Learning in Later Life While Engaging in Cross-Generational Digital Content Creation and Playful Educational Activities

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Abstract Older people (60+) are using digital technologies in growing numbers. Previous research has pointed out that digital game-based learning has positive effects on learning. Yet, older adults are often portrayed as passive receivers of digital information. Moreover, studies of digital games conducted with them have overlooked learning, focusing almost exclusively on helping older people to cope with age-related changes in functional abilities and improve intergenerational communication. This chapter reports on two case studies, which address digital video creation and digital gameplay in educational activities by older adults with mild-to-moderate age-related changes in functional abilities and different levels of previous experience of ICT use. Both case studies show older people learning more about themselves (i.e., realizing they have the skills to master computers and express themselves through digital technologies) and a number of different topics (ranging from contemporary digital technologies to literature and arts), while actively creating digital content and playing online digital games. The results show the potential of playful learning activities, and the importance of both inter- and intragenerational communication and taking into account older people's needs and interests, in order to envision a richer and diverse ICT-mediated learning in later life.

Keywords Older people • Digital content creation • Digital games • Learning in later life

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Introduction

This chapter addresses Digital Game-Based Learning (DGBL) across the lifespan within the context of Human–Computer Interaction (HCI) and Digital Games (DG). While older people (60+) are using digital technologies in growing numbers, they are often portrayed as passive receivers of digital information or remote observers (Vines et al. 2015), and previous studies argue that HCI researchers have largely been concerned with the downside of aging, focusing mostly on the design of assistive technologies (Rogers et al. 2014). Similar claims have been made in the field of DG. Despite the fact that previous research has pointed out that digital game-based learning has positive effects on learning (Van Eck 2006), studies of digital games with older people often focus on helping older players to cope with age-related changes in functional abilities and improve intergenerational communication (Mosberg Iversen 2014). By drawing upon two case studies, this chapter argues that older people can make a much more active use of ICTs and shows the potential of playful learning activities in order to envision a richer and diverse learning in later life.

The first case study focuses on digital video production (i.e., recording, editing, and sharing), whereas the second deals with digital gameplay and creation in educational activities. Taken together, both case studies show older people learning more about themselves (i.e., realizing they have the skills to master computers and express themselves through digital technologies) and about a number of different topics, ranging from ICTs to literature, while actively creating digital content and playing digital games. As our literature review will demonstrate, both learning behaviors while creating digital content and playing digital games have seldom been documented by previous research thus far (e.g., Ferreira et al. 2015; Ferreira 2015). Inter- and intragenerational communication aspects stood out in both case studies too. This result shows the value of collaborative playful learning activities, and community positive reinforcement, in learning in later life. Finally, the results suggest that taking into consideration older people's needs and interests, as well as age-related declines in functional abilities, when designing tools and ICT courses for them is key to foster and strengthen their engagement in learning and educational activities in older adulthood.

Literature Review

Digital Game-Based Learning and Older People

Digital games are becoming more and more popular among older adults (De Schutter et al. 2014; Marston 2013; Nap et al. 2014). Indeed, and despite the *grey* digital divide, much of previous research in HCI, DG, and gerontechnology portrays older people as actual or potential players of digital games (e.g., Brown 2012; De Schutter 2010; De Schutter and Malliet 2014; Ijsselsteijn et al. 2007; Nap et al.

