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Challenging Students' perspectives with Game Design for Older Adults

Simone Hausknecht
Simon Fraser Univ., Canada
simone_hausknecht@sfu.ca
0000-0003-2666-3980

Fan Zhang
Simon Fraser Univ., Canada
fza26@sfu.ca
0000-0002-3874-9928

Julija Jeremic
Simon Fraser Univ., Canada
julija_jeremic@sfu.ca
0000-0001-5594-0057

Hollis Owens
Simon Fraser Univ., Canada
howens@sfu.ca
0000-0002-9512-0368

David Kaufman
Simon Fraser University, Canada
dkaufman@sfu.ca
0000-0003-4621-1404

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Abstract
Older adults are a group that is often overlooked by the game industry, even though they make up a reasonable portion of gamers. It is important for game designers to be able to consider different users and the needs involved. In this study, game design students were challenged with the task of making a video game for older adults that had some level of learning and social interaction. A total of sixty students, 13 older adults, an instructor, and the researchers were involved in the study. Seven games were created over two semesters. Older adults participated in the design by providing feedback. The students initially were disappointed with this assignment and resistant to the task, but as the project continued, they were able to embrace the challenge and see the benefits of designing for older adults. It challenged them to think from a different perspective and consider game design that is accessible to a wider audience. What they thought was intuitive (e.g. easy for the player to understand and use) did not always turn out to be so for the older cohort. This required the students adjust their design to suit a wider audience. User-centered design with a cohort different from their own was a beneficial approach to getting students to think of a broader audience.

Keywords *Game design, user-centered, older adults, digital game, student experience*

1. Introduction

Older adults have increasingly made up a noticeable portion of the gaming demographic. In 2021, sixteen percent were over the age of 55 (ESA, 2021). Previous research suggests that older gamers are mainly casual gamers (66%), who prefer puzzle games, card, arcade, or word games (De Schutter, 2011, ESA, 2016). However, as specific cohorts move into older adult categories these preferences may change. Digital games can offer an important role in providing the motivation and excitement that allow older adults to pursue areas to improve social well-being, lifelong learning, digital literacy, and intergenerational connections (Astell, 2013; Schell, et al 2016; Hausknecht, 2013).

Previous studies suggest that older adults enjoy a variety of benefits from digital games including fun, social connections to others, and cognitive (De Schutter, 2011; Hausknecht, 2013; Schell, Hausknecht, Zhang, Kaufman, 2016). For example, a study conducted by Schell, and colleagues (2016) reported on an eight-week Wii Bowling tournament in seniors' centres. They found that older adults increased their social connectedness and reduced loneliness levels during the time frame. In a follow-

up study, they found that many of the social connections remained for a longer period of time (Hausknecht et al., 2015). However, this study was not without some challenges such as some players needing to compensate due to vision impairment and balance issues (Schell et al., 2015). These challenges did not hinder enjoyment. Other studies have noted that older adults, particularly those with an impairment, may struggle with games (IJsselsteijn, Nap, de Kort, & Poels, 2007; Gerling, Schulte, & Masuch, 2011). As a cohort, older adults are both unique in their interest and game style. Yet, designs should not be based upon stereotypes of what they may or may not like. Extending from our previous work, this study examines a collaborative project in which a research team and post-secondary students came together to design digital games, with some learning content, for older adults.

1.1 Importance of Learning in Later Life

The importance of lifelong learning and the role it plays in enhancing later life has been well established (Findsen & Formosa, 2011). The World Health Organization (2015) maintains that healthy ageing includes engagement with life and lifelong learning as an important aspect. In addition, the United Nations (2008) also called on governments to use education and learning to address the various issues arising from the increased aging population such as job training and increasing literacy. Learning activities are not only beneficial for the individual, but often have a positive effect on community engagement and wellbeing (Merriam & Key, 2014). Merriam and Key (2014) suggest that community wellbeing, “the notion of a locality where people are socially interconnected in healthy and prosperous ways” (p.130) can be promoted through lifelong learning. They point to the overwhelming evidence that learning is beneficial to wellbeing and communities.

