Scaffolding Digital Game Design Activities Grouping Older Adults, Younger Adults and Teens

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Abstract. Digital game design is a complex activity relying on multiple skills of the 21st century as such creativity, problem solving, collaboration in interdisciplinary teams and computational thinking. The complexity of the knowledge modelling and creation process, game design is a powerful learning activity that could benefit in learning from childhood to older adults. Our experiences take advantage of the digital game design as a complex learning activity and engages learners from different age groups in a joint activity. In this paper, we analyze the scaffolding process of intergenerational game design activities as an instructional learning strategy. We argue that the process could help learners from different ages and backgrounds to collaborate together in doing progressive steps through their game design process.

Keywords: Older adults · Digital game design · Intergenerational learning · Knowledge creation

1 Introduction

Digital ageism is a form of discrimination appearing through the use of technologies that have not been adapted for older adults or that conveys a negative image of older adults through their representation of older adults. For instance, digital games tend to convey negative images of older adults and often misrepresent this age category [1]. Intergenerational participatory game design could help overcome those issues by engaging older adults in the game design process through a collaborative approach with game designers of other age groups. Engaging teens, young and older adults in a joint game design activity allows each of the age groups to know each other better and ensure their own representativeness in the game design process and product they develop together [2, 3]. In order to explore the intergenerational game design activities as a way to avoid digital ageism and promote intergenerational learning through game design, we introduce in this paper the organization of two intergenerational game design workshop activities that have been developed during the Silver Gaming Intergenerational Summer School (SGISS) in Québec City. First, we introduce participatory game design and the learning opportunities that are introduced by this approach. Second, we describe the different phases of the game design workshop and the way each one of them has been scaffolded to better support the objectives of the activity in terms of social participation, representation of older adults and intergenerational learning [4].

2   Intergenerational Participatory Game Design

Games are mostly designed by white young males, including only 11.5 per cent of females in the field in 2009 and 22 per cent in 2016 (International Game Developers Association, 2016). Different initiatives trying to question the diversity in the game industry has led to highly violent campaigns; in 2014, the #gamergate put into their collective crosshairs several women working within the video game industry, including well-known game developers Zoë Quinn and Brianna Wu and cultural critic Anita Sarkeesian. Women in gaming have been victims of sexism, misogyny and harassment within the video game culture [5]. At our knowledge, older adults have not been the object of harassment; still, they remain an age group not only underrepresented but also misrepresented. This is especially true of older women, who are often appearing as maleficent antagonists [1, 6]. Our research [7, 8] points towards a need for a more participatory design process which could allow social participation and a better representation of different age groups, sexual and gender diversity. Participatory design aims to engage individuals from different disciplines and backgrounds in the design decision-making process. In the field of information systems (IS), participative design "promises IS quality while empowering the participants and fostering relationships among developers and users" [9, p. 1]. The participatory game co-design blurs the boundary between game players and the professional game designers [10]. Co-design strategies could include making games from scratch, modifying or 'modding' existing games [11] through a shared-decision making process. Opening the participative design to individuals from different social groups, ages and background aims at improving social representation through a critical perspective.

3   Intergenerational Game Design Workshops

Game creation could be used as a participatory activity in the pursuit of developing and strengthening the link between different generations of participants [12, 13]. In this section, we introduce the intergenerational game creation activities that were held during the *Silver Gaming International Summer School* (SGISS) in August, 2015. The game creation workshops teamed participants from different age groups (18 to 80 years old) from secondary-level students (n = 2) to adults (n = 32). The workshops were held in French and in English. Our main objective was to engage participants in an intergenerational game design experience in order to develop a better awareness of each age group game design preferences. Their contact with each other enabled them to learn together about different aspects of game design. In order to ensure the success of such innovative activities, the scaffolding of the different phases of the game design workshop were the object of an important preparation during several weeks. The researchers needed to ensure both the zone of proximal development (ZPD) [14] and the zone of proximal innovation and complexity (ZPIC) were at the reach of all the intergenerational teams engaged in the task. In the next sections, we introduce the different phases of the workshop and how the intergenerational game design activity

was scaffolded and supported to enable the social participation of all the members of the intergenerational teams.