2009; Pearce 2008). Their motivations for playing digital games range from entertainment (Pearce 2008; Nap et al. 2009) and avoiding social isolation (Kern et al. 2006; Quandt et al. 2009) to improving cognitive abilities (Luckner et al. 2013; Zelinski and Reyes 2009). A large number of digital games targeted at older people have also been designed, such as *Waterball* (Tsai et al. 2013), *Cogniplay* (Vasconcelos et al. 2012), *iStoppFalls* (Gschwind et al. 2014), and *Blast from the past* (Abeele and Schutter 2014). Common to these games is that they aim to help older people to cope with age-related changes in functional abilities, improve/enrich grandchildren–grandparent communication, and encourage cross-generational social interaction (Sayago et al. 2016). Despite this growing body of knowledge, previous research on digital games with older people has mostly overlooked learning. On the one hand, this might be surprising, because learning by playing games is well documented in the literature (especially, with children). On the other hand, however, failing to address learning might be accounted for the fact that learning in later life is a challenge, especially if age-related changes in cognition—namely, fluid intelligence (Czaja and Lee 2007)—are considered. By drawing on a 4-year ethnographical study with 420 older people in two different environments, Sayago et al. (2013) argue that older people adopt three strategies to become *successful* ICT learners (i.e., using ICTs over extended periods of time without the support of instructors/relatives) over time (a) linking learning to real-life needs, (b) learning collaboratively and informally, and (c) adopting appropriate memory aids. These results reinforce the need of understanding the learning needs of older people, where and how they learn in older adult education (Kern 2014). Yet, the relationship between learning, digital games, and older people (e.g., needs satisfied by playing games and collaboratively learning playful activities) still warrants further research. It is our conviction that by developing a better understanding of older people digital game-based learning, we could design technologies that not only compensate for "a lack of something" but also enrich their lives, thereby strengthening their social and digital inclusion.

Learning While Creating Digital Contents

Current research concerning the design of interactive technologies for older adults typically focuses on providing them with access to digital resources: "older adults are normally characterized as consumers, rather than producers, of digital content"(Waycott et al. 2013). Seeing this situation from a learning perspective, there is room for thinking that learning takes place in a rather traditional scenario (e.g., learning by reading). However, older people can actually become digital content creators, and this presents different learning opportunities (e.g., learning by creating digital contents). Karahasanovic conducted three studies that investigated elderly people's user requirements related to consumption, sharing, and co-creation of user-generated content online (Karahasanović et al. 2009). The results suggest that given the right circumstances, elderly people are eager to cocreate narratives

based on a common history or documenting the history of their neighborhood. By focusing on understanding the factors affecting elderly user's participation in online video creation, Ryu et al. (2009) conducted an online survey in which 290 online Korean people aged 50+ participated. Respondents reported being willing to adopt video creation services if some conditions, such as ease of participation, usefulness, and enjoyment, were satisfied. Harley and Fitzpatrick's studies analyzed 8 videos generated and uploaded by an older person, Peter, owner of a very popular YouTube channel and also known as "Geriatric1927" (Harley and Fitzpatrick 2008, 2009). The authors argued that intergenerational contact, reminiscence, reciprocal learning, and co-creation of content emerged from how the videos produced by Peter were used in YouTube. Despite the potential of digital content creation for opening up alternative and/or richer learning scenarios (e.g., learning by reading, doing and collaborating with others) than those which can be envisaged within the traditional digital content consumer perspective, what older people actually learn while creating digital content, and how they do it, still has not received much research attention.

Case Studies

We carried out two case studies (CS1 and CS2) in Àgora,[1] a 35-year-old highly participatory adult learning community in Barcelona, Spain. Since the 1980s, Àgora has been fostering the social inclusion of people who are, or might be, excluded from the Catalan society, such as immigrants and older people. To this end, Àgora adopts a dialogical learning approach (Aroca 1999), which empowers the students to decide what they want to learn in free courses.

CS1 focuses on older people's digital video creation. In CS1, we report on ethnographic research activities conducted over a 5-year (2010–2015) period in order to examine the relationship between active and healthy older people and ICTs. We participated in 21 computer courses and 18 drop-in sessions in Àgora as participant observers, resulting in a total of 298 h of fieldwork with 217 older people (aged 60 to 85; women: 120; men: 97) with different levels of experience with ICTs. We also conducted online observation on a daily basis of participants' use of Facebook, WhatsApp, and YouTube. Facebook and WhatsApp groups were set up to provide a closed channel of communication for the most active participants (44 Facebook, 25 WhatsApp), and those who were interested in using these technologies. The fieldworker (first author) was a Facebook friend of 50 participants and followed the YouTube uploads of three of them throughout the study. Participants reported having been using computers and the Internet for 3 months to 8 years. Participants were original from different Spanish regions and had low levels of educational attainment (70 % with at most primary school formal education).

