, emotions
5. how many items have been tried for level customization
6. how much time was spent for level customization
7. how much time was spent for playing the created level
8. frustration with controller (easy, in-between, difficult)
9. number of times asking for help from observers
10. was he/she strategic about level

### 2.2.1 Strategic Play

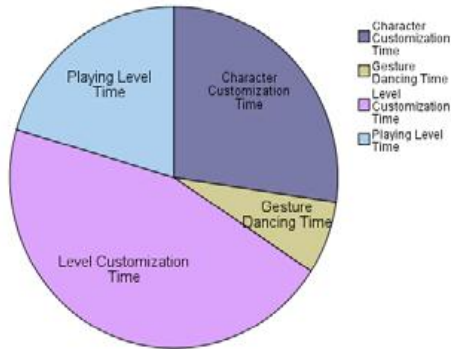
Half of the participants, 30, were considered by the observers as being strategic about the level they created, i.e. they made up stories, obstacles, and had general ideas of the levels they wanted to create. For example, two participants discussed making a level about the story of a duck in a pond. One put some stickers of a

duck while the other drew a pond. In some cases, participants discussed the difficulty of their level and adjusted their objects and design accordingly. Of the 30 strategic participants, 8 were females (out of 18 total females) and 22 were males (out of 42 total males), that is 44% of females and 52% of males.

We also investigated how experience with *Little Big Planet* influences players' strategic play. 10 (1 female, 9 male) out of 60 participants played *Little Big Planet* before. Table 3 shows the percentage and number of participants who have and have not played the game before and whether they were strategic about their level by gender distinction. As one can see, 80% of participants who have played the game before were strategic while 44% of participants who have not played the game before were strategic. Gender did not play a big role here, as can be seen from the table. Considering age influence, we could not find any role of age as we had a very small number of participants (only 10) who had experience with *Little Big Planet*.

**Table 3. Number of players who played strategic**

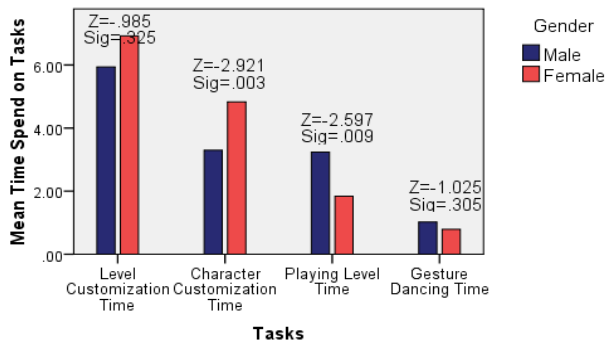
Gender	Have played before	Have not played before
Male	7/9 or 78%	15/33 or 45%
Female	1/1 or 100%	7/17 or 41%
Total N	8/10 or 80%	22/50 or 44%



**Figure 4. Time Spent by activity**

### 2.2.2 Time Spent per activity

We analyzed the time spent for each type of activity within *Little Big Planet*. We defined the activities as: character customization, level customization, gesturing and dancing, and playing the level they built. On average, participants spent 06:24 on level customization, 04:15 on character customization, 03:22 on playing their level, and 01:24 on doing gesture, emotions, dancing, as seen in Figure 4.

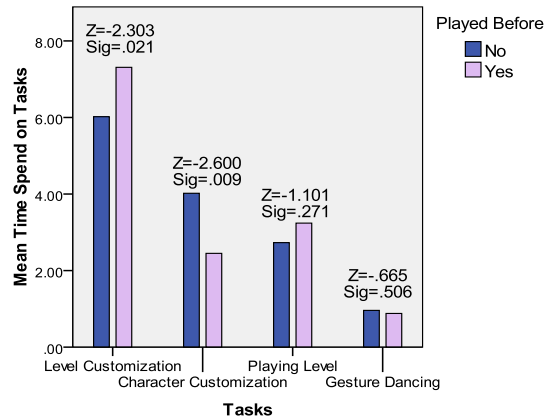


**Figure 5. Time Spent in activities by gender**

We used separate Mann-Whitney U Tests to test for significant gender effects on time spent on these activities; Figure 5 shows the

corresponding Z-Values and Sig. values (two-tailed). The results for level customization and gesture-dancing show no significant difference between groups; while the results for character customization and playing level show significant difference between groups (Sig<.05). Therefore, we conclude that females spent significantly more time on character customization and males spent significantly more time on level playing.

We also investigated the influence of experience playing *Little Big Planet* game before on the time parameters shown in Figure 6. We ran similar variance analysis which shows that the only finding of significance is that players who played before spent less time on character customization and more time on level customization. This is also aligned with our finding that participants who played the game before were more strategic about their level designs.