Learning habits have been associated with an increased sense of well-being in older adults (Jenkins & Mostafa, 2015). In a longitudinal study, Jenkins and Mostafa (2015) compared older adult participants’ subjective well-being with their learning behaviors. They found that there was a significant relationship between learning behavior and reported well-being. Nevertheless, these results seemed to only apply to informal learning. In another large study in which researchers surveyed 2645 older adults (aged 50 +) in Australia, Boulton-Lewis, Buys and Lovie-Kitchin (2006) found that good mental and emotional health had a significant relationship with engagement in learning activities. In vulnerable older adults, lifelong learning may play a crucial role in helping them adapt to changes occurring within their world and body (Narushima, Liu, Diestelkamp, 2018).

Technology provides a great opportunity for older adults to engage in informal learning. Digital games can be an engaging way to learn and play (Hausknecht, 2013; Sauvé, Kaufman & Plante, 2019). The possible cognitive benefits of digital games for older adults have had promising results (Hausknecht, 2013). Play combined with learning could provide a wide range of learning options and provide a digital space for varying interest.

1.2. Human-centred Design, User-centered Design, and Participatory Design for Representation

Although older adult gamers make up a quarter of the gaming population, they are often a neglected target demographic group. The game design industry administrators and game designers rarely target this audience (Jeremic, 2020). A further difficulty is that intergenerational interactions are becoming increasingly limited through societal age segregation such as schools, workplace, housing, and families living in different regions (Hagestad & Uhlenberg, 2005). This may mean that young designer's interactions with older adults may be limited. These factors can also contribute to a lack of awareness of differences in the needs of older adults compared to a younger gaming community. Further difficulties may arise due to an I-methodology design approach. This is an approach where designers design a game with the perception that they are representative of end users (Akrich, 1995). Although the designer may, or may not, be aware of this, it has implications. Some have argued that when an I-methodology design approach is used then the diversity of gamers may be neglected, including aspects as age and gender (Loos, 2014; Romero & Ouellet, 2016). Thus, introducing game design students to varied end users can increase awareness of diverse end users.

Approaches to innovative designs have undergone a change with increased interest in incorporating the feedback and needs of end users and other stakeholders (Sanders, 2002). Previous studies have also pointed to the need for more participatory design processes to allow for a better representation of such aspects such as age and gender (Romero & Ouellet, 2016). One approach has been to incorporate others (beyond the design team) in the process of design (Sanders, Brandt, & Binder, 2010). User-centered game design (UCD) has become increasingly popular. It allows for game designers to better understand the end users and their needs. This is important to limit the bias of the game industry (International Game Developers Association, 2016). User-centered design is an iterative process whereby the user is considered at all stages of development (Gulliksen et al. 2003). It seeks to collect data around users' behaviors, needs and practices to provide more intuitive systems and interfaces (Perry, Aragon, Cruz, Peters, & Chowning, 2013).

To address specific needs and interests of older adult gamers, some researchers have started to design games specifically for older adults. For example, Gerling, Schulte and Masuch (2011) created the game SilverPromenade which was designed for frail elderly. In this study, they used a participatory design incorporating older adults in a care home into the process and attempting to adjust for the specific limitations that arose. Extending from user-centered design, Vanden Abeele and Van Rompaey (2006) suggested that these ideas need to be pushed further to incorporate the end user early in the process. Vanden Abeele and Van Rompaey (2006) adopted a human-centered (HC) procedure to design game concepts for and with older adults. Several other game developers have also recently applied an HC approach (*e.g.* Sauvé, Kaufman, & Plante, 2019). This procedure started with observing older adults' positive experiences in their daily life. Then, older adults and researchers generated game-ideas and co-designed the selected ideas into some game concepts. Loos (2014) suggested that Vanden, Abeele and Van Rompaey's HC procedure was a way to avoid some of the pitfalls of I-methodology.

The aim of this study was to explore and examine the game design students' experiences of working and designing for older adults. This included their process of designing for a cohort outside their own and the challenges they faced. Our main research question was:

1. What are the experiences of game design students when designing for an older adult population?

2. Methods

The study was conducted over nine months in 2016 during a game design course at an art institute in Vancouver. A collaborative approach to the research, design, and learning experience was used. The design process involved a combination of user-centered and participatory approaches incorporating input from researchers, the instructor, and older adults into the games developed by the students. All stakeholders had some input into the game design and provided feedback throughout; however, as this was a student course project, there were some limitations to the contributions as the students had the final decisions on what feedback to incorporate.