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[1] Agora, Escola d`Adults de La Verneda-Sant Martí, Barcelona, Spain (http://www.edaverneda.org/).

CS2 focuses on playing and creating digital games. CS2 was conducted within the context of WorthPlay,[2] a 2-year project aimed to conceptualize, design, and evaluate digital games that are sufficiently appealing, meaningful, and playable in the everyday lives of older people. In CS2, the experiences of digital gameplay of older people interested and uninterested in digital games were explored. The study was divided into three phases: conceptualization, Participatory Action Research (PAR), and evaluation, which are described in full in (Sayago et al. 2016). The conceptualization phase was grounded in a 6-month ethnographical study of the play experiences of 178 active and healthy older people (75 % women and 25 % men) with different play interests. The design (and implementation) phase consisted of three Participatory Action Research (PAR) activities conducted with approximately 100 older people over a 2-month period. The evaluation was conducted in 3 European cities (Barcelona, Madrid, and Dundee) in order to validate/challenge the results of the ethnographical and PAR activities. Fifteen games were created and played by 99 older people with different cultural backgrounds. The age of the participants ranged from 60 to 85 years old. They reported to have different previous experience with ICTs, ranging from those who had never used computers and the Internet (approximately, 12 %), or had been using them for a few months or years (80 %) to those who had been using computers for more than two decades and owned smartphones (8 %).

In both case studies, fieldnotes were taken mostly immediately after the sessions, due to our active participation in most of them. Regarding data analysis, the analysis of fieldnotes in CS1 follows the interpretation of Nigel Gilbert (Researching Social Life) (Gilbert 2008) of Strauss and Corbin (Strauss and Corbin 1998) Grounded Theory's methodology. The fieldnotes were coded line-by-line (Open Coding), resulting in several preliminary categories (Axial Coding). The preliminary categories that emerged from Axial Coding were discussed among the authors until a clear outcome was agreed. In CS2, we adopted a thematic analysis (Braun and Clarke 2008) approach to analyze the data. All fieldnotes were read to identify common topics, and findings were discussed amongst the project team, which in turn led to the development of a corpus of "stories" from the activities. The main results are presented next.

Results

CS1: Digital Video Creation

While there are older people who are not motivated to use ICTs, there are others who are interested in learning ICTs by interacting with multimedia content and digital entertainment (Ferreira et al. 2014, 2016). As our ethnographical study in Àgora progressed, we witnessed how our participants moved from seeking and

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[2] http://worthplay.upf.edu.

watching YouTube videos to creating and editing their own digital videos and sharing them. They produced approximately 320 digital videos over the course of the study. We show that by engaging with digital video content technologies, participants learned more about ICTs and different ways of expressing themselves with these technologies. We observed, and participants confirmed, that two key results of this digital video content creation learning were enriched intra- and intergenerational communication and perceived digital social inclusion.

Learning More About Themselves, ICTs, and Digital Self-Expression

Participants' digital video creation was highly associated with how they appropriated digital video creation technologies. They appropriated these technologies in a social way, for example, creating videos, which were meaningful to them, and then sharing these videos with specific members of their community. Regardless of their previous knowledge of ICT, participants were motivated to operate new digital devices and applications in order to create videos and express themselves digitally, as the following two vignettes of representative cases illustrate.

Vignette 1: Learning More About Themselves and ICTs

Maria finds it very difficult to interact with computers. She actually does not like them very much. Yet, she thinks that nowadays it is important to know how to use technologies in order not to lag behind. Maria often takes part in courses in order to learn how to use computers and the Internet. She started taking the video creation courses. She had numerous difficulties in following the course. However, she was interested in the topic and took the course many times.