**Figure 6. Time Spent by activity divided by whether they played before or not**

We ran the Mann-Whitney U Test to test if previous gaming experience had any systematic influence on time spent on level customization, level playing, character customization, and gesturing and dancing. We found there were two significant correlations. First, we found a negative significant correlation between playing level time and experience in MMORPG,  $p < .05$ , i.e. we found that participants who don't play MMORPG players tend to play the level more than participants who considered themselves as MMORPG players. This is a surprising and interesting result. It may be due to the fact that MMORPG games emphasize character customization that most participants who play them would spend a lot more time customizing their characters and levels than playing the levels. The second correlation found was a significant positive correlation between experience in expression games and mean time spent in level customization,  $p < .05$ .

It was surprising that these were the only two significant correlations. It may be that the participants are too young to see an impact of previous gaming experience on their play styles. It may also be that *Little Big Planet* itself presents very new game mechanics, which stimulated exploration time from participants regardless of their gaming experience.

### 2.2.3 Number of Objects used per activity

Figures 7 and 8 show the percentage of participants and the number of items used for level customization and character customization, respectively. On average, participants spent 06:24 minutes on level customization and most of them used 3 different items (see Figure 7). Upon investigation, we found that these items were mostly stickers, 3D objects, and tools for drawing. As

is shown Figure 7, the peak number of items used for level customization differed by gender; in addition, stickers and tools for drawing were used by all females. While male participants did use these items, they tended to use 3D objects more. This finding confirms gender role theory as described in, e.g., [10].

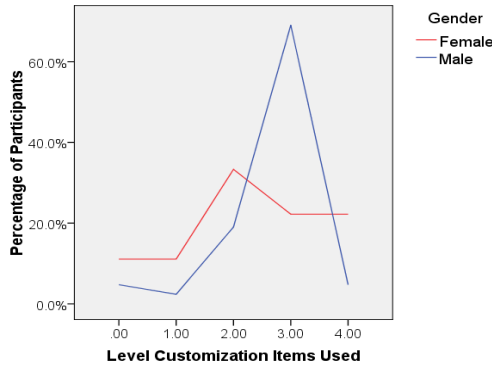


Figure 7. Number of Items spent for level customization by gender

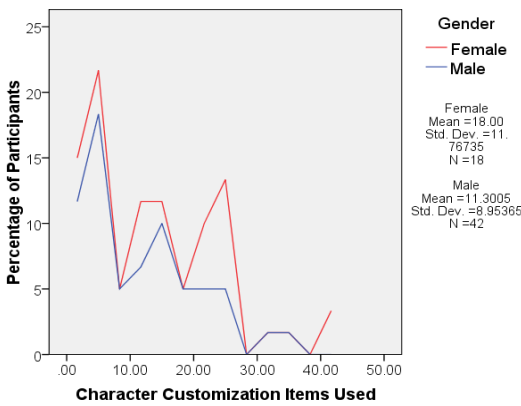


Figure 8. Number of Items used for character customization by gender

For character customization, participants, on average, spent 04:15 minutes and, as shown in Figure 8, used on average 13 items. Interestingly, though, females used on average 18 items, whereas males used only 11.3 items. The items used for character customization varied from skin colors to different hairstyles to different clothes, etc. Usually females tried all the options for clothes, hairstyles, etc., and thus, the number of items they tried is different from the male participants.

We also performed analyses to investigate the influence of previous gaming experience on the number of items used for level and character customization items. Figure 9 compares the average number of items used for level customization by previous gaming experience. Looking at experienced participants, we can see that Online/Casual, Simulation, Expression, and RPG gamers used more items for level customization, and that Educational, Music, Mobile, and Board gamers used fewer items. We performed Mann-Whitney U Test on each of these game types to see if the differences shown between groups were significant. The results for level customization show no significant difference between groups in any game genre; except for Online/Casual gamers, where we found significant results ( $p=0.005$ ), i.e. experienced online gamers use significantly more level customization items than non-online/casual gamers.