A letter of agreement was written up between the research university and the Art Institute in 2015. Ethics approval was given by Simon Fraser University Research Ethics Board (REB) study number 2015s0481. Consent forms were given to all students. One student did not want their comments used in the research, and these were not included.

2.1. Participants and collaborators

This collaboration involved five researchers, thirteen older adults, sixty students from a college, and one instructor all from Vancouver, Canada. The researchers were made up of three graduate students, a postdoctoral scholar, and a Professor (over 65 years old). The older adults were recruited from the community and the University's Seniors 55+ programs. The students in the study attended a Game Design program and were seeking a degree as either game designers, programmers, or artists. Most of the students were in their early 20s and less than 10% were female.

2.2. Interactions and design sessions

There were five sessions in which the researchers and older adults attended to provide feedback and guidance to the student designers. The students formed teams of 5-12 students. For this class, students were required to create a digital game for older adults with some form of learning incorporated into the design. Specific criteria:

- create a digital game for older adults that can be played on tablets and/or personal computers;
- create games that can be played both alone and with other players (consider social aspects);

- consider the possibility of creating a game that can be played by an intergenerational team;
- embed subject matter content into the games that is appropriate and motivating to older adults (learning);
- conduct evaluation of the games with groups of older adults.

The process occurred during a nine-month project course in which they collaborated to create a video game that met the above criteria. After the initial sessions, older adults were brought in for consultation. Although the initial criteria suggested creating a multiplayer game, this was more a conceptual exercise due to the level of students and the time restrictions. It was quickly agreed that multiplayer games were beyond the scope of the project.

In our first session, the researchers explained the project and gave the students a profile of what we had learned about older adults and digital gameplay based on previous research. We also presented them with topics of interest based on the 55+ programs of interest at the researchers' university. In this session the researchers, students, and instructor did brainstorming exercises. The students were asked to consider this information and create a pitch for a game idea by the next session. In the second session, students pitched ideas to the instructor and researchers (with one researcher being an older adult). The ideas that were most suitable and engaging were chosen. In previous years, the class had been given free reign on the project, so the researchers noted some initial resistance to the restrictions. Table 1 presents the list of games chosen and then created by the students.

For the third, fourth, and fifth sessions, groups of 5-7 older adults tested the games and provided feedback. In the third session, a group of older adults joined the researchers to comment on the art, storyline, and game ideas as they had progressed. There weren't any prototypes at this point, and the games were still in early production. It allowed the students to get feedback on whether the concept was appealing to the older adults. The older adults were given the opportunity to comment and give the students ideas on what they would like.

In the fourth and fifth sessions, older adults tested the prototypes and provided feedback on the games. Both the researchers and the game design teams asked questions to the older adults shared their findings with each other. This process also involved extensive observation of game play. Figure 1 provides an example of one of the games created and an older adult testing it.

Table 1. Seven games designed for older adults

Game	Game concept
Chromalife	*"Chromalife is a 2D puzzle platformer designed to try and bridge the gap into learning about multiculturalism and inclusivism. We did that through color-based puzzle mechanics and creating a gorgeous art style to show off our story in full, in a nutshell."*
Daredevle Fishing	*"It's a fishing simulation game. It has an emphasis on education through once you've caught the fish, it gives you information about it. General information so they can use. All the models must be realistic so you can recognize it outside of the game. How to use specific lures. It's a fictional lake but it presents it as if it was a realistic lake using knowledge and other facts to make it realistic."*
Dig It	*"Dig It is an archeological collection game where the user travels the world to geographically accurate dig sites. Digs up either fossils, gems and/or artifacts. Takes them back to their museum, displays them and then runs an exhibition to show them publicly where they get a score based on what they have displayed."*
Modern Mischief	*"It's an action stuff and educational video game.So we're just thinking of museums and studying up on modern art just to get to know the paintings a bit in terms of artist, year and the painting style."*
Too Many Cooks	*"Too Many Cooks is a mini-game collection that centers around a virtual kitchen. The idea is that you would learn about cooking, although not terribly specifically how to cook, while you play a series of games that tests your dexterity and memory, etc."*
Violet Light	*This game is an adventure solving game where players solve the crime of a friend who has been murdered.*
Virtual Virtuoso	*"The idea is to teach piano in a portable and pressure-free environment. We do that through the use of sheet music on-screen and also ear training. I think that's a pretty good synopsis."*