Maria often sits next to a more experienced participant, who creates the videos. Maria shares her opinions with this expert participant. Motivated by the course and the videos that the other participants were creating, Maria wanted to create her own video. Her first idea was to create a video about her birds. One day she used her camera for recording the birds while they were playing in the water. This was a very unusual activity for Maria, as she normally does not practice at home what she learns in the course. On the next video creation class, Maria brought her camera. She was very proud of her birds and her video. She wanted to show her birds to the other participants and needed help to transfer the video from the camera to the computer. However, the teacher of the course told her that she made a mistake and that there was no video in the camera. That was the first time Maria tried to use the camera to record a video on her own. Despite this shortcoming, a few weeks later she decided to practice again. She realized that she could do it, and this was an important change in her life and attitude toward computers. This time she decided to take pictures of one of her flowers, and then combined these pictures into a video. She had learned how to do so in the course. She eventually created a video. Maria was happy and more confident in herself.

Fig. 1 Participant's video experiment

Vignette 2: Learning More About Different Ways of Expressing Themselves

Pedro really enjoys interacting with technologies. He knows more about computers than most of his friends. He teaches MS PowerPoint to other older adults of his neighborhood. In his free time, Pedro enjoys practicing ICT and learning new things. Digital video creation has become his favorite activity: "*A good thing about creating videos is that there are so many effects and cool things that we can add to the video that it doesn't matter how much I practice, there is always something new to learn.*"

Pedro saw in YouTube a tutorial about how to change the background of a video. He got very interested in carrying out this task in his videos. He bought a plain fabric to make his experiments. One of his first experiments was to record himself talking and acting as if he was carrying an invisible ball—Pedro is mad about football and sports. He then looked for a nice background on Internet (he selected a picture of a beach). Pedro them created his video by combining his videos with the beach in the background. To make the video funnier, he included an animated picture of a ball. He had a lot of fun doing it and came up with more ideas to explore this technique further. Fig. 1 shows one of Pedro's video experiments.

Key Results of Digital Video Creation Learning: Enriched Cross-Generational Communication and Perceived Digital Social Inclusion

Participants perceived that sharing their digital videos with people they cared for, especially their children, grandchildren, and close friends, could strengthen their ties with them. They appropriated digital videos in a very social manner, and

sharing their videos was a very important step in their creation process. Sharing the videos they created was often used as a strategy to:

- Give a present, "*My daughter's birthday is in February and I want to give her a video as a present. She is a bit sick so I want to do something nice for her.*" [60, F25]
- Say "Hi," "*I liked the video a lot, it nearly gave me goose bumps!*" [41, F70e] "*Hi! Show it to your mom please! A special kiss for both of you!*" [64, F16] *(Conversation on [64, F16] Facebook's wall)*
- Catch up with friends and relatives, "*We're watching a video on my iPad. I recorded a couple of videos of my grandchildren this weekend and I was showing the videos to them before the session with you was due to begin. We took advantage of this to catch up on things, you know.*" [76, F39]

Moving from using analog videos and paper photographs to sharing media online also facilitated participants' intergenerational communication: "*(…) this is the video I recorded from the lunch last weekend* (showing the video in a *WhatsApp* conversation). *I sent it to my partner's son, who was also there. He told me that he liked it a lot*" [75, M3]. This interaction was promoted by using the same communication channels as those used by younger generations, such as e-mail, Facebook, YouTube, or WhatsApp.

Sharing their digital videos also gave rise to follow-up intra- and intergenerational conversations. The topics of most of these face-to-face or online conversations were about the memories the video brought up, the quality of the video, or the technologies applied, all of which contributed to their ICT learning. By talking with friends and relatives, participants received positive reinforcement and exchanged their knowledge about ICTs (teaching and learning new concepts). These social interactions increased their engagement in the video creation process and made them feel—as they told us—more socially and digitally included.

CS2: Creating and Playing Digital Games in Educational Activities

Previous research has addressed diversity amongst older people's use of digital games (De Schutter and Malliet 2014). In WorthPlay (Sayago et al. 2016), we observed that the relationship between older people with different cultural backgrounds and digital games is very diverse. While there are older people who do play games, others refuse point-blank to do so because they do not perceive the usefulness of engaging in gameplay. Thus, in an attempt to cater for this diversity, we decided to create an online platform whereby older people can create (and play) different types of quiz-based online games. Given the educational setting in which we conducted our research, we considered that quiz games could be the most appealing type of games to our participants. In this case study, we argue that (a) participants reported learning about ICTs and the topics of the games (e.g.,

mathematics, history, and arts) as a result of creating and playing them in the platform and (b) intragenerational interaction took on an important role in creating and playing games in collaborative learning scenarios.