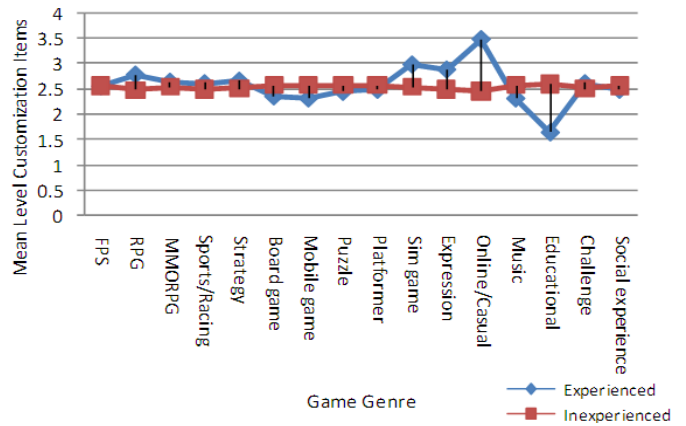


Figure 9. Average number of items used for level customization by previous gaming experience in game genres

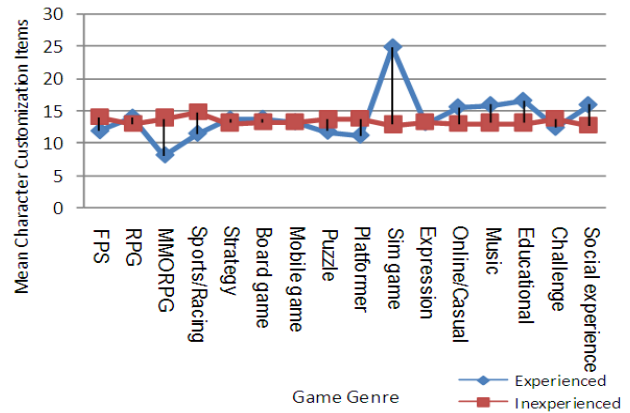


Figure 10. Average number of items used for character customization by previous gaming experience in game genres

Figure 10 compares the average number of items used for character customization by previous gaming experience in game genres. For experienced participants of different game genres we see that Simulation, Online/Casual, Music, and Educational gamers used more items for character customization while MMORPG, Sports/Racing, Puzzle, and Platformer gamers used fewer items. Similar to level customization, we performed Mann-Whitney U Test on each of these game types to see if the differences shown between groups were significant. Our analysis revealed no significant differences between groups for character customization.

### 3 LIMITATIONS AND FUTURE WORK

In *Little Big Planet* play session, we didn't ask participants to play the game as intended by the designers and instructed the participants to play the customization part of the game from the beginning. Thus, the findings here should not be used to evaluate or discuss game play in *Little Big Planet*. Moreover, we estimated several variables. For example, the previous gaming experience was computed based on responses to interview questions, which we know are subjective. These answers are limited and are often biased as kids don't usually know or cannot guess correctly how much time they spent playing a specific game in the past weeks. Also, in some cases, parents were present during the interview, which influenced kids' responses, but also may have provided more precise and realistic answers. In addition, the play time

duration was limited; 15:51 minutes on average may not be enough time to gauge participant feedback.

It is also important to note that we conducted this study with a sample of 60 kids only, which is not representative of the population. Therefore, generalization from these figures may be misleading. However, limitations aside, the methods, processes, and results from this study can help inform future work in several areas; specifically, results can be used to motivate and guide future studies.

## 4 CONCLUSION

In this paper, we reported on one of the first studies to look into the impact of age, gender, and previous gaming experience on customization activities within games. In summary, we found some definite effect of gender, age, and previous gaming experience on players' game activities, which we will highlight here. We found that participants who previously played the game were more strategic about their customization or building activities. We also found that there is a significant gender effect on the type of activities they engaged in and the number of objects used within these activities. Females engaged more in character customization than males, and males engaged more than females in playing the levels they created. Also, females tended to use a lot more objects than males in character customization (18 for females vs. 11.3 for males) while males used more level customization objects, especially more 3D objects than females. As expected, we also found that previous experience with the game significantly influences the activities undertaken; participants who had played the game before tended to engage more in level customization and level playing than participants who didn't play the game before. Surprisingly, we found very little correlations between previous gaming experience and types of activities or objects used. Only three were of significance. We found that people who had experience with MMORPG games played the level less and instead focused on level customization activities as compared to participants who didn't report playing MMORPG games. This may be due to the emphasis on customization activities within MMORPGs. We also found that participants who had experience in expression-based games spent significantly more time in level customization than participants who didn't report playing expression-based games. Additionally, we found that experienced online gamers use significantly more level customization items than non-online/casual gamers.

These results present a clear contribution to game design, especially when designing for gender inclusion. The type of customization activities and objects given to players will need to be crafted taken the results discussed here into consideration. As one of our findings suggests, designers of customization activities within games or virtual worlds will require some character customization items for female players and physical customization items for male players. This study is just one of many to continue. Such studies are essential to understand different markets, their motivations, habits, and the play activities that appeal to them.

## 5 ACKNOWLEDGMENTS

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