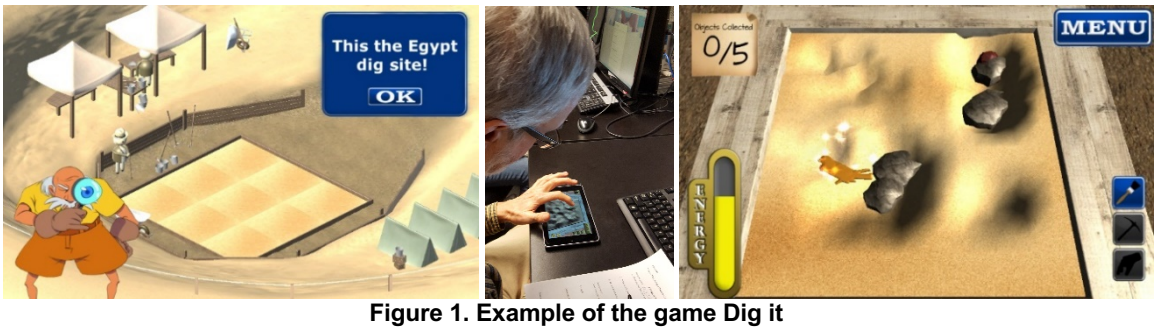

Figure 1. Example of the game Dig it

2.3. Data Collection and analysis

Throughout the term, researchers observed the game design process and interactions. At the end of the nine months, the researchers conducted semi-structured focus group interviews with each game design team (7 groups) and a separate one with the instructor. Each interview was conducted by two researchers (SH + another researcher). As the projects were group projects, focus groups were the most appropriate as they provided group dynamics and perspectives. The main topics covered through the interview were a description of the process of designing a game

for older adults, challenges and benefits, experience of involving older adults in the process, impact on professional understanding, and how would you do it differently.

A thematic analysis was used to capture themes from each focus group of the teams. Braun and Clarke's (2006) six phase approach to thematic analysis was used. This involved becoming familiar with the data, generating initial codes, searching for themes, reviewing the themes, defining, and naming the themes, and producing the report. For the analysis, each team was considered as an individual entity; while the overarching themes were examined to find themes that appeared across most of the game design teams. NVIVO 11 was used to assist with the analysis. The transcripts were added to the system and then each phrase was examined for the main content and a code was applied. The codes were then organized into themes. The observations and the instructor's interview were also examined to see if there was a triangulation of the findings. For example, the instructor's interview was also broken into codes and then these were examined against the emerging themes.

3. Results

The first section outlines the main finding of the thematic analysis in relation to the student experience of the process, while the second section highlights the results of what, if anything, they learned in designing for an older adult cohort.

3.1. From resistance to new perspectives: experience designing for older adults

The students started with a high level of resistance to the project, feeling annoyed that they had constraints on their game designs and that their target audience was older adults. This evolved over time as they began to create their games and began to appreciate the end users.

3.1.1 Starting with resistance

Over half of the teams commented on how many of the students started with a level of resistance to designing for older adults. It was apparent that they were hoping to design for their own cohort. The researchers and instructor observed this resistance in the initial consultation. During the focus group interviews this was also noted by some of the teams.

> And a lot of people were grumbling about this when this was announced like I have to spend 9 months making a tablet game for seniors. Like I don't want anything to… because people already envision themselves like I'm going to go work in this company. I'm making high tempo shooting games. This will not help me at all. I hate it. Right?

Some groups highlighted their surprise at the end of the project on their change of opinion, where they admitted their initial reactions and how these evolved.

> I had a lot of fun doing this actually. I was quite surprised at how much I enjoyed it. Honestly, when I was initially told I was making a game for older adults, I was thinking to myself this might be the worst thing ever. But it really was quite an interesting experience. I definitely would be interested in doing this again.

> Yeah, specifically addressing design for older adults, it's interesting to move from, to be blunt like relative shivering at the start to actually really enjoying the project now.

This adjustment from their original perspective that designing for older cohorts would be a terrible experience to one of enjoying the project is an important transition as the initial resistance was based on stereotypes and what older adults represent. As the project progressed, there was a change in these attitudes.

3.1.2 Gaining an appreciation for the user and their feedback.

All the game design teams commented on the usefulness of the older adult feedback. The students enjoyed working with the older adults and gaining insight into differences and similarities. They commented on how having the older adult feedback was very important to their designs and the progress on the games as one mentioned "*I would say that the older adults' feedback is the most important part of any of the testing or feedback that we got in general*".

