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## **“Device Engagement: An Experimental Research with Games on Different Devices”**

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# Devices Device Engagement: An Experimental Research with Games on Different Devices

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## **Abstract**

Research was overlooked to study game engagement between games on desktops and small mobile devices. The accessibility of smart phone had been in the rise in the past decade, but everyone has a preference in gaming. Sometimes a game title is release on multiple devices and the user experience is different due to screen size, quality, availability of buttons, and even the navigation design. Originally, participants volunteered for within group testing with a hidden item adventure on a computer and mobile phone. Due to an epidemic, the within user testing in personal had ended and lead to a between-group observance survey regarding game play and preferences. The observations in the online survey were examined between genders to see if men or women would give different responses to game play. After picking a game that features some female characters, participants were asked on the type of women had seen in video games in the past, which had more variety than expected.

## **General Terms**

Measurements, Performance, Experimentations, Human Computer Interactions.

## **Keywords**

Control Device, Engagement, Immersion, Play Experience, Videogames.

## **Introduction**

The original purpose of the investigation is to discover to what degree does screen size and user experience influence game play or satisfaction. However, there may multiple attributes to engagement gameplay. Research and in-person user testing had taken place with two devices that each contained the same game title, with the Independent variable (IV) being the screen size on each device. Dependent variables (DV) would have been the immersion, game engagement, or the player's reaction to the game. With the large use of smart devices and game systems in the turn of the century, games had evolved into different styles and had become playable on different electronics. A video game designed for a targeted device can later be released on to another device with different buttons and functions. Some games can function with a mouse, joystick, d-pad, a few buttons, stylus, or just fingers touching the screen. A study was being done to see if the game engagement would be different with in regards to screen size and functionality.

There were possibilities to test engagement with a jewel-matching game (i.e. Bejeweled Stars). A hidden object adventure game from the *Dark Parables* franchise was eventually used for testing, being available for both the laptop and mobile phone.

Nintendo Switch had a lot opportunities being that it could be played on a television screen or carried on the go. During the time of the proposal, testing was planned for the more available personal computer and Samsung mobile device.

Due to the constraints of the Coronavirus that had taken place, the in person user testing was changed into an online survey regarding game engagements on different devices in general. The logics of the online survey answers were organized by gender to discover if results would have any notable

differences in relations to playing electronic games, an alternative IV. The new DV would involve the rating of which devices the participants enjoy the most. The previous game experiment would be categorized as “Phase One User Testing” in the research (pilot). The online survey would be “Phase Two User Testing.”

## **Literature Overview**

Choosing a system to play video games could be comparable to choosing between a car and a bicycle, although very different. Some people choose a form of transportation because of availability, accessibility, comfort, convenience, price, environment, family, security, or the type of supplies being carried. Some people ride a bike for exercise. Some drive car when they live far away from towns and cities. Some people take a train to places because it happened to there. For video games, a title might be played on a select system because of the screen size, selection of games, integrity of the company, design of the controls, the price, the storage space, or it was compatible on a device already used for other tasks. The purpose of the game play and type of immersion may influence the selection of devices and screen size.

### *Engagement and immersive involving sizing*

Although not a gaming industry, Netflix offers a selection of movies and television programs to be views to be on television screen or a small mobile device. Amazon Instant videos and YouTube videos can also be viewed on screens and devices of different sizes. There is some freedom and convenience, but could be different experiences across devices (Rigby, Brumby, Cox, & Gould, 2016). There was a study featured in *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services Adjunct* where 19 participants watched entertainment from Netflix on three different sized screens. The results from that study did not imply ample differences between the three sizes, but the immersion might have been reduced in the small mobile screen (Rigby, Brumby, Cox, & Gould, 2016). The display of the screen of the right size could have created an immersion that allows the viewer to feel like he or she is the same world as the characters on the screen (Rigby, Brumby, Cox, & Gould, 2016).

In the article, *Effects of screen size, viewing angle, and players’ immersion tendencies on game experience*, one study in the University of Southern California there was a concern whether realism, viewing angles, and immersion could influence a user’s emotion (Hou, Nam, Peng & Lee, 2012). The illusion and immersion of a game could influence the user’s sense of memory, arousal, and enjoyment of the game (Hou, Nam, Peng & Lee, 2012). The study had a concern with this immersion with violent games where a user could go into a psychological state that he or she is the exploring and shooting much like the avatar in his or her control, and identifying with the characters’ emotions, including aggressive ones (Hou, Nam, Peng & Lee, 2012). Their research however involved screens that were 81 inches (205.74 cm) and 12.7 inches (32.26 cm) with participants sitting nearby. The study suggested that the participants had a greater experience of self-presence and involvement with the larger screen (Hou, Nam, Peng & Lee, 2012). In other research, there was a concern of epilepsy, wrist pain, and video game addiction along with aggressiveness (Griffiths, 2005). However, playing games regardless of screen size give children with learning disabilities something to do while a child Erb’s palsy was able improve on hand movement (Griffiths, 2005). Another child, a boy with cerebral palsy, was able play video games he uses a specially adapted controller with two or three head switches positioned on his wheelchair headrest (Bierre, Chetwynd, Ellis, Hinn, Ludi, & Westin, 2005, July).

In the article, *Effects of Stereoscopic Presentation, Image Motion, and Screen Size on Subjective and Objective Corroborative Measures of Presence*, researcher from the United Kingdom and the Netherlands did a study with images in motion projected on a rather larger screen. This experiment though was a study of the participants feel the presence that they were in another environment, in relation to interest in Virtual Reality (VR) at the turn of the millennium and the sensation of “being there” (IJsselsteijn, Ridder, Freeman, Avons, & Bouwhuis, 2001). Since their study involved racecars in motion, sickness and postures were concern. The video projectors had differently polarized filters placed in front of each, so that left and right eye imagery could be separated by the users wearing polarized spectacles (IJsselsteijn, Ridder, Freeman, Avons, & Bouwhuis, 2001). Along with visual presence, background sound and noise influenced the immersion.

Sometimes there is another self-presence when playing a video game. In other studies, the sense of being there involve spatial immersion and emotional. *Spatial immersion* refers to the type of immersion triggered and maintained by the spatial qualities of the virtual environment, while *Emotional Immersion* refers to user feeling emotionally aroused and absorbed by the narrative content of the story (Zhang, Perkis & Arndt, 2017). *Spatial* could have a focus inside the environment while *emotional* involves a closer look at the characters. Perhaps the type of focus the game has could influence the immersion with a large screen or a mobile screen. Such attention to architecture and decoration could create a façade and make the player feel that they are in another land (Recuber, 2007). But exposures to characters faces and emotions would be important if storytelling was a part of the immersion.

In the 2012 paper, *Effect of Touch-Screen Size on Game Immersion*, there study with two portable Apple devices. A study was done with participants playing games on the iPad and iPod Touch; immersion was said to be higher for the slightly bigger iPad (Thompson, Nordin, & Cairns, 2012). The team did feel that more research could be done in the subject and the different pixel densities of each device could have influenced the scores (Thompson, Nordin, & Cairns, 2012).

### *Portable engagement*

There are select video games that were designed to be played on the go. Some mobile games require updates or have temporary events with rare prizes. Games like the mobile version of *Plants vs. Zombies™ 2* allows competition between other players and provides special plants for purchase during limited time periods, including holidays. Versions of the original *Plants vs. Zombies™* available for devices including the personal computer does provide online competition or have updated levels. The original format of the game continues to work without updates and the player individually completes each stage to accomplish goals.

Some video games have one-hundred percent completion and do require competitive interaction with other players over the Internet, such hidden object games, visual novels, cooking games, time management games, select Role-Playing Games (RPG), or game titles of a certain type of narrative. Virtual worlds such as *Second Life* and *Facebook Spaces* were designed with online interaction in mind. Facebook Spaces requires a Virtual Reality (VR) headset to interact with friends over the Internet and game features.

Some video games use Augmented Reality (AR) infused with the gameplay. *Pokémon GO* uses AR as a part of the gameplay as the players find and captures creatures in the franchise. Users with the mobile game have the unique feature of capturing different types of Pokémon depending on elements, the setting, and surroundings based off satellite mapping (Yip, Windleharth, & Lee, 2017). Different types

can be located in areas with water or special location that requires players to step outside and explore. Sometimes with the help of social media and interaction with people online, players can exchange different Pokémon exclusion in certain continents or locate “nesting” areas (Yip, Windleharth, & Lee, 2017). *Pokémon GO* could require some physical activity and mobility, but usually not at par with *Fitness Boxing* on the Switch or *Dance Dance Revolution* usually played with a larger screen and rhythmic patterns. Other games in the *Pokémon* franchise do not require as much physical activity or online interaction. Select games for Nintendo Gameboy, Nintendo DS, or Nintendo Switch did not require the player themselves to move in different location; the protagonist in the game usually wanders in the micro-world of the game. The player can just sit down in once place to play. But too much game play with sitting could be an influence with obesity.

Mobile games can start out as “free” or cost little money. Game cartridges and compact discs for game consoles can cost a lot more money during the immediate purchase (i.e. \$ 34.99, \$ 59.99). But depending on the motives of the user, the fees for additional content could add up over time with mobile games and could cost as much a console game in the long run. Over time, the continuing functionality of mobile games varies depending on the updates and current model of the mobile phone. Some older games may not continue to function as well as newer games on current mobile devices.

