Exergames and Dementia: Discussing and Reflecting Preliminary Results from an Exploratory Field Study

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Abstract
This paper reports on a study with people with dementia and videogame-based exergames affected the daily life routines of them and their caregivers. Over the course of 8 months, we collected qualitative data and investigated practices and attitudes of people with dementia and their informal and professional caregivers by conducting interviews and accompanying them in their daily routines. Findings indicate that perceived quality of life for both improved and people with dementia were able to retake parts of their social and daily activities. Preliminary results from our research, we suggest, may serve as a starting point to discuss and reflect the related challenges of using exergames in the context of dementia.

Author Keywords
Dementia; exergame; ICT; participatory design; social support; caregivers; field study;

Introduction
Video game-based prevention and intervention programs like exergames, which are video games that involve different exercises, and integrates exercises as listed above may ease the access for people with dementia, improve their physical and mental capabilities and relieve related stakeholders. The use of exergames combined with an integral approach may support and promote a self-sustained life-style for people with dementia and their caregivers. In this context, ICT-based solutions are a promising approach

for people with dementia and their caregivers. Developing an appropriate ICT-based system for people with dementia requires to identify relevant stakeholder and environmental needs and negotiate them for the design and research process. This field of design and research, concerning the highly sensitive setting with people with dementia and their social surrounding, represents a special challenge for every actor in this process.

Designing technologies based upon participatory and experience-based research offers a significant advantage with regard to uncovering and respecting the social, emotional, ethical and legal concerns, as well as different needs of all stakeholders [1]–[5]. In the case of people with dementia and their caregivers, using participatory design methods can support integration and appropriation by allowing the space for a deeper understanding of their individual demands [6], the collective development of design decisions [7]–[9], and the inclusion of all stakeholders into the design process [3]. A specific advantage of the presented work and underlying approach here is that participatory design-based research, especially considering dementia and technology addresses the need to go beyond single case studies [10].

The workshop will therefore serve as a platform to discuss and reflect the presented findings with regard to other current research activities, methodological concepts, and experiences in the field of qualitative work with respect to research and technology design for people with dementia.

The Project

MobiAssist

Within the project MobiAssist, we have developed videogame-based exergames to support daily life activities of people with dementia and their caregivers. The training exercises address physical, creative and cognitive areas. The motion-sensing-based exercise training program is running on a space-saving and quiet mini-computer to reduce the disturbances of using too much technology. Currently, a MS Kinect is used to detect the motions of the participant while interacting with the system, but the open implementation will allow other cameras to be used as well.

Figure 1: Training Session with Grandchildren at home

To simplify the interaction with the overall system, a tablet and a PlayStation 3 Buzzer were used. The tablet shows the current exercise plan, the results of the different games and education material about the disease, while the Buzzer with its big colourful buttons is used as input device during the games. In an eight-month participatory design study, the authors designed a prototype system for the support of daily life activities

for people with dementia. In total, 31 semi-structured interviews and 70 moderated group-sessions were conducted.

Methods and Data

The presented study was conducted in three day-care facilities and ambulatory care environments with people with dementia. The aim of the study was to investigate the integration of the exergames into the daily routines of people with dementia and their informal and professional caregivers over a longer period of time (in total 8-months). Here, relevant aspects concentrate on sustainable effects of exergames on individual performance and social interaction. First, we conducted interviews with people with dementia, their relatives and other stakeholders such as caregivers, therapists and doctors to gain meaningful insights about the participants' daily routines, their biographical background, memory and social environment, and therapeutically successful field test methods and instruments. During the following exploratory study, we evaluated the system over a period of 34 weeks with three participants with early stage of dementia at their home setting and in three day-care centres in a group setting, where the authors trained with three to five participants with early to medium dementia in weekly sessions.

Preliminary Findings