3.1 Scaffolding the Group Forming for the Highest Intergenerational Diversity

The intergenerational workshop game design activity is structured in teams which aims to be the more diverse possible in terms of age and self-declared gender. In order to create teams with the highest quotient of intergenerational participation, we introduced a team-constitution activity based on a pyramid of age representation. As the first activity within the workshop we asked the participants to position themselves on an age and gender pyramid (Fig. 1).
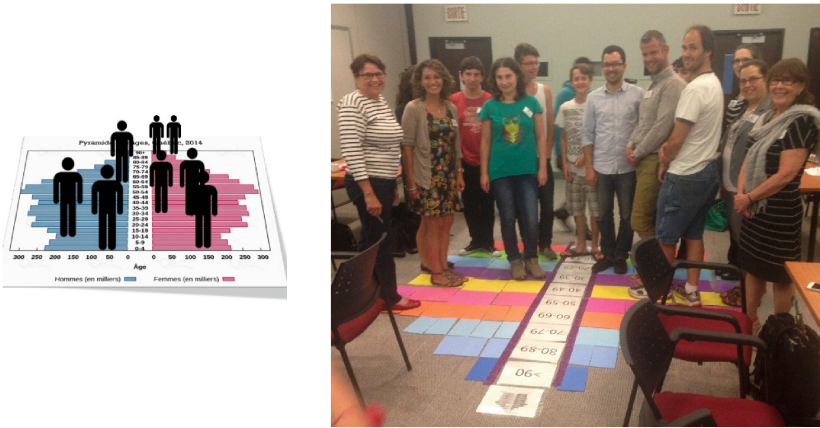
Fig. 1. Age pyramid distribution of the workshop participants

The purpose of this exercise was to help us put together teams with the higher intergenerational diversity possible.

3.2 Scaffolding the Team Selection and Exploration of a Topic for Their Game Creation Activity

The second activity of the workshop was oriented towards the team decision making for selecting a topic to be developed as a game. Each intergenerational team had to determine what topic they would work on. The two workshop facilitators oriented the decision making towards topics related to the modernization of the province of Québec in the French group and towards topics related to the recent world history for the international English group. The workshop facilitators listed a series of events that could be explored (i.e. the electrification of the province, women's suffragette, Expo 67, the Baby Boom, etc.). We noticed that the choice of topic was strongly influenced by the older member of the teams as they used their own life narrative, having had first-hand memories of some of those events. The three secondary-level students were aware of these topics as they studied them in their prior school year. When asked what they knew about this

content, they positioned themselves as "non-experts". Interestingly, they stated that the in-class teaching strategy used was magisterial and that the topics were greatly simplified, not only in their transmission but also in the conversations it generated. The intergenerational approach to the chosen event helped create more diversity and complexity as no effort was made to abridge the topic. They also remained fully focused during the conversations, asking questions and commenting on the topic or the life experiences of the older adult(s) (Fig. 2).

Fig. 2. Teams during the topic selection decision making.

3.3 Scaffolding the Game Design Process

In order to support the game design process, we suggested to develop a short narrative based on a first-person character. The workshop facilitators introduced the objectives of creating an interactive process where the objective was to put together a short narrative sequence centered on the decisions of a real, significant political figure that helped shape a particular historical event. It is this semi-fictional "character" that will communicate directly to the players by asking them questions on the chosen event. As each question constitutes a scene of the game, deciding what to ask is an integral part of the writing process; mobilizing and conceptualizing prior information are an important part of creating new knowledge. In the storyboard example below, Team 2 has decided to focus on the topic of the liberation of Nelson Mandela. He is also the main character of their mini-game. The group has identified a first question for their mini-game "Who made his release possible?" and has imagined (and verified in a second step) three different answers, one of which is correct (Fig. 3).

- We scaffold the game creation process through four steps: (1) identification of a character central to the historic event of the mini-game, (2) identification of the question to be asked by the character, (3) developing hypotheses on the possible answers to the questions formulated in the second step and (4) verifying the validity of the hypothetical answers through an information search. The selection of the character aims to engage the intergenerational team in a discussion during which they explore together who they consider to be one ofthe main proponent in the historical

event of their choice. The decision to focus on a character's aims also help humanizing the decision making related to historical event.

- The second step to undertake is to identify what questions they could ask the student. We suggest that each team write what they spontaneously know about their topic of choice. Then, they identify what could be rephrased as potential questions and assemble the information in a chronological order to determine a sequence plan.

- The third step is to formulate possible answers (or hypothesis) to the questions they chose, hence render explicit their prior knowledge. In most cases, their preconceptions are erroneous; making them explicit enables the knowledge deconstruction and its reconstruction.