#### *Touch screen discussions and research*

Using a touch screen is a different experience in comparison to using a device with buttons or a computer. Touch screen devices can pose challenges and opportunities for user and researchers (Guerreiro, Nicolau, Jorge, & Gonçalves, 2010). There are some researchers that felt that interfaces designed for mouse and keyboard interaction cannot be easily augmented with multi-touch capability without redesigning the interface accordingly (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). The touch screen technology and mobile phones could enable concurrent co-locate collaborations, although a larger surface could increase this (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). There could be one using a touch screen device or multiple users on a device at the same time (Caprani, O’Connor, & Gurrin, 2012). The touch screen interfaces could give some users a feeling of control with their actions (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). There are still some obstacles and challenges with these types of user experiences. The selections in touch screen applications can be difficult with the touch points are smaller than one’s fingers (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). Each person, although sometimes similar, has fingers and hands of different sizes. The average width of an index finger and the thumb could be 18.2 millimeters and 22.9 millimeters for some adult men and an average of 15.5 millimeters and 19.1 millimeters for some women (Guerreiro, Nicolau, Jorge, & Gonçalves, 2010). Accuracy with very small targets could be easier with a mouse, unless one has a stylus (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). Other major challenges with touch screens, depending on the design of the technology, could involve difficulties zooming in, or rotating (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). Hand held positions and preferences with hand gestures could influence the user experience with touch screens (Bachl, Tomitsch, Wimmer, & Grechenig, 2010). Clothing and jewelry on the hands could interfere with performance, including gloves.

#### *Different controls to play*

For point-and-click games, the experience has both similarities and differences between playing the game on a computer with a mouse or a mobile device. Game consoles have a variety of control devices and accessories, each providing a difference experience for the user. There are possibilities the interface mapping physical control inputs could influence the game experience. According to researchers in

Australia, directional natural mapping usually takes place when there is a 'correspondence' with direction between a physical control and virtual result (McEwan, Johnson, Wyeth, & Blackler, 2012). This 'correspondence' can be pushing a D-pad or joystick to make a character move forward. Naturally mapped control interfaces (NMCI) can take advantage of a user's understanding of objects and actions used to control them from the real world (McEwan, Johnson, Wyeth, & Blackler, 2012). In an Australian study with a racing game testing experiences with three different devices, such as a standard game Xbox controller, a U-shaped accelerometer based Speed Wheel, and a racing wheel (McEwan, Johnson, Wyeth, & Blackler, 2012). In the study and regards to competence, the participants performed slightly better with the controller than the Speed Wheel, based on survey results (McEwan, Johnson, Wyeth, & Blackler, 2012). However, the immersion had better ratings Speed Wheel and Racing Wheel (McEwan, Johnson, Wyeth, & Blackler, 2012).

In the first phase of the experiment featuring the game on the computer and mobile phone, the actions involving pointing to imitate selection of items and using them together. The hidden object game is not the same as racing, but the experience may still be different between two devices and different settings.

#### *Conversion between systems and devices*

Some activities are suitable for different screen sizes and devices. Some people could watch a long movie on a large screen, while other people watch a random selection of short videos on a computer or mobile device. There are video games that are available for one device but not another. They are restriction due to licensing and company exclusions to convince consumers to purchase a certain game system. Older games had trouble converting to smaller format for portable device in the 20<sup>th</sup> century. Even though technology is pixel quality has improved, some games are on select devices. 1983 game *Dragon's Lair* was like an interactive animated movie in arcades, but the adaption for Nintendo Entertainment System (NES) was more like a side-scroll platform game with the available technology. There some game that only available on portal devices, excluding mobile phones. Nintendo DS games requiring the use of a slim stylus seemed to have taken a long time to be converted usable format for a mobile (i.e. games in the *Professor Layton* franchise). Some hand held game consoles have a different layout of accessories from other devices, such as buttons, microphone(s), and cameras that are used in different games. Some games with visual attention to detail, whether it is a hidden object game or a fighting game. An action for some players might be a challenge if the game control is also the tiny screen. There may still be desires for additional games to be available in a mobile or home console. The immersive satisfaction could depend on the personal preference of the user as well as his or her location. The experiment is also to study if the user experience is different between devices for any reason.

#### *Some reasoning behind the game selection for this experiment and gender*

The game chosen for the research was from the *Dark Parables* franchise due to how different it appears from popular mainstream games. The selected game is different from console games titles especially targeted for boys. The games for this franchised were usually designed for personal computers and touch screen devices. The *Dark Parables* franchise, although inspired by popular fairy tales, often feature female characters that may appear stronger than their original counter-part or infused with another fable character (i.e. Snow White and the Snow Queen appearing as the same character). There had been concerns on gender and women getting too sexualized in video games in the past (Fox, Bailenson, & Tricase, 2013).

The early marketing of video games was rather unisex and sold originally in the electronics department (truTV, 2015). There were some assumptions that video games were marketed to boys in the mid 1980's when the game consoles were moved to toy department, which was already deeply segregated by gender (truTV, 2015). Although there were still female characters that were not damsels and a select number in female programmers, there were still a lot of male dominated games that were considered more popular than other video games (Lien, 2013). A game like *Metroid* had a female protagonist but some users were not familiar with her gender unless they played the game or did research on the character. The iterated hand held versions of the Nintendo games were identified as Game Boys until 2004, when it replaced by the Nintendo DS (Minotti, 2014). When marketed as the DS, a new collection of merchandised was released such as grown up titles that included recipes, classic literature, and programs to help users quit smoking; this was before the release of iPhones.

There had also been accusations of video games making children violent, although some experts criticize that there enough evidence to link video games to real life violence (truTV, 2019). Despite there being a variety games in the market such as *Animal Crossing* and *Farmville*, people would put the focus on games like *Doom*, *Mortal Kombat*, and *Call of Duty*, especially when something bad occurs (Lien, 2013). The game chosen for this experiment would not necessarily prove that not all games are violent and masculine, but could expose users to something that not everyone plays at home.

Also some gaming titles, regardless of the gender of the targeted audience or the level of violence, can have a story almost as engaging as the game play itself. Select games motivate the player with storytelling while games reward players with different forms of achievements. The volunteers in the first experiment were given brief questions about characters featured in the game and the role of the protagonist, even though the main purpose would still be focus on immersion, user experience, and engagement. The participants in the second phase of the research were requested to state what they have seen and what they do in regards to video games.

## **Phase One – In Person User Testing Pilot With-in Groups**

### **METHOD**

#### **Participants**

Gaming sessions held between February 20, 2020 and March 13, 2020. About 4 participants were able to schedule an appointment to partake in the study. A fifth participant was excused due conflicts outside the experiment. The volunteers that were able to participate were between the ages 18 and 35. They were each in Graduate school. *Calendly* was used to recruit participants. Only one volunteer was male and the rest were women. Some did not have much as gameplay experience as others but they were willing to help with the study. These participants were enrolled in SUNY Oswego. It was required that the volunteers be at least 18 years of age. It was advised that the participants to not be entirely or legally blind to play in the experiment. At least two wear glasses. Three users played video games 5 hours or less each week. One user claims to play video games between 6 and 10 hours a week.

#### **Design**

The experiment was *within-subjects* in two groups. Participants had played the game on *both* the personal computer and the mobile device. Independent variable (IV) would be the screen size on each device. Dependent variables (DV) would be the immersion, game engagement, or the player's reaction to the game through a *Qualtrics* survey.

One hypothesis would be that many participants would give stronger satisfactory towards the version on the personal computer than the mobile version.

There was another hypothesis that players would be willing to play Dark Parables on mobile device if the user had to spend less than \$7.00 to play as opposed to a computer version that cost more than \$7.00.

### **Materials and Programs**

Participants randomly were asked to play the videogame on either a personal computer or mobile device. Each device had the same extant game distributed on by the same companies. *Dark Parables: Goldilocks and the Fallen Star* was developed by Eipix Entertainment and published by Big Fish Games. Blue Tea Games had developed previous titles (and select games) in the franchise, and was popular for “casual games with beautiful artwork and rich stories.” The video game had a twist with classic fairy tales, with each title featuring a different conflict and different characters. The lead character, the Fairy Tale Detective, had an ambiguous gender during the start of the franchise but newer games give stronger implication that “she” could be a woman. Not all of the users saw the opening credits presenting the main conflict and theme of the plot.

Participants would rate their experience and satisfaction with the gameplay in survey questions created with *Qualtrics*. Headphones and a computer mouse were also present. The headset was not usable with the mobile device. Paper consent forms would present for participants to sign prior to the gameplay.

### **Procedure**

After scheduling a time to meet with *Calendly*, the subject would meet the conductor of the experiment in a reserved location in the campus science building. Each subject was given a consent form and the conductor went over activities and a little bit about the research. If the subject signs the consent form and decides to stay, the subject will be shown a place to sit down next to the computer next to the mobile device. The user would play the game on one device and then the other.

After being presented the first device (either the laptop or mobile phone at random), the user would be asked to play a hidden item challenge in the extra features of the game title. After completing the first challenge, the conductor exits from the challenge for the participant and upload the main game. The conductor asked the user to perform certain tasks including moving to another place, selecting an item, and use the map. After completing the first game session, the conductor would switch devices for the user to perform the same tasks for the second device (either the laptop or mobile phone). The conductor in charge of the experiment would also observe and write down comments from user.

After the two sessions of gameplay, the user will be exited out of the game and shown the *Qualtrics* survey on the computer. The first part of the survey would be personal questions about each participant. The last half of the survey will be the subject rating the gameplay and user satisfaction.

Although it was originally not the main objective, there were questions about the gender of the lead character and types of women the participants have seen in video games in the past. After collecting the result, the conductor of the experiment looked over the ratings.

