The Space Journey Game: An Intergenerational Pervasive Experience

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ABSTRACT

There is a need to re-design the entertainment systems for the older adults, incorporating the population of this age group into the digital culture. With this aim in mind this work presents an intergenerational experience carried out in an Interactive Space where tangible and gestures interaction are used to participate in pervasive gaming experiences. The experience makes use of a game initially designed just for children but in a very flexible way so that it can be tailored to different players' characteristics. Family groups made up of one or two grandparents and one or two grandchildren have played together The Fantastic Journey fulfilling all the missions either on tangible tabletops, just moving around the space or interacting by gestures. The experience was positively valued by both age groups; they were indeed happy with the opportunity of playing together in a challenging game. Nevertheless, the difficulty of designing engaging experiences for both age groups points to a challenging research area.

KEYWORDS

Intergenerational play; Interactive Spaces; Pervasive Games

1 INTRODUCTION: INTERGENERATIONAL GAMING EXPERIENCES IN INTERACTIVE SPACES

Older people represent a growing proportion of the world population. Between 2000 and 2050, the proportion of the world's population over 60 years will double from about 11% to 22%. In our occidental societies, the older adults often suffer from social and emotional isolation. In line with other transformations produced by the networked society and by the incorporation of ICTs into the field of digital entertainment, there is a need to re-design the entertainment systems for the older adults, incorporating the population of this age group into the digital culture, and promoting their active aging.

The increase of life expectancy has given grandparents the opportunity to interact with their grandchildren and participate in their lives. Digital games can be individually beneficial for both generations. For older adults, they can improve cognitive functioning; overcome communication problems and social isolation; encourage physical exercising and prevent falls. For children, collaborative digital games can improve learning, skill building, and healthy development. Moreover, intergenerational interactions can be mutually beneficial for both collectives: breaking with some age stereotypes or ageist attitudes; developing civic engagement and contributing to an age inclusive society [8].

Intergenerational game creation is scarcely found in the HCI literature. The following recommendations for designing intergenerational digital games were the most cited [4,5]: prioritize physical, mixed-reality games and multimodal interaction; support collaborative storytelling; prioritize peer-to-peer mentoring, collaboration, scaffolding, and learning; enable social interactions, shared context, and meeting places.

Pervasive games overcome traditional digital games' drawbacks increasing physical activity and social interaction while maintaining their intrinsic motivation [2]. The term has several definitions that set the focus in different issues related to the games. In spite of this ambiguity three common characteristics are shared by all of them: the mixing of real and virtual world, the support of natural styles of interactions (voice, tangibles, gestures), and their strong social component. This strong social component may be used to facilitate interactions between older and younger generations, diminishing intergenerational gaps.

In the context of a national research project, an Interactive Space (IS) has been developed at the ETOPIA Art and Technology Center of Zaragoza's City Council. The IS supports tangible and gestures interaction to be used in pervasive gaming experiences. To create them a theoretical framework and a software toolkit have been developed. Thanks to that framework artistic [6] and educational [7] ludic experiences are being held. In particular, a pervasive game called "The Fantastic Journey" has been created to work children's cognitive, manipulative and social skills. Our hypothesis was that pervasive games, due to their strong social component, and interactive spaces, as they support mixed (physical/digital) and multimodal interactions and provide a shared context and gaming place, would be an ideal basis to carry out intergenerational gaming experiences. This work presents such an experience based on the Fantastic Journey game.
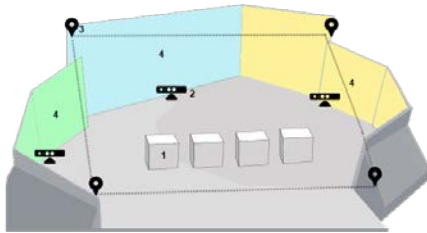
Figure 1: JUGUEMOS Interactive Space. 1: Tabletop devices; 2: Kinect sensors; 3. Real Time Localization System; 4. Video projection on walls

Figure 2. Meeting Pipo, the game main character

2. THE FANTASTIC JOURNEY

The game has been designed to be played in the JUGUEMOS IS. It is an indoor space of around 70 m² (see Figure1). It includes a real-time localization system, two Kinects (to support gesture interaction), microphones, and projectors. It includes a set of four NikVision tangible tabletop devices which have been proved to be useful for kids to improve their cognitive, manipulative and social skills [3].