Learning About Different Topics as a Result of Both Creating and Playing Digital Games in Collaborative Learning Scenarios

With respect to creating games, participants worked together in order to seek online information about the topic of the game. They also discussed how to write appealing questions. It might be worth noting that writing motivating questions is a cognitive-demanding task, as it calls for a comprehensive understanding of a topic plus writing abilities. Thus, creating games encouraged participants to brush up on their knowledge of a topic and make the most of their social, writing and reading skills.

With respect to playing games, most of the playing activities consisted of reading, discussing, and looking for information using contemporary ICTs in order to answer the questions of a game. When playing games, participants reinforced their learning by (a) reassessing aspects of a desired topic, (b) transferring the knowledge they acquired in the class or in the books to a digital learning scenario, and (c) learning new content adding up to their previous knowledge about a topic, for example, "*We have learnt several new things… I didn't know that there was a palace here… and I've been living here for a long time ago"* [Player, playing session in the book reading club].

Both creating and playing games were developed in collaborative learning scenarios, which corresponded to the already existing educational activities in Àgora. A noteworthy example is the *geolocated book quiz*, which was conducted with older people who met at a weekly book-reading club in Àgora, Fig. 2a and b. Participants were separated into two groups and were tasked with creating geolocated questions about the book they were reading by using smartphones or tablet devices and a geolocated web-based system (Santos et al. 2013). This quiz helped us to understand key elements of their playful experiences (e.g., learning and socializing) beyond winning or losing, in which participants had no interest.

Given that the platform was designed to be easy to use for novice ICT users and to introduce more expert users to popular online technologies, such as YouTube, Google Images, Wikipedia, or newspapers, creating and playing games in the WorthPlay platform was seen:

As a motivating way of introducing older people with little or no previous experience of ICT to these technologies, "*It broke the fear for working with the computer… it allows you to see what can be done in the computer and that you can do it… people enjoyed the activity, had fun with the questions, with the work, with the group… it is not just avoiding fear. It can be done and I can do it!"* [Coordinator of playing/interview about the experience of general knowledge game].

As a stimulating activity for more expert ones, "*If I click here… Is it going to open, so I can see more things? Look! Here in the side I can also see other news from today! (…) This is very useful for me! I didn't know how to see the news in the computer. I found this very interesting!*" [Player, playing session in the ICT learning course].

Fig. 2 (**a**) Geolocated book quiz: creating game session. (**b**) Geolocated book quiz: playing session

Design Recommendations

We consider that drawing design implications (or recommendations) from ethnographical research is difficult and controversial for, amongst other reasons, ethnography cannot (and should not) be reduced to a finite number of "bullet points"

(Dourish 2006). Yet, in this section, we aim to highlight key results that emerge from CS1 and CS2 in an attempt to (a) share with the reader important lessons we have learned in our case studies and (b) encourage future research studies to take them forward.

Older People ICT Learning is a Learning Area

Based on a literature review, Thalhammer draws attention to the fact that since older adults tend to learn in nonformal rather than formal settings, it is important to understand the extent to which ICTs actually influence their daily life and whether this is in fact perceived as a learning area (Thalhammer 2014). While there are reasons to believe that older people might not be able to learn to use ICTs because of age-related changes in fluid intelligence, our results, along with some previous research (e.g., Sayago et al. 2013), show that this is not the case, and that older people ICT learning is actually a learning area. ICTs (can) influence multiple facets of older people's everyday lives, and how they learn to use these technologies is highly determined by these activities, as well as other factors, such as social relationships, personal interests, and life experiences. With respect to the dichotomy nonformal vs. formal learning alluded in Thalhammer's statement (Thalhammer 2014), CS1 and CS2 show that there is a lot of nonformal ICT learning in Àgora. Perhaps, informal ICT learning is more suitable for older people than formal learning, given that most of them (at least, our participants) are more interested in actually learning how to use the technologies in their everyday lives than in getting official certificates and passing exams. This is a research issue that can be addressed further in future studies.