### **Measurements**

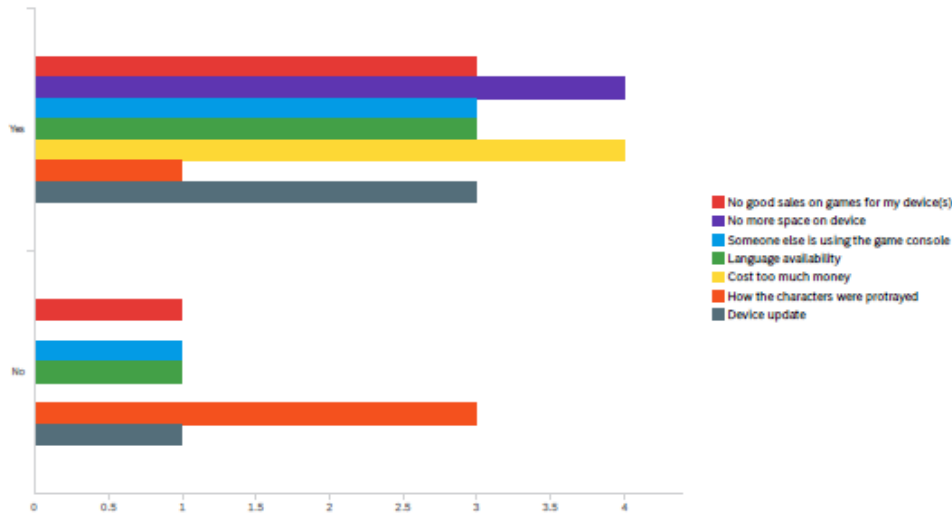
Before rating the gameplay, the users answered questions regarding to video games. Each participant was asked “*What could influence you to play or not play a video game on a certain device? Check all that apply.*” No one in the Phase One survey felt that size of the screen was a factor. 8.33% felt that “size of screen” was an influence. “Social activity” influenced 16.67%, while 25% felt that “availability” affected the influence. 25% also felt the price was an influence. 16.67% would be influence by a “certain title.” Only 8.33% had a concern for “publicity.”



The four participants in the Phase One survey were asked “What can STOP YOU from playing a video game.” All four of the users agreed that the “cost” would stop them from playing. Having space on a device would stop each the four participants from playing a game. Three out of four participants would not play game due a device update, language availability, lack of good sales, or someone else using the game console. Only one out of four users in this survey would be willing to stop playing a game based on “how the characters were portrayed.”

Present below is the result for the question.

What can STOP YOU from playing a video game(among various other reasons)



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	No good sales on games for my device(s)	1.00	2.00	1.25	0.43	0.19	4
2	No more space on device	1.00	1.00	1.00	0.00	0.00	4
3	Someone else is using the game console	1.00	2.00	1.25	0.43	0.19	4
4	Language availability	1.00	2.00	1.25	0.43	0.19	4
5	Cost too much money	1.00	1.00	1.00	0.00	0.00	4
6	How the characters were portrayed	1.00	2.00	1.75	0.43	0.19	4
7	Device update	1.00	2.00	1.25	0.43	0.19	4

The next questions were based on the game play. Two users played the mobile device first and two played the computer game first. The users rated the scenery of the game on each device. For the mobile device most users felt the scenery was “OK” or appealing. For the personal computer, one found it “OK” and the rest found appealing.

Scenery rating for the mobile device

Answer	Percentage	Count
Not Very Appealing	0.00%	0
Not Appealing	0.00%	0
OK	50.00%	2
Appealing	25.00%	1
Very Appealing	25.00%	1

Scenery rating for the personal computer

Answer	Percentage	Count
Not Very Appealing	0.00%	0
Not Appealing	0.00%	0
OK	25.00%	1
Appealing	75.00%	3
Very Appealing	0.00%	0

Next in the participants were asked to they felt about “using” the following in the navigation bars and tasks. It should be noted that layout of function on the mobile device is slightly different from the game released on the personal computer. For *Dark Parables* on the personal computer, the hint button is on the left side of the screen and a map function is on the right side of the screen above the button for the “Main Menu.” Meanwhile, the same game on the mobile device has the hint button on the right side of the screen instead. A compass and “Main Menu” button is on the left side of screen on the mobile device. The mobile version of the game also had a “foot print” icon to help with moving from screen to screen and the “Inventory” is not labeled. The change in the layout between devices created some confusion with the users when playing game on the second device.



Screen shot of *Dark Parables* released for the personal computer (Windows).



Screen shot of *Dark Parables* released for the mobile phone (Samsung).

User experience matrix for mobile device

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Pointing at items in the scenery	2	5	4.25	1.3	1.69	4
Selecting items in inventory	2	5	4.25	1.3	1.69	4
Selecting Maps, Hint buttons	2	5	3.75	1.09	1.19	4
Moving from place to place	2	5	4.00	1.22	1.5	4

User experience matrix for personal computer

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Pointing at items in the scenery	4	5	4.75	0.43	0.19	4
Selecting items in inventory	4	5	4.75	0.43	0.19	4
Selecting Maps, Hint buttons	4	5	4.75	0.43	0.19	4
Moving from place to place	4	5	4.75	0.87	0.75	4

Game rating matrix for the mobile device

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Puzzles	4	4	4.0	0.00	0.00	2
Hidden Object Game	4	5	4.0	0.71	0.5	4
Using items in inventory	4	5	3.75	0.83	0.69	4
Using hint button	4	5	4.0	0.71	0.5	4

Game rating matrix for the personal computer

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Puzzles	2	5	3.67	1.25	1.56	3
Hidden Object Game	4	4	4.0	0.00	0.00	4
Using items in inventory	4	5	4.5	0.5	0.25	4
Using hint button	4	5	4.5	0.5	0.25	4

Matrix rating of quality in terms of visibility on Mobile device

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Opening Scene	3	5	4.00	1.00	1.0	2
Scenery	3	5	4.00	0.71	0.5	4
Reading or Hearing the Dialogue	3	5	4.00	0.71	0.5	4
Puzzle(s)	3	5	4	1	1	2
Hidden Object Game	3	5	4.00	0.71	0.5	4
Items in Inventory	3	5	4.25	0.83	0.69	4
Hint Button(s)	4	5	4.25	0.43	0.19	4
Map(s)	3	5	3.67	0.94	0.89	3

Matrix rating of quality in terms of visibility on personal computer

	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
Opening Scene	3	5	3.5	0.87	0.75	4
Scenery	3	5	4.25	0.83	0.69	4
Reading or Hearing the Dialogue	3	5	4	1.00	1.00	4
Puzzle(s)	4	5	4.33	0.47	0.22	3
Hidden Object Game	4	5	4.5	0.5	0.25	4
Items in Inventory	4	5	4.5	0.5	0.25	4
Hint Button(s)	4	5	4.5	0.5	0.25	4
Map(s)	3	5	4.5	0.87	0.75	4

Next, the participants were asked possibilities of playing the game or something similar outside of the experiment. When asked they would like to play the game again, about 50% would probably not play this “Dark Parables” game, while the other 50% felt that they might play it again. When asked, “Do you think that you might try to play a similar game on MOBILE device?” about 75% felt that they might play a similar game on a mobile device. However when asked, “Do you think that you might try to play a similar game on a COMPUTER or something with a LARGER screen?” it was split 50/50 with probably not and probably yes.

Statistics for users: “In general, do you think that you might try to play this game again?”

Minimum	Maximum	Mean	Standard Deviation	Variance	Count
2	3	2.5	0.5	0.25	

Statistics for users: “Do you think that you might try to play a similar game on MOBILE device?”

Minimum	Maximum	Mean	Standard Deviation	Variance	Count
2	3	2.75	0.43	0.19	4

Statistics for users: “Do you think that you might try to play a similar game on a COMPUTER or something with a LARGER screen?”

Minimum	Maximum	Mean	Standard Deviation	Variance	Count
2	3	2.5	0.5	0.25	4

The users were asked two questions about purchasing in the future. Although some users gave some fair ratings, they did not seem too eager to purchase for game for more than \$10.00 or even less than \$7.00 for the mobile phone. Perhaps there were other factors or a different title of a similar genre would suit their taste more. Unfortunately they users were not asked if they willing to play the game again for less than \$10.00 on a computer or download “free” on a mobile phone. Presented below are the graphs for the two questions.

Presently... do you think that you would purchase this game for a desktop computer for more than \$10.00?



Graph from Qualtrics

Q29 - Presently... do you think that you would purchase or download this game for a mobile phone if was much less than \$7.00?

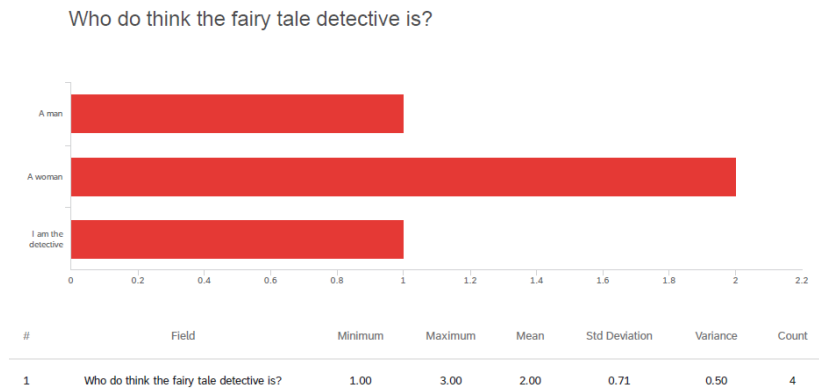


Graph from Qualtrics

The next question involved the character played by the user followed by a question regarding female characters. Originally, the experiment had the potential of being “between groups” with each user playing the game from the beginning with two opening credits, including one with the detective with gloves holding a cassette player. None of the participants saw the video with the cassette player

describing the situation of the game and at one user did not see the opening credits with the story's antagonist. However, the question on the detective's gender was left in this experiment. Two of the participants felt that the detective was a woman while one participant thought that the detective was a man. One participant selected the answer to say "I am the detective."

Close towards the end of the survey for Phase One, the four participants were asked to select from a long list of the 20 types of female characters that they have seen in video games in the past. The list contains the following character types: princess, any fighter, scientist, doctor/healer, lawyer, detective, business owner, prostitute, dancer, farmer, musician, mother, daughter, teacher/instructor, robot, athlete/fitness trainer, chef/waitress, fashionista/clothing designer, goddess, and "other." All four participants have seen princesses and fighters in video games. At least three participants have seen video games with mothers, daughters, and goddess. The participants left no other comments.