The game was initially conceived for children with attention and concentration problems but following an inclusive perspective, so that it could be useful for all children. The game helps to work these aspects in a funny way by combining different goals, devices and technologies. Regarding the development of the game, the GeoPGD methodological proposal for pervasive game development was followed. This proposal evolves from the classic approach of game development, adapting it to the features of these games [1]. The four components of GeoPGD (pervasive narrative, game world, rules and pervasive dynamics) should be defined in order to specify a pervasive game, which is done in the Game Experience Design Document (GEDD). In next section, an overview of the game is presented.

2.1 Features, gameplay and story

The game is an adventure game, in which the protagonist has to progress over the story interacting with different characters and objects. It is a multiplayer game: players have to interact in a collaborative way to achieve the goal. The game is played between the real world and the virtual game. This implies that the game is pervasive mainly in the physical dimension, as players can freely move throughout the interactive space. It also could have some kind of social pervasiveness, as players may interact with other people in the space and ask them for help.

The story is about a girl called Pipo (see Fig.2), who has a dream in which she puts on a magic hat. With the hat on, she flies into the space, where she meets the Comet of laughs, which delivers laughs all over the universe. During the encounter, Pipo gets lost with the bag of laughs. Then, she decides to travel through the space to find the comet and return the bag. During the journey she meets different characters (Saturn, the Sun, the Moon,..) and will have to perform certain missions to continue the journey.

The target players are children between 7 and 12 years. Four teams of four children each is formed at the beginning of the play. Each of them is given a batch with a planet name with corresponds with the names of the four tabletops (that act as their spaceships). The missions have to be accomplished by all teams: if one team ends quickly their members can help the other teams to fulfill their challenge.

Children are accompanied by one of more mediators, which help them if they need it and control the progress of the game. The game mediator can adapt the level of difficulty, repeat mission instructions or even skip an activity. This makes the experience quite adaptable to different players' characteristics.

Figure 3. The search of the suitcase mission

Figure 4. Starloop mission

Figure 5. Planet of Indians mission

2.2 Missions

The missions to be fulfilled make use of the technologies present in the interactive space.

Magic words. Here, players have to pay attention to the lyrics of a song and then, order the words that make up the chorus. This is made with physical words put on the tabletop devices

The sun and the moon. In this mission, players have to make up the shapes of the sun and the moon (projected on a wall) by placing themselves (localization) inside the silhouettes.

The search for the suitcase. Here, players have to find a suitcase hidden in the IS (see Fig.3). The suitcase is closed with a padlock. The key can be obtained by playing Starloop [7], a game that were developed to improve computational thinking in kids (see Fig.4).

Keyword. This mission allows working attention in both selective and global levels. Children will listen to a story in which a word is constantly repeated. Then, they will have to find the word in a word soup that is projected on the tabletop devices.

Planet of Indians. Here, players have to follow sound patterns, so successive processing and selective attention are worked. Each tabletop device represents a color and a sound (see Fig.5). Players have to reproduce a sound sequence by hitting the tabletop with drumsticks in the correct order.

Freeing the stars. Here, the goal is to free three stars that have been trapped in a spider web. Selective attention and simultaneous processing are the abilities developed. The player has to select the elements required by means of gestural interaction (see Fig.6).

Meteorite attack. This mission is about destroying a set of meteorites. It helps to work on selective attention and planning of time-space paths. The meteorites get destroyed by shooting them with spaceships on the tabletops.

Butterflies. In this game, players must stay quiet so that the butterflies that are projected on the walls are placed on the flowers and can be counted. The idea is to work on the inhibition of impulsive behaviors and on self-control.

Encounter with the Comet of laughs. The last phase of the game consists of a projection of the last scene, in which the protagonist meets the Comet of laughs, and of the playing of the song of the game, which will be sung and danced by the players to celebrate the success of the mission.