This was particularly important because they were not aware of the demographic or how they differed from their own cohort. The students began to realize that designing for self was very different than designing for others.

> It [the feedback] was super valuable because we've never designed anything for a demographic that isn't us. So the first two play tests were super valuable insight as to what we should actually be focusing on. Because up until then, we had just been guessing.

> For me, at the start it wasn't as hard because I wasn't thinking about it as much. And then when you guys came in the first play test, it was like this is out and this is out. It was so hard. So that was kind of a wakeup call for the project. I think, where it's just like, oh, my God. Like we've been trying to make this game and it was all about the mechanics and we forgot that it was about our target market for a piece of music.

The students also noted that they needed the feedback from the older adults as compared to their own cohort and other game design students, or themselves, as noted that, *"we can't possibly fathom how older adults would prefer it until you see it yourself"*.This seemed to lead to some students beginning to understand the importance of designing for others.

> That was probably the most useful feedback I would say, because I mean I can ask a hundred people that are in their late 20s what they would prefer and I could ask 10 people or 5 people in the range that we're aiming for and the 5 people's feedback is going to be more accurate than the hundred people in their mid-20s.

This was also a challenge with feedback from their cohort versus the feedback given by older adults. It was difficult for them to negotiate what was useful when they tested it with their cohort.

> It was also still very difficult to incorporate it because, again, whenever we play tested, we would do it on younger people and they would say, "Oh, it's too easy." Okay. So then maybe turn it up a little bit harder while also trying to think of the older adults. It was difficult. It was very difficult.

The instructor also commented on the importance of the feedback to students' understanding, describing it as a *"kind of eye-openers to things they had to be more concerned about".* This led teams to consider the feedback and use it. The feedback influenced their approach and shaped the game significantly as one team suggested:

> We took their feedback very seriously. And we actually tuned way too much after that. Like if you can compare the previous version the older adults were playing and this version, there is a huge drastic difference.

Students also had to negotiate and use their judgement between what feedback was worth using and what was not.

> I think whenever you're getting feedback you have to take it with a grain of salt as some of it you probably don't want to consider. But I think for the most part, a lot of the feedback we got was gold because we were really walking blind on this project. And it was refreshing to actually have a bit of grounding as to how we were actually doing compared to how we feel we were doing.

> I like to talk to them and ask what suggestions they have. Because sometimes they can have really good ideas… sometimes they think they want something, but they don't really want that. They want something different.

Students commented that they adjusted based on the users' feedback as, "we did make a bunch of changes based off of that last play test session." These changes were noted as crucial to making a good game for older adults.

> First off, I don't think the project would have turned out the way that it did without that feedback. And second off, I don't think the game would have been as good as it is without that feedback. We added in a lot of options that make the game more fun as a result of that feedback because now, instead of having frustrated players, we have players that feel like they're… that have come up to me after playing and are like, "I feel like I can go out and play some piano."

3.1.3 Challenged ideas and gave new perspective on design

Almost all groups commented on how the project challenged their ideas, provided new perspectives, and required them to think in different ways to solve problems. Some of the students commented on how it made their teams approach the design in different ways and explore different perspectives since, "*it forces you in a different mindset."* Many students gained a more diverse approach and had comments such as:

> I think the best thing about doing this was it made us think outside the box, made us really look into people in a different light. Designing a good game that's not for us, it's for somebody else.

> Gives us experience and new perspective and opens up our mind for more different challenges and different experiences and experiments. Like we can make more kinds of games, different kinds of games, experimental games like how we can actually exercise… how can we take our games, what games we like, and make them available to the older adults with a different skin.

Some saw it as an opportunity to see different perspectives. For example, one student suggested it changed their perspective of how to design, "*I don't think I'd think the same way about design if I hadn't had the opportunity to actually design a game for an older adult."* Other students commented on how they appreciated how it pushed them beyond their current view of people of different cohorts and how that relates to their designs:

> Improve my ability to design better because it makes me go beyond what I know, beyond my comfort zone. So as a designer I think that's amazing the opportunity to see other people that have a different concept of fun than you have.