- The fourth step is to research information regarding the hypotheses formulated before and find the right answer about the topic. As the erroneous possible answers and knowledge that were formulated by the team could be shared by other learners, none of them were to be discarded; instead, they constituted possible wrong answers for the student to select. To further explain why they were not the desired answer, we asked the teams to write a short text hinting at the right answer.
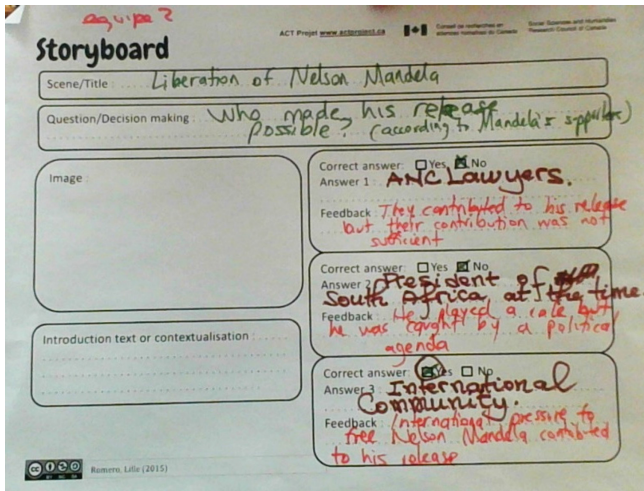

Fig. 3. Template distributed to the teams for supporting their game design process

3.4   Scaffolding the Game Creation Process in a Visual Programming Environment

Once the game design steps were completed, teams were asked to create a storyboard explaining what would constitute their game. They could create it by using either analog (pen and paper, post-its, blackboards, etc.) or digital tools. Each scene had to contextualize a key question developed in step 3.3 (Fig. 4).

Fig. 4. From game design templates to visual programming through Scratch

Now in possession of a storyboard, teams started digitally recreating their ideas in the visual programming tool Scratch (https://scratch.mit.edu/). Scratch is a visual, drag-and-drop programming software that allows the creation of interactive scenes and mini-games. Its appeal is broad, as it was created to be used by individuals from 7 to 107 years old. Scratch can support the creative programming approach — which goes well beyond the learning to code movement — to engage participants in creating new digital media, stories and artefacts through the use of programming [7, 15]. After a short introduction in how to use Scratch, each intergenerational team had less than an hour to code a mini-game. In order to scaffold the game creation process we provided a mini-game template to the students. As a team, they could explore the code of the mini-game and decide if they wanted to reuse the example as a template (changing the characters, decorum, texts and interactions) or if they wanted to start anew. In coherency with the growing research on ICTs, we observed that the programming part of the workshop was seen differently by the students and the older adults. While the younger members of the teams were trying to program through "trial and error", adults used a more reflexive approach; some asked for tutorials and many were trying to understand "why" it worked as it was before starting the design process (Fig. 5).

Fig. 5. Scratch game creation based on a game character

3.5   Peer Playing the Mini-Games Created by the Intergenerational Teams

Towards the end of the workshop, we invited the intergenerational teams to demonstrate their work to the other teams. Despite the different aspects that were not finished or not functioning, the participants enjoyed showing their creations to their peers. As a synthesis and a closing comments, participants gave their impressions of the workshop and of coding, its limits and the opportunities it generates as a pedagogical tool. For most of the participants, this intergenerational game design activity was a first both in terms of game design, intergenerational team-based process and coding. Despite the degree of novelty in the tasks to accomplish and the knowledge and competences related to the intergenerational participatory digital game design, the participants enjoyed the experience and were not uncomfortable despite being permanently out of their zone of proximal development and innovation.

4   Conclusion and Discussion

We found that using a highly guided approach to scaffold the intergenerational game creation workshop was a key element for its successful development. Having a predetermined topics list also helped in getting the teams to work quickly. In the same line, making explicit all the tasks that were to accomplish was beneficial to the flow of the workshop and ensured to achieve the pedagogical and intergenerational learning objectives.

As for the difficulties that rose, we noted that in one workshop held at the SGISS, one team had two computers to work on instead of one, shared by the whole team. The result was that this separated the team into two independent groups; each produced their own game without communicating with each other. This split hindered both teamwork and fun for the participants. We should also consider the important time investment required to prepare the intergenerational game creation workshops in terms of participants' recruitment and the preparation with the pedagogical staff in the different educational settings (i.e. high schools and community centers). Despite the efforts required to deploy the intergenerational game creation workshop, the intergenerational learning and cross-age social bonding are extraordinary, as all the actors engaged (learners, teachers, pedagogical experts, game designers, researchers) in these experiences appreciated at the highest level the experiences. Their feedback highlighted the benefits in terms of education, social participation and fun; this has propelled and encouraged us to continue enabling these experiences.

All participants in the workshops experienced an enjoyable and valuable intergenerational learning experience where they developed a joint knowledge creation activity through game design. In these activities, the final game product is not the objective, but an intergenerational facilitator; the game design process in itself is the core of the research as it is enabling participants from different ages and backgrounds to exchange about a certain topic and engage in a joint creative task where the competences and specific know-how of each one is valued and mobilized towards the objective. We invite

the digital game industry to introduce intergenerational game design and game evaluation activities when developing new products in order to better represent the needs and interests of different generations and genders.

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