Qualtrics results from Phase One user testing

### Phase One Discussion

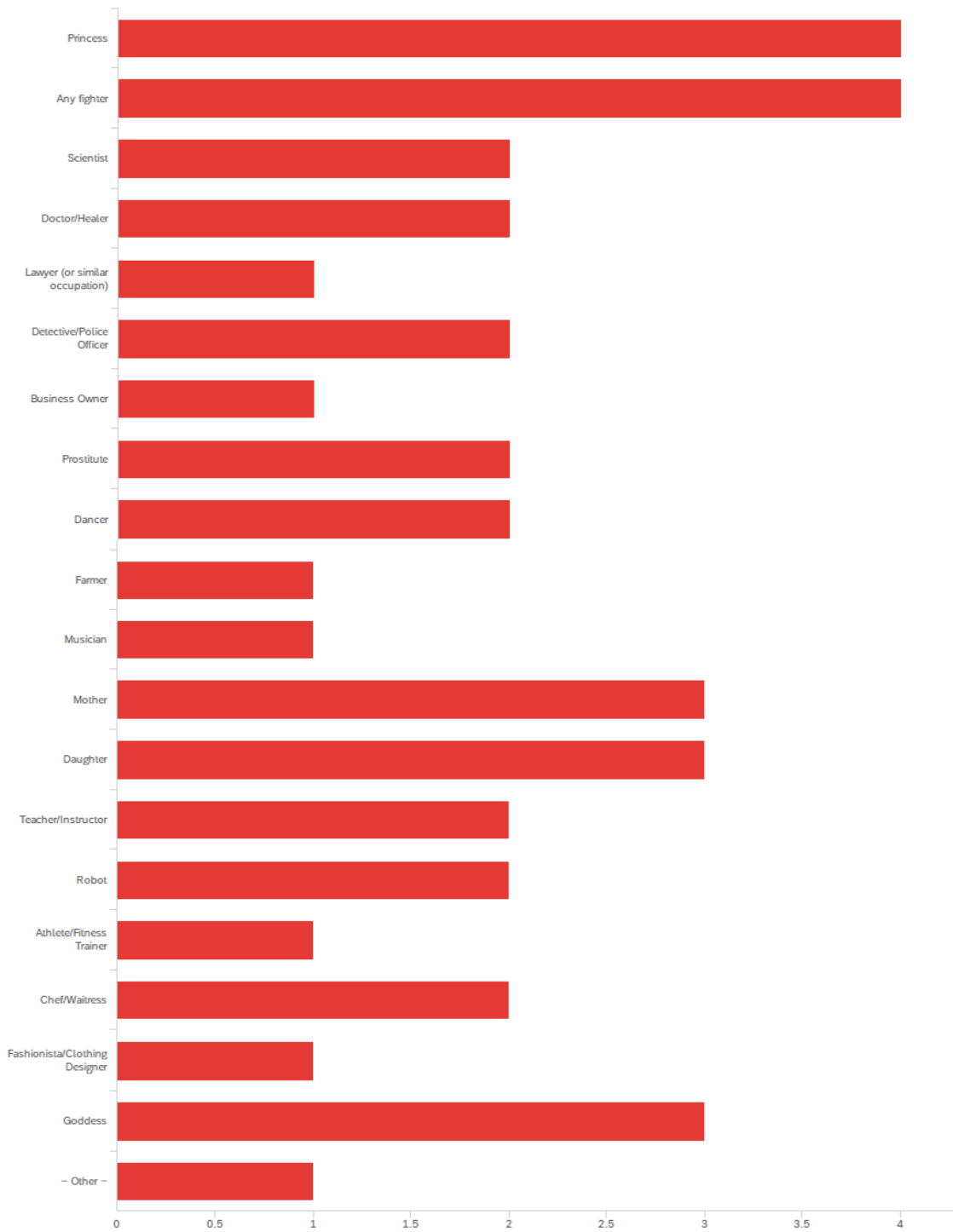
There was not enough evidence with in person user testing to support any hypothesis in Phase One. One user was sad that the experiment had to end so soon; she was having fun and did some exploring outside the tasks given. However, *none* of the participants shown much interest in the "purchasing" the game themselves for mobile phone for less than \$7.00. None of the user wanted to pay more than \$10.00 for a copy of the game of a personal computer, offering no support to the alternative hypothesis regarding price and purchases.

At least two volunteers may have spoken English as a second language. The hidden items were displayed as images and not a list of words, as the user had to search the item hiding in the scenery. Hidden items were selected by touch on the screen or the click of the mouse.

The conductor of the experiment was under the impression that the male participant may have given different answers from the females, at least with checking the list of different women seen video games. Then again, some the participants volunteers arrived out of gratitude whether they were expert gamers or not. The experiment was open to almost anyone who was a free and legal adult with severe disabilities. Some people are more engaged with gaming than others. Sometimes people do not always know how many hours that men and women each play video games. The results for the characters and gender would be of interest for the next phase.

Due to the limited number of volunteers and a virus outbreak, the in person user testing had to end. A different survey regarding the research was later uploaded without the need for volunteers to come in person.

Displayed below is *Qualtrics* Statistics of the types of “female characters” seen by the participants in Phase One survey, who had done the user testing in person (The participant doing the online survey in Phase Two would give their own results).



*Qualtrics* results of female character - Phase One



## Phase Two User Testing – Online Game Engagement Survey

### METHOD

#### Participants

Between March 2020 and May 2020, an online *Qualtrics* Survey was uploaded. The participants were recruited through digital messages and emails. Many of the participants were enrolled in SUNY Oswego and others were adults from outside the campus. Although many were American, there were volunteers from other countries including India, Brazil, Saudi Arabia, South Korea, and Ukraine.

About 20 to 21 participants answered the questions on the survey. One participant appeared to have answered only two questions.

Nine participants identified themselves as male and about twelve participants identified themselves as female. About five participants were between the ages of 18 and 22. About five participants were between the ages of 23 and 26. Seven participants were between the ages of 27 and 35, while one was between the ages 36 and 45. Two participants were older than 45 years of age. Almost 50% of the participants (10 people) had Graduate school as their highest form of education. About 30 % (6 participants) stated that their highest form of education was college.

#### Design

The experiment was *between* two gender groups (with the possibility for a third gender). Independent variable (IV) would involve the sorting of question according gender. Dependent variables (DV) would involve the responses to the question through a *Qualtrics* survey.

One hypothesis was that women may prefer portable devices more than the men.

Another hypothesis would be that women are more often discouraged from playing a video game because of appliances and game systems being used by someone else.

There was an impression (or hypothesis) that “princesses” in video game would be seen the most by men and women.

#### Programs and Procedures

Participants would state levels experience and use gameplay in second survey created with *Qualtrics*. The logic of *Qualtrics* was set so the result could be displayed according to gender. Either by birth or transition, each user was required to select male, female or “other” as a gender identity. “Other” was left as an option, although no one selected “other” in this specific survey and logic questions that were connected to “other” had zero results in this specific survey. Selecting gender was one of the mandatory answers for this survey. The participants (as required through *Qualtrics*) must digitally sign for consent before submitting the survey. Many of the question involved video games, hours played, favorite devices, and what could influence them to play. Like in Phase One, the participants were asked about women featured in videos in this second survey. Participants would be asked if they had recalled playing a video game on two or more devices. Both the men and the women answer the same number of questions. The conductor of the survey marked select survey questions with “m” (male), “f” (female), and “o” (other).

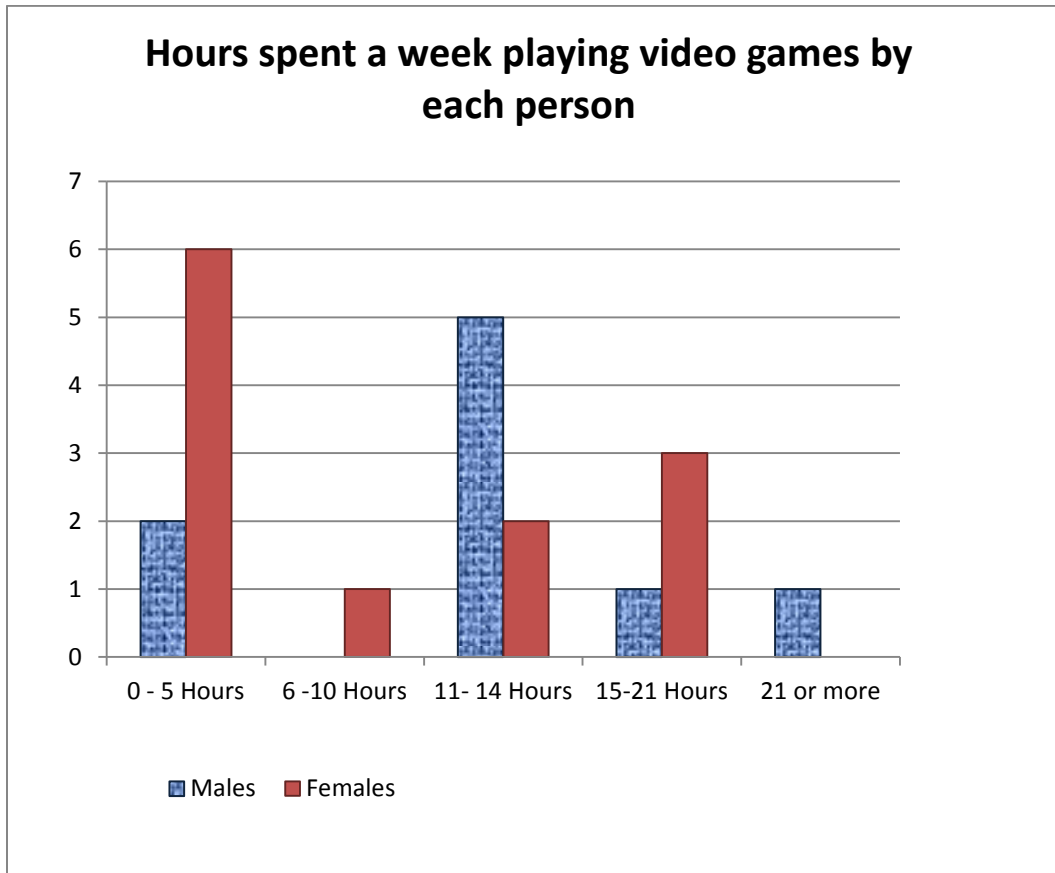
#### Measurements

The first video game relation question was about the number of hours the participant plays a week.