> The other thing that I worked with the UI and art and I realized that when you make UI for seniors it's also different because you have to think which reference they have, which icons they're going to understand, and they wouldn't understand because their reference are different. So that's something that I didn't think I would need to worry about.

Although there was initial resistance, the situation required them to move beyond what was comfortable. This provided new perspective. It was also later perceived as a benefit to working in the industry.

3.1.4 Benefits to their future work in the game design industry

At the end of the project, most groups commented on how they felt it was a great educational experience that would have real world benefits when they were out in the industry. Through having to design for different cohorts, it meant understanding how to design beyond the scope of their own cohort. Students described it as a "*more accurate representation*" of what working for a company would look like. They gained the realization that they won't simply be designing for themselves.

> I think this experience working with you guys, I think it's a more reflective experience as to what we'll see when we start working in the industry. Because very few studios actually have free rein to make their own games.

A couple of groups commented on how the older adult gamer could be an important industry, and they saw it as an opportunity to have a niche as one student commented:

> If I can start designing these games now for a demographic that is about to take off, we may be able to create an entirely new sector of industry based around this type of educational cognitive game play. And I think it's very important especially knowing that my grandparents are looking forward to playing this game.

> This is going to become a very large market very, very soon. Because all of us have grown up playing games and, as I said, I'm nearly 30. So in about 30 years, I'm going to be that demographic playing these games.

This idea of the specific constraints being useful for the industry was not limited to the designers, but also the artists.

> A benefit actually, I think it's our ability to adapt to your guys' target market. So like with the constraints that we have, we have to make it a certain way and that in turn will help us in the industry since we have to follow another, like a lead character artist or a lead artist design as well… Yeah, that adaptability is really good.

One student met with a future employer and found that it was useful as a selling point. (This student was later offered a job by the company).

> I met a designer from a game company recently for coffee and just brought the game with me. I just decided to show him what it was, just how it is, kind of explained the design choice of this, why we kind of did everything. And by the end of it he was like, "Can I have your resume?"

At the end of the project, some students thought the experience gave them an advantage over previous years that did not have to focus on a specific user demographic.

> Every other production group beforehand is literally just they create their ideas, and they go. Right? Whereas this is better for us because it's styled the same way as the industry where we have a target audience, and this is who we're building for and let's focus on that. So that alone, that experience has been like awesome because it's taught us exactly how it's done in the industry.

3.2. Lessons in designing for others

One of the main outcomes was that the students had to negotiate with design aspects that they "*take for granted*" or believe are "*intuitive*." However, as the project progressed and the older adults came in to provide feedback and test the games, they soon realized that what appeared intuitive to them was not necessarily intuitive to others.

3.2.1. Intuitive design is not always intuitive

Many of the teams discussed how what they thought would be intuitive, where players would easily be able to understand and interact with the game, was not always intuitive to everyone. This was nicely summed up by one student as:

> We spent quite a time actually questioning whether or not stuff that we took as maybe a bit intuitive. We actually had to question ourselves as to whether or not it actually was as intuitive as we thought it was, which was an interesting problem to deal with.

The feedback made the students question themselves and what they know. One student commented on how "*Like especially I keep bringing it up at the last milestone test when you guys came in, it was like, oh, maybe I'm like not as intuitively good as I thought*." However, intuition and skill seemed to not always be clear as one student seemed to suggest it was the older adults who were not intuitive about games as he commented "*What we found out was the hardest part about that was establishing solid communication with our player because they're quite different from our usual audience who's very intuitive about certain controls*."

Quite a few students talked about aspects they took for granted that everyone would know how to play in a certain way with comments such as "*I definitely took for granted that most people I know play platformers from time to time.*" Working on the project made them reflect on different aspects in the design that they simply took for granted.

> We took for granted is that we need to be more patient with some things. Like for some of us that have played Guitar Hero, for example, the notes move really fast, and we are sort of used to it. But for other people that have never played that game, we went... It should be good enough since we can play it. And it turns out it was really not the way to go.

I never thought of that really, but there are conventions within gaming of like this symbol means this. But it doesn't mean that in the rest of the world, you know.

3.2.2. Accessibility: Designing for all as an approach

To tackle the issue of designing for older adults, but not always having them nearby to consult, some teams approached it by making the games accessible to everyone. In general, this is important as it made students think beyond their current situation. One student commented that "*we need to make them accessible*". Others mentioned that they challenged each other as this conversation between team members highlights:

> Respondent1: Okay, it's technically we did this as a challenge for like designing for everyone because we actually, when me and S. talked we were like, okay, older adults and younger children are like pretty much the same.
>
> Respondent2: One with the maturity.