3. INTERGENERATIONAL EXPERIENCES

Two intergenerational experiences were done during Christmas holidays (all the precedent mission figures were taken during those experiences). They were announced through the municipal web and family groups formed by one or two grandparents and one or two grandchildren aging from 7 to 12 could sign up. In the first group there were 18 people so two families were put together in one of the tabletops. In the second group, there was just a family in each tabletop. As the game mediator could stop, and tailor the missions during the play it was decided to play the game as usual. Only a greeting from Pipo's grandma was added to welcome the families when they entered the Interactive Space (see Fig.7). One researcher took observation notes and two other helped

Figure 6. Freeing the stars mission

Figure 7. Pipo's grandma

Figure 8. Talking and writing with the grandparents about the experience

players with the different missions. The game lasted one hour plus 15 minutes to talk with both age groups (separately).

The family groups were able to get through all the missions without special difficulties. Compared to usual children-only groups, children were observed to be more quiet and careful when playing. Following main observations are commented.

With regard to participation:

In general they all helped and facilitated that all of them could see what was happening and could participate in the missions. They all celebrated their achievements. Especially grandparents celebrated them, singing Pipo's song after the missions.

In terms of leadership:

Children made proposals and grandparents observed or helped. In general, the grandparents were much more prudent than children, acting slowly, leaving the children take decisions and act. When children failed to perform activities, then grandparents began to act and to take decisions.

Regarding mediation:

Grandparents provided the children with the materials needed for the missions. They gave instructions and advices when children got stacked. Some grandparents organized turns among their grandchildren and encouraged them to help other teams after having accomplished their own missions.

In some activities interaction was quite intensive:

- In the Starloop mission some grandparents participated quite actively, giving advice about the best strategies. They also expressed curiosity asking the children to explain how they had succeeded in completing the activities ("Why have you put this tab here?")
- In the suitcase mission, the suitcase was a quite old-fashion one and the grandparents had to explain the children how to open it.
- In the word soup, grandparents got involved much more actively giving precise instructions.

After the play players were divided in two age groups. Grandparents filled a questionnaire (se Table1). Children preferred just to talk about the experience. Many of them said that even though they spend quite a lot of time with their grandparents they do not play with them ("It has been the first time my grandfather has been playing with me"). They all thought that their grandparents would not been able to finish the game without their help. Nevertheless, they admitted that in some missions, such as the word soup, their grandparents had been better than them.

In both groups the game was very positively considered. They all agree they had had a good time and thanked the opportunity of playing together.

4. CONCLUSIONS

In spite of the time spent together (in Spain grandparents take care of the children to allow their mothers go to work) they usually don't have many opportunities to spend time just playing together. Video games have not been designed thinking in grandparents and they feel too incom-

Table 1. Questionnaire filled by grandparents (left) and common answers (right).

Have I come to realize what my grandchild needed?	*No / He/she knew everything / I needed more help.*
How have I helped him/her?	*He/she didn't need help /Almost nothing,/ Little/ Moral support.*
When we have had difficulties, we have solved them …	*Talking / Fondly / Completely normal /Going back to try it.*
In this game, when we have been playing together, it has been different from other occasions because…	*I was more confused / nothing / We had illusion /It was very pleasant.*
I have discovered my grandchild to be…	*Fast / Eager to participate with me /Quite attentive/Needed to play with more children.*
Playing with my grandson, I've felt…	*Always very happy/ Happy/ Slow, stupid*
In what activity have I played better with him/her?	*In remembering things/ In all of them*
The game I liked most is….	*All of them*
The game that I liked least is….	*None*

petent to play with them. Common grandparent games such as domino or cards are not considered sufficiently engaging by the children. There is a necessity of designing games that can engage both collectives, making it possible to include grandparents in digital entertainment.

The experience presented here was quite successful and showed the potential of interactive spaces and pervasive games to support intergenerational entertainment. Nevertheless, the design of such intergenerational games is quite challenging. In our short experience we detected the necessity of including activities in which grandparents feel competent so that they can show their knowledge and skills to their grandchildren. More technologically advanced activities give grandchildren the opportunity of showing their grandparents their competences and interests. But designers should be very careful when designing them so that they do not make grandparents feel that they do not have enough skills to play with their grandchildren. Moreover, grandparents tend to choose a secondary role being difficult for them to take the initiative. The challenge of designing engaging gaming experiences for both age groups is considerable but the prize will be a more age inclusive society.

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