Two males play video games for 0- 5 hours. Five males play video games between 11 and 14 hours a week.

Two males played video games at least 15 hours a week; one claimed to playing 21 hours a week.

For the women, about six spend between 0-5 hours playing video games a week. One female claimed to playing video between 6-10 hours a week. Two females felt that spend 11-14 hours a week playing video games. And about three females stated that play video games 15-21 hours a week. None of the women claimed to play video games more than 21 hours each week.



Graph sorted by hours of game play and numbers of males and females

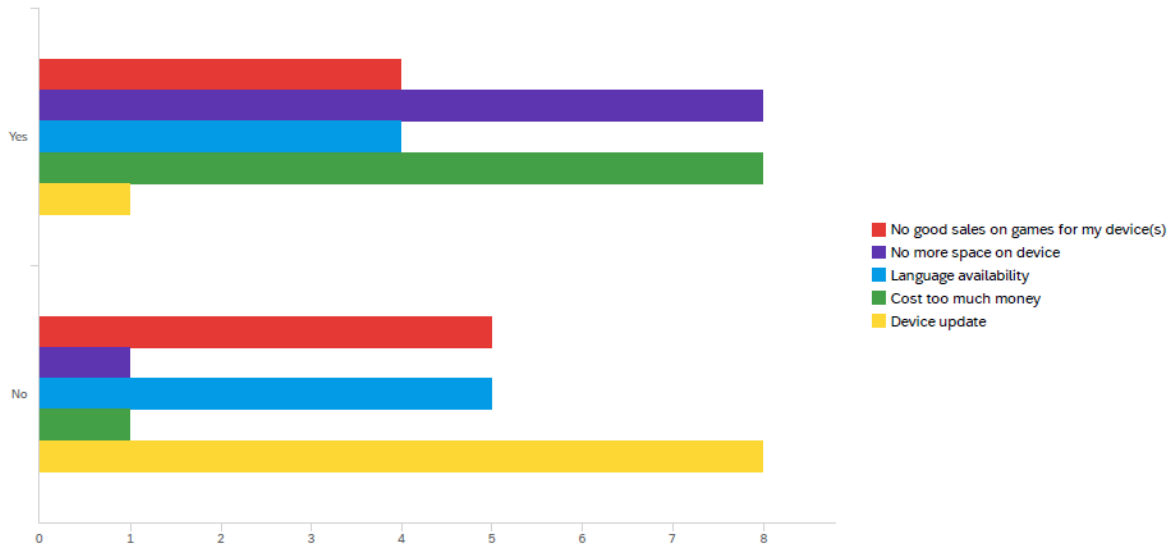
The question for each of the genders was “What could influence you to play or not play a video game on a certain device? Check all that apply.” Factors displayed included size of screen, portability, social activity, availability, price, certain title, and publicity.

About nine of the men selected size of screen. Six men selected portability. Three males selected social activity as a factor. Four males selected availability. Four males also selected price. Three males select would play or not play because of a certain title. Only two men had publicity as a factor.

For the women, eight were concerned about the size screen and only two were concerned about portability. Four females found social activity as a factor. Five women were influenced by availability. About seven female would play or not play due to price. Four women would be influenced by a certain title. And just two females were influenced by publicity.

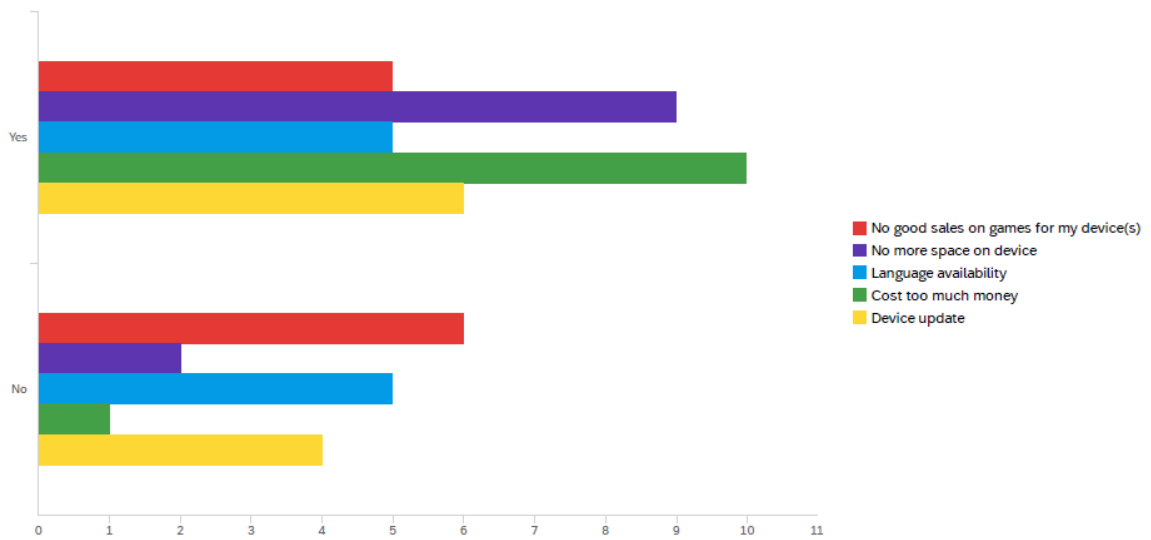
Qualtrics results from the males

Q11m - What can STOP YOU from playing a video game(among various other reasons)

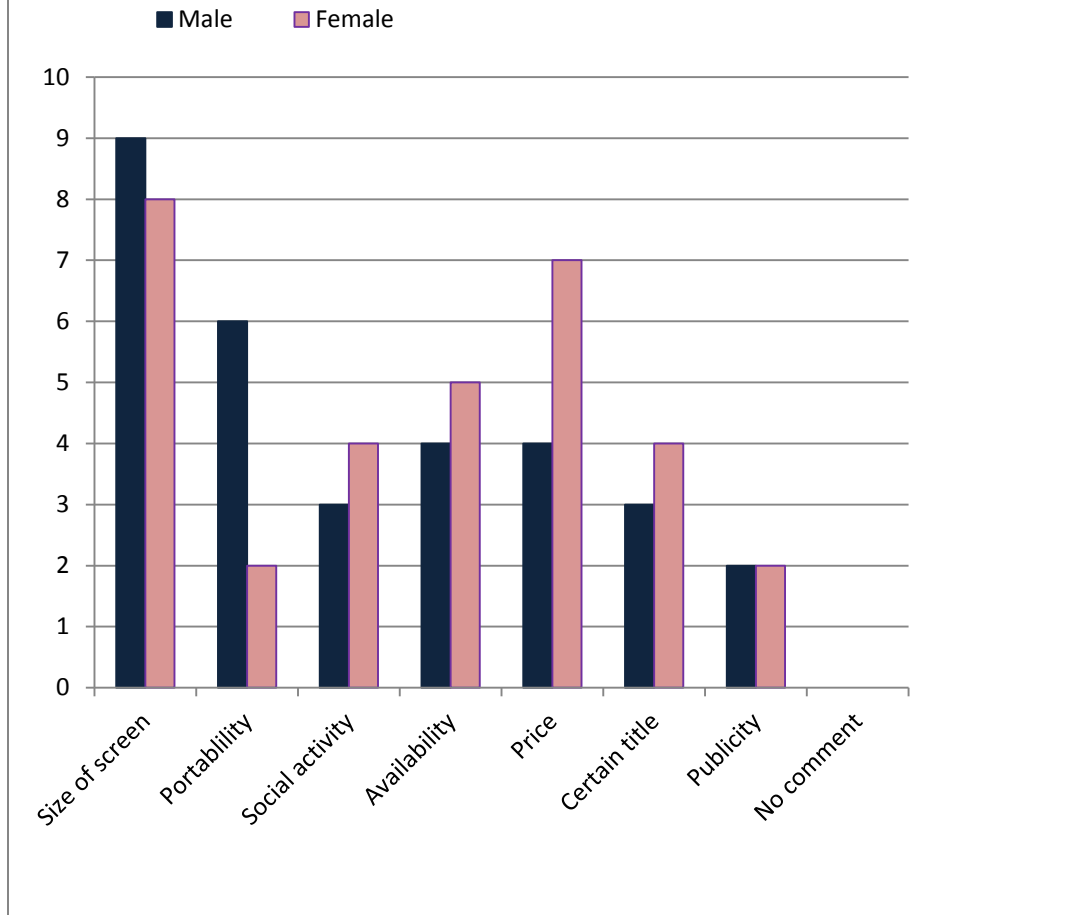


Qualtrics results from the females

Q11f - What can STOP YOU from playing a video game(among various other reasons)



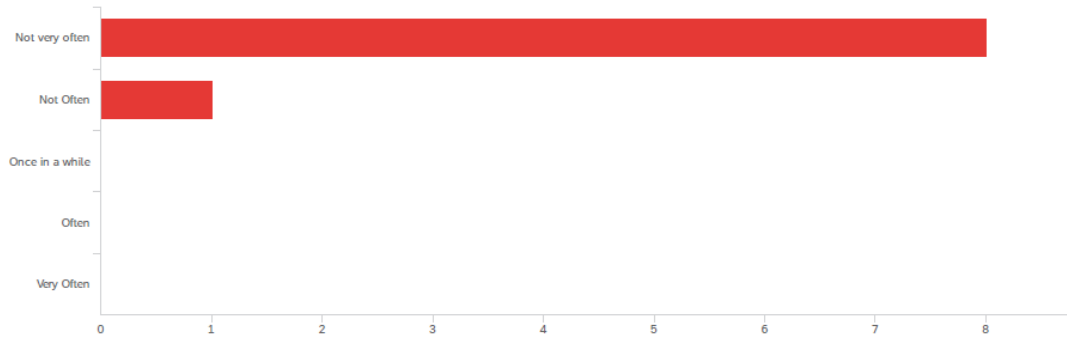
## What could influence you to play or not play a video game on a certain device? (Check all that apply)



Graph with game influences from males and females

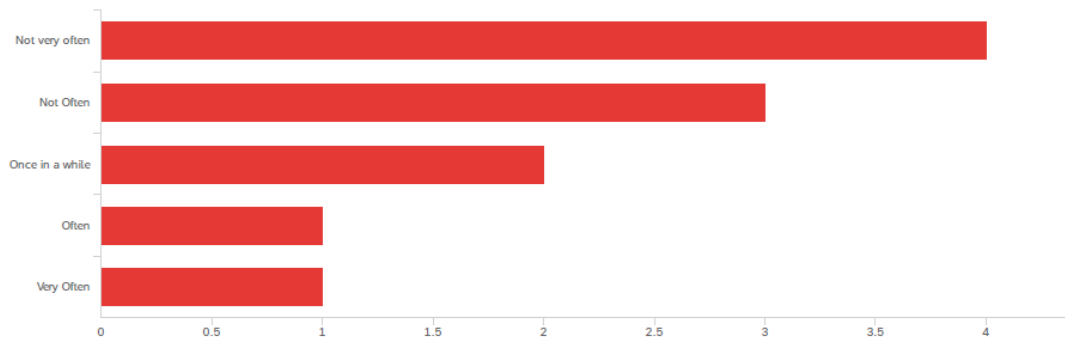
The next question is five point matrixes rating between “not very often” and “very often.” The question was “How often did you not play a game because someone else was using [the] TV, computer, or game system?” Most of the male participant selected not very often. However for the females gave a bigger variety of responses. Although about 36.36% felt not very often and 27.27% stated not often, two females (9.09%) admit that once in while they did not play a video game because someone else playing a game or using the equipment. About two other females felt that this happened pretty often.

## Results from the male participants



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How often did you not play a game because someone else was using TV, computer, or game system?	1.00	2.00	1.11	0.31	0.10	9

## Results from the female participants

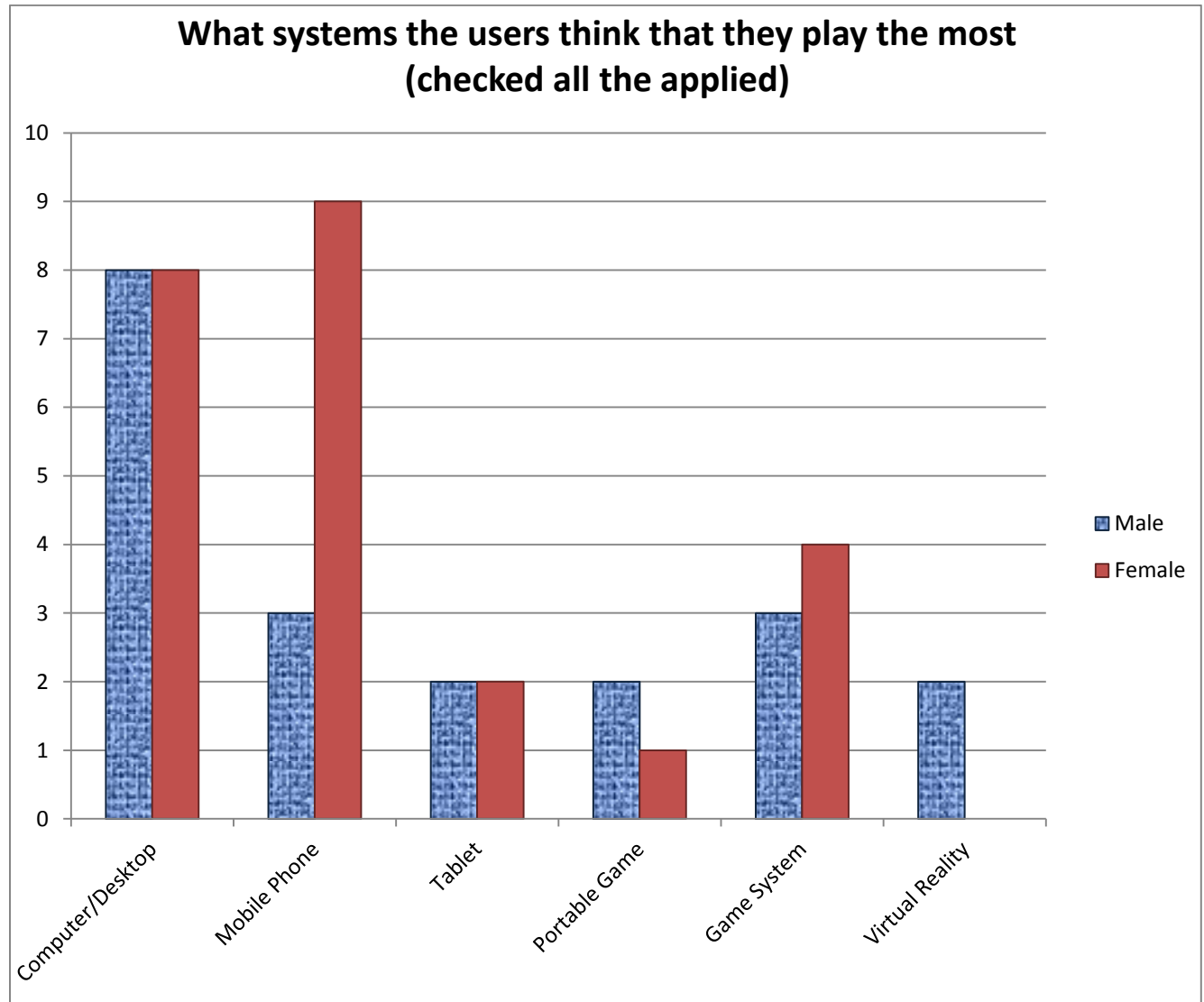


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How often did you not play a game because someone else was using TV, computer, or game system?	1.00	5.00	2.27	1.29	1.65	11

**Disclaimer:** the maximum numbers for the males and female are different sizes. Eight men replied with “not very often” while four women replied with “not very often”.

The next question asked users what devices or game systems that they play the most. This question was “check all that apply,” since a “ranking list” would only work if the participant rearranges the list. For the men, about eight of them played a lot on a personal computer. Three males claimed to play games on their mobile phones. Two males play games a lot on their tablets. Two males play portable games on a Nintendo DS, PSP, or a similar gaming device. Three men play games a lot on a game system (such as a console released by Playstation, Xbox, Nintendo, Sega Genesis, or Atari). At two least males claim to playing games in Virtual Reality (VR).

For the women, eight female play games on their computer while nine female play games on the mobile phones. Two females play games on their tablets, and one female plays often with a portable gaming device. Four females play games often on game consoles. The women in this survey felt that they did NOT play with VR as much as the other devices.

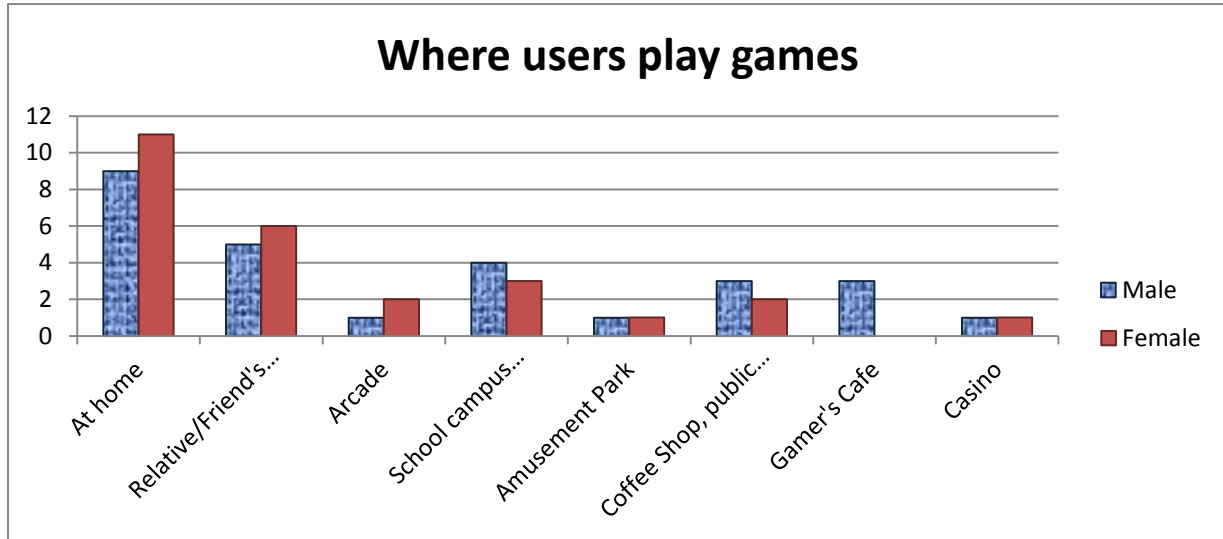


Graph for video games systems and devices used by the participants.

The next question is another “*check all that apply.*” The question asked users “*Where could you play a video game?*”

All nine men would place games at home. About five males could play games at a friend’s place or at a relative’s home. At least one male plays games in arcade. At least four males play video games on a school campus for research or an experiment. One male would play games in amusement parks. Three males would play games in a public place, such as a coffee shop. Three males have played in gamers’ cafes. And one male has played in casinos.

For the women, most of the females play games at home. Six females play games at relative's or friend's house. Two females play in arcades. At least three females play games on school campus for research or experiments. One plays games at amusement parks and at least two play games in public places. One female plays games in casinos. None of the women in this research play video games in gamers' cafes.

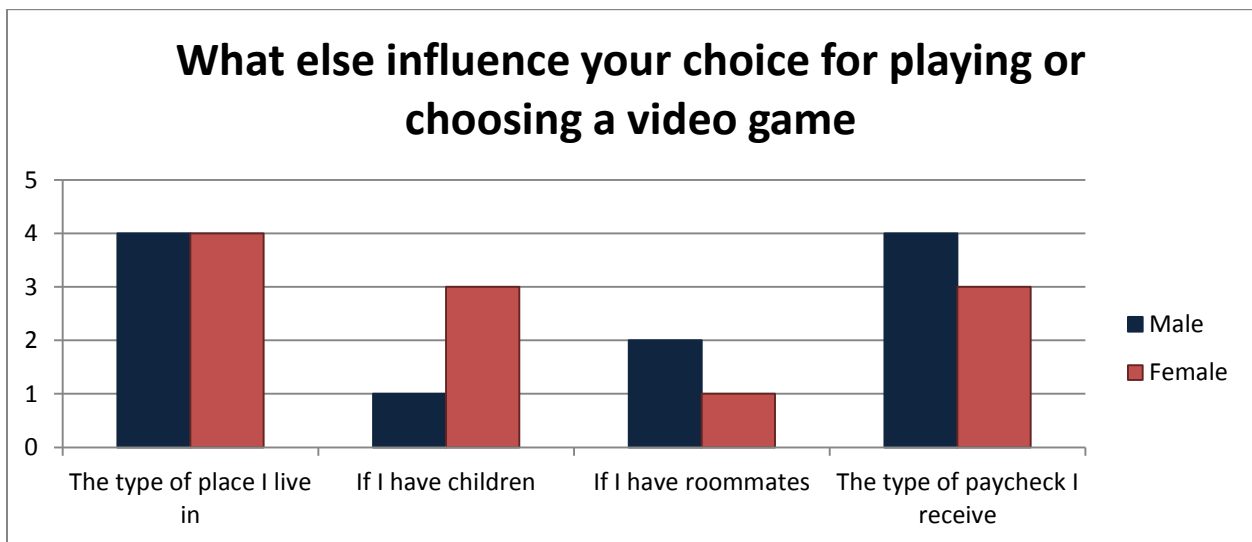


Result for places of game play.

Next question deals with other influences on playing video games and choosing video games. These influences involve lifestyles, the presences of children and roommates, and money.

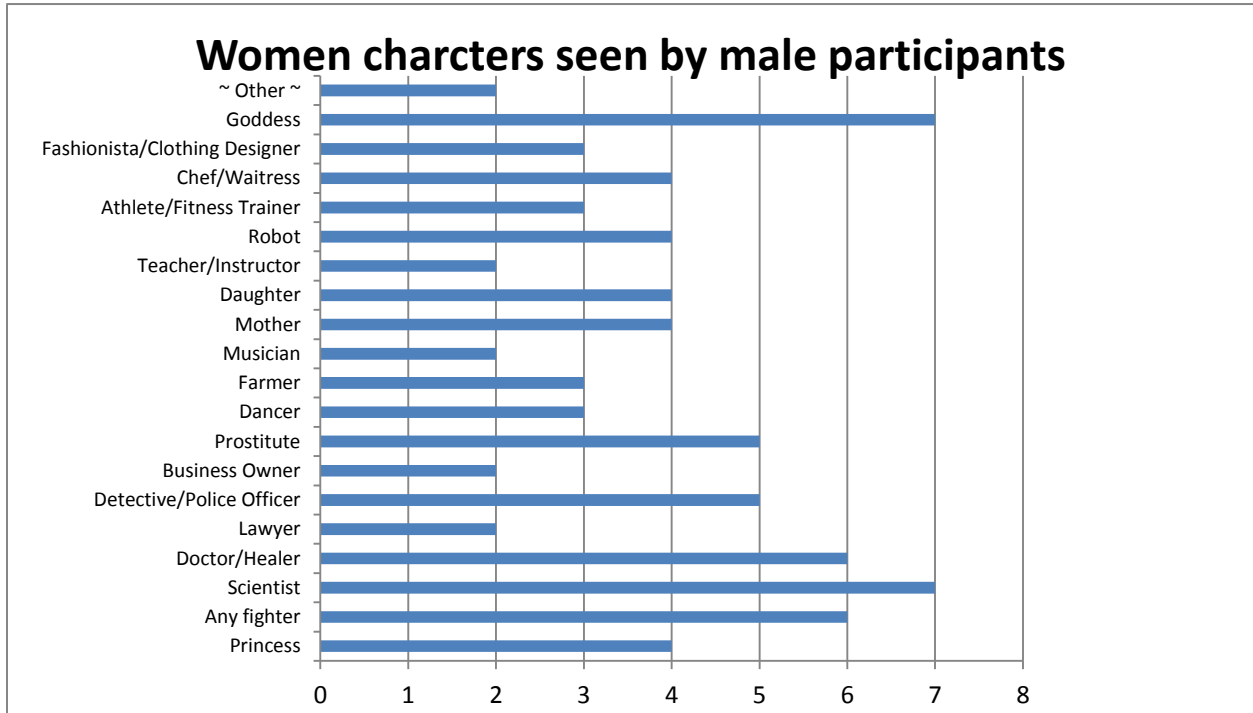
Four males would be influenced by the place they lived in. Only male is effected by having children with him. Two males would be influenced on gameplay and selections if they have roommates. Four males at least would be influenced on the type of paycheck they receive.

For the women, four females would have the place they live in be an influence on the games they play and select. Three women would be influenced if they had children with them. One female would have gameplay based on if there was a roommate. Three women would have their game play influenced by the paycheck they receive.

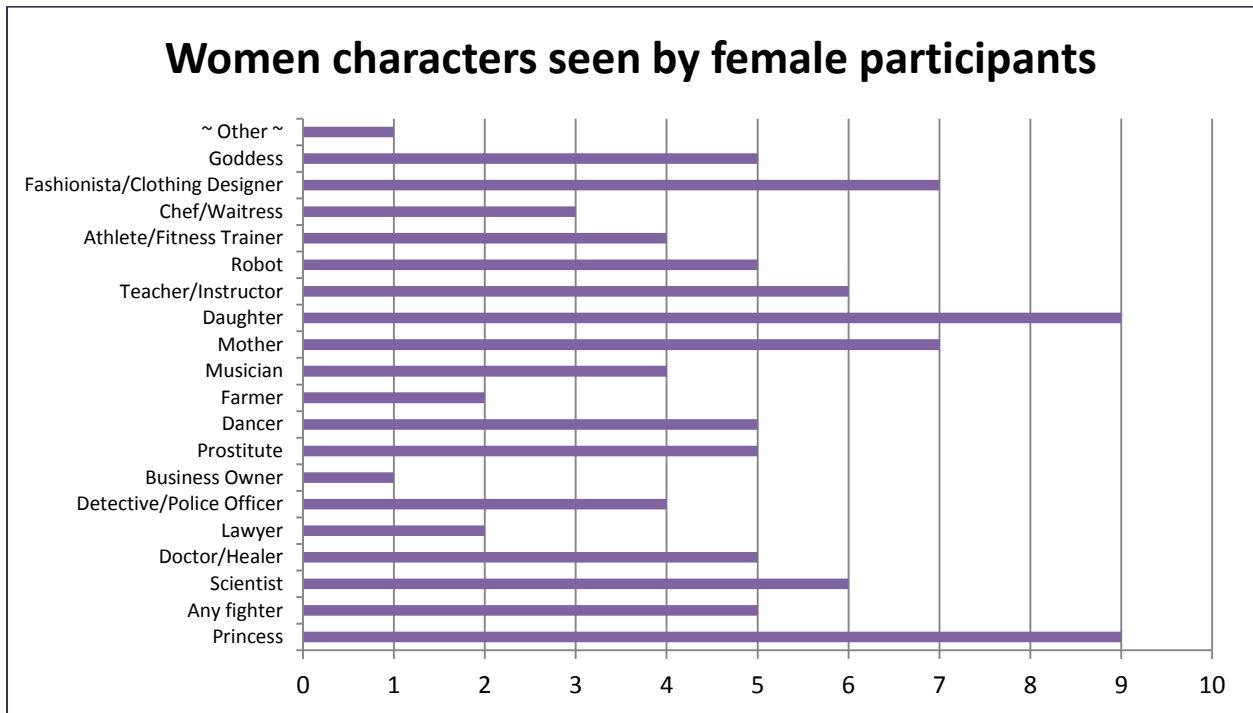


Result for other influences for game play

The next question is the selection of women characters seen in video games for the Phase Two survey. The participants towards the end of the survey were asked, "Also, please select what types of women are in video games that you have seen or played. Check any that apply." Each male and female checked off the different characters that they have seen.



(Answered by the men)



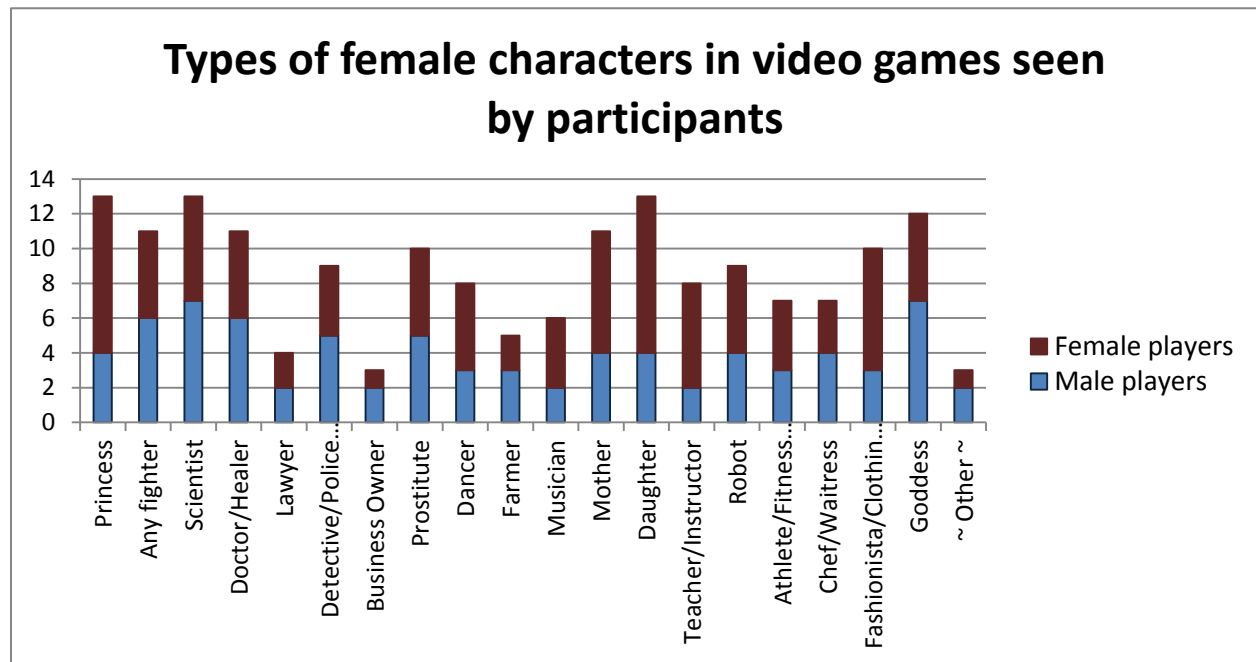
(Answered by the women)



For the male participants, at least seven men have seen female scientists and goddesses. At least six males have seen female fighters and healing characters in video games. However, at least five males have seen females in the police force and prostitution in video games.

The most common characters seen by least nine women participants were princesses and daughters. At least seven female participants have seen fashion women and mothers in video games. At least six women participants have seen female scientists and teachers.

The most common characters in total with both genders appeared to be scientists (13), princesses (13), daughters (13), and goddesses (12).



Combined results of women characters in games

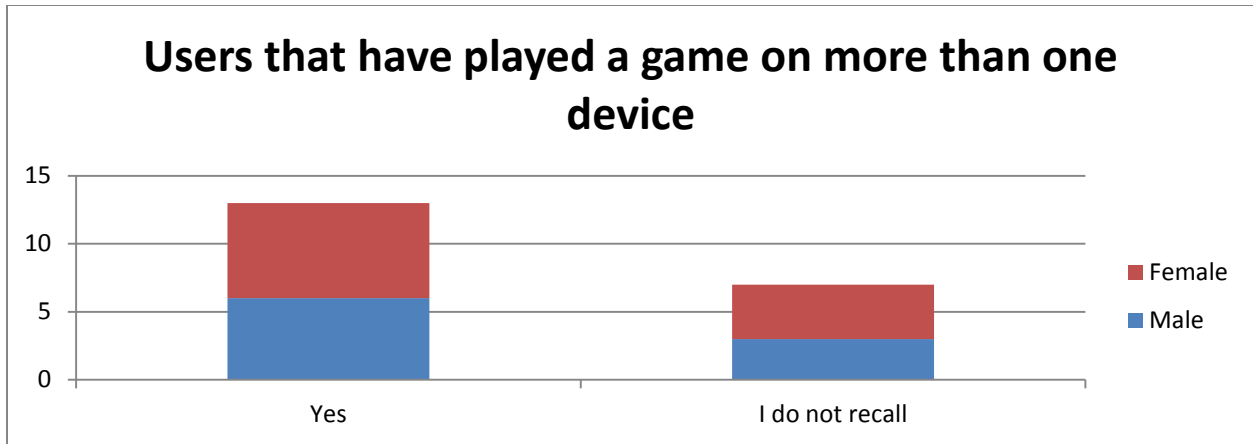
Before completing and submitting the online survey, participants were asked about playing a game on more than one device in the last two questions. When the men were asked if they have played games on more than one device, nine said yes, while three males could not recall. The males were asked, “Does a video game feel different on a different device or system? (i.e. Playstation game released on a touch-phone with different buttons).” Eight claimed, “Yes, it felt different.” One male could not recall. When the women were asked if they have played games on more than one device, seven said yes. Although four females could not recall playing a game on multiple devices, eleven female agreed that the experience felt different between game systems and devices.

Statistic for the Question: *Have you play a video game on two or more devices before?*

	Minimum	Maximum	Mean	Standard Dev.	Variance	Count
Male	4	5	4.33	0.47	0.22	9
Female	4	5	4.36	0.84	0.23	11

66.67% of male said yes, while 33.33 % not recall playing a game on multiple devices.

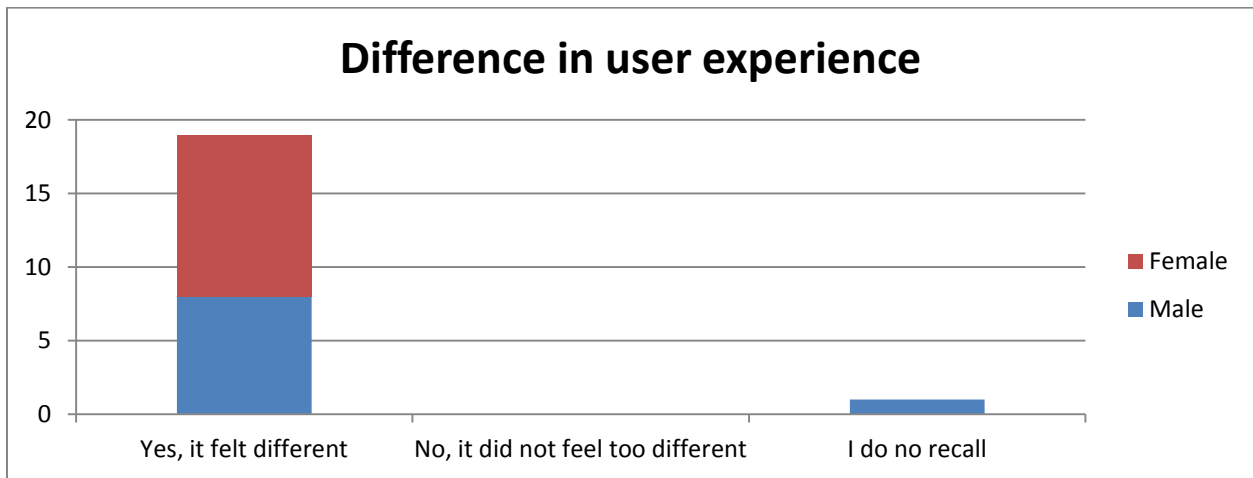
63.64% of females said yes, while 36.36% not recall playing a game on multiple devices.



Statistics for the Question: *Does a video game feel different on a different device or system?*

	Minimum	Maximum	Mean	Standard Dev.	Variance	Count
Male	1	3	1.22	0.63	0.40	9
Female	1	1	1.00	0.00	0.00	11

88.89% males thought that it felt different and 11.11% not did recall. 0% felt nothing different. 100% of the females answering the question felt that yes, the experience felt different.



#### Phase Two Discussion

Both men and women have different preferences for playing video games. Both men and women enjoy playing computer games. Women appeared to enjoy their mobile phone more than the male participants. A few participants play with game consoles, but the men appear to enjoy a little more and use the gamers' cafes.

The biggest concerns for playing a game involved the size of the screen. Although both men and women are influenced by the screen size, a few more men cared about more. More women are likely to not play a video game someone else is playing a game or using the television, but the numbers are small and may not be enough support to the second hypothesis.

In general, the men appear to play video games more but there are still a fair amount of women that like to play. The female participants are more likely to get influenced by other people using the video game systems or children in the house. Women also have a bigger concern price it comes to game play. Users of both genders seemed to have played video games on multiple systems and devices. Both the men and women agreed that the experience was different.

Although princesses were commonly seen by the female participants, it was impression that 13 participants in total (both genders together) supposedly have seen female scientists in video games. More research may have to be verified in the future, but perhaps scientists in video games are common than people realize. But it is unknown what games the participants had played, whether the scientist was running away from a monster in a lab or she was assisting the hero with supplies. It almost disregard the possible hypothesis with princesses being popular although about 13 participants have still seen princesses in video games; most of the players that seen them are female participants in this research. It is possible if the research was done with a bigger group of people the numbers might change slightly.

#### **Investigation ideas for the future**

There are many games in the market. Some games are more suitable on certain devices than others. There are also games can be appealing to players due to a person's lifestyle, budget, number of people in a living space, skill, age, gender, or personal taste. There could more investigations to examine these possibilities. Another survey could be released with different questions or sort the hour use with each device.

Prior to this project, there were desires to study gameplay in relation to the presence of background music or sound effects. However, that study would require a deeper literature review involving game immersion, productivity with music, and possible semiotics with sound indications (or sound "recall"). If the sound research would be more gender neutral compared to the game engagement research done here.

#### **Acknowledgements in regards to COVID-19 and support for research**

I give thanks to the instructors of the SUNY Oswego campus for supervising the research, including Gi Woong Choi and Damian Schofield. Having the research request approved by IRB was a relief. Not limited to the Human Computer Interaction (HCI) department, there is good gratitude for the students on campus that volunteered to help with the research and offer moral support. Volunteers outside of the department and even outside the campus are also appreciated for the help. Working in the HCI department had its advantage with doing working with computer and the Internet, but the 2020 spring semester was a challenge for everyone. There is much appreciation for the support even when some things are uncertain.

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