> Respondent1: Yeah. It's how they're mature. We started with that, okay, we'll target everyone so that it appeals for a wider audience so that older adults will be like,"hey, this is a game which can be played by everyone".
>
> Respondent2: It doesn't come off as feeling this is just for us because, I mean, as much as that can be kind of fun, it kind of comes up I wouldn't say stagnant but it's a game for us… This is a game you could teach an 8-year-old to play, and you teach an 80-year-old to play.

Some groups commented on how it shouldn't be just for older adults, but should appeal to a wide range, if it is done right. Thus, they moved from the initial idea of a game for older adults not being appealing to gaining a deeper perception of good design. One team member pointed out that "*If an older adult likes it and if it's done right then younger people will as well, which is I think what we really tried to go for*." Another member commented, "I *think anybody can play the game now*."

4. Discussion

This study examined the experience of game design students who were challenged with a project to design for an older adult cohort versus the freedom to design a game for themselves. Such experiences require students to think as user-centered designers. This process made the teams reflect and acknowledge the weaknesses of designing with an I-methodology. For example, what the students took for granted as "*intuitive*" often is not as intuitive as they believed. When an I-methodology design approach is used then the diversity of gamers may be neglected including such aspects as age and gender (Loos, 2014; Romero and Ouellet, 2016). Simply getting feedback and suggestions from their peers does not allow them to understand the needs of a diverse demographic of game players.

The students' initial resistance also shows their perceptions of older adults as being uninteresting and highlights the ageism that can occur within game designers. Ageism is an ongoing issue within society that needs to be dealt with but often goes unnoticed (Palmore, 2001). Once the students engaged in the process it gave them insight into designing for diverse users, and they found it was an engaging experience that required considering alternative perspectives. Working with the older adults provided useful insights.

The user-centered approach allowed the students to gain insights beyond their own experiences and think of design in different ways. For some, it was a matter of making games that are engaging for a wider audience. With an increased move towards Universal design and accessible design for technology programs and games (Grammenos, Savidis, & Stephanidis, 2009), it is useful to have first-hand opportunities for students to be able to consider how to do this. User-centered design is becoming more common for technology design. Yet, students still often design for *"themselves".* This can be useful for beginners, learning the skills required for game design. Nevertheless, this study suggests a benefit of including a target audience that is a different demographic from the students and is often overlooked within the game design industry. The students appreciated this as it forced them to think about design from a different perspective. As mentioned by Romero and Ouellet (2016), game design is a great exercise in critical thinking

and problem solving. Challenging students to look beyond their understanding and use critical thinking to solve problems can enhance their experience.

4.1. Limitations and Future Directions

There were a number of limitations on the project mainly due to the coordination of the various collaborators. In retrospect, it would have been beneficial to have more sessions with older adults and a larger number of them. Students suggested that they would have liked more input from older adults and felt their limited access was a problem. Older adult participants were limited to those who were able to come out to the school. This meant that anyone with accessibility issues was unlikely to volunteer. Furthermore, the volunteers were recruited through the University over 55 program which may attract a specific type of older adult. Although the focus of this paper is on the students, more interactions could have led to further insights.

One guideline for future inclusion of older adults in game design is to bring them into the process early and often. It is also important to be aware of the vast differences in the needs and interests of older adults. Thus, increasing the number and age range of participants would be advantageous. The students were surprised to observe that certain aspects that seemed "*intuitive*" to them were not as obvious for the older adults. It is important for the students to get an opportunity to observe what is working, to talk to the older adults while they play, and to think critically beyond the student cohort norms.

5. Conclusions

The objective of this paper was to explore the experiences and processes of game design students who were tasked with designing for a cohort outside their own, specifically older adults. The students went through a process of rejecting the assignment to finding the experience to be extremely beneficial to their understanding of designing for other users. Including diverse users as a factor for game design students can help them think about their audience in broader terms and avoid the problems of I-methodology. Although there may be some initial challenges, it allows students to gain important skills moving forward in their careers. Using participants who are different from the students, such as older adults, challenges students to not only think about design from the user perspective but also challenges them to consider their own assumptions about others.

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