Putting Older People First

The results of CS1 and CS2 suggest that when thinking in terms of designing ICTs for learning, it is very important to put older people first. This is not to say that technology is not important. However, instead of coming up with a new technological development that can potentially help older people to take their learning forward and trying to fit that technology in their daily lives in some way or another, we could (and should) first of all understand the characteristics of the user group, identify their learning interests and practices, and then think which and how technology could enrich their actual learning process. While this design philosophy is not new at all within HCI (e.g., user-centered design), we perceive a risk of putting technology first when it comes to older people, especially because of widespread stereotypes associated with ageing and ICTs (Durick et al. 2013).

Going Beyond Stereotypes

We (or, at least, a large number of us) tend to have preconceived ideas of old age and older people. This is due in part to our own experiences of ageing, which include, for instance, our grandparents, elderly neighbors, and older people in the street (e.g., shopping, walking, and commuting). These experiences of ageing determine the way in which we think about older adults. For instance, it might be surprising for a great many of us to realize that older people can actually learn to create digital games (CS2) because our grandparents struggle to learn how to operate a digital TV or a new mobile phone with a different menu. Creativity, which is addressed in CS1, might also be surprising, since old age tends to be associated with a period of declines in functional abilities. Both case studies encourage us to go beyond stereotypes when it comes to ICT learning and older people.

Cross-Generational Communication is Very Important in Effective Learning in Later Life

As one might expect, communication cuts across CS1 and CS2, wherein it played different roles. By keeping in touch with younger relatives and members of their local community by using contemporary digital technologies, our participants reported feeling more social and digitally included. By sharing their videos with their friends and discussing about the answers of a question in a game, our participants learned further aspects of technologies, a book they were reading, etc. These results indicate that the learning of our participants was both an individual and social activity, thereby reinforcing the importance of communication in ageing (Nussbaum et al. 2000). Thus, these findings suggest that designing tools that promote cross-generational communication is important to foster effective and engaging ICT learning amongst older people.

Conclusion and Future Work

In this chapter, we have presented two case studies that challenge widespread views of older people within HCI, wherein they are seen as consumers rather than producers of digital content (Waycott et al. 2013), and take forward previous HCI and DG research by showing older people learning more about themselves, a wide range of topics, ICTs, and self-expression by actively producing digital content, and creating and playing digital games in educational activities. Those older people who participated in our study were highly motivated to engage in digital content creation activities. They saw in these activities an opportunity to enrich their intra- and intergenerational communication. By seeing the value of the digital video creation in

their daily life, participants engaged in the creation process and were very motivated to keep learning more about video creating and sharing tools. The WorthPlay platform was successfully integrated into already established collaborative learning scenarios. Learning therefore happened by reinforcing part of the content presented in regular courses and by adding a playful and digital element to them. Overall, both case studies show the potential of digital playful learning activities to enhance learning (of ICTs, and other topics) in later life.

These results should be understood by bearing in mind the profile of our participants and the setting in which we conducted our research. That is, one of the most important limitations of this chapter is that the results presented herein might not be easy to generalize to other profiles of older people and settings. Future research can deepen and widen the results presented in this study.

In terms of future research perspectives, the creativity shown by our participants is worth noting, especially because current HCI research with the older population is dominated by removing usability and accessibility barriers due to ageing, "as if creativity (and outstanding performance) were not significant parts of aging" (Cohen 2006). Thus, future research studies could explore creativity and its relationship with DGBL and older people. It might also be important to point out that participants were able to personalize the activities according to their interests. This personalization turned out to be essential for engaging them in the learning process and strengthening their relationship with ICTs. As games are effective not because of what they are, but because of what they embody and what learners are doing as they play a game (Van Eck 2006), in our studies, the content of the activities and the discussions among the participants were crucial in their engagement with the learning activities. Future studies can also look into different ways of personalizing educational activities by adding a ludic element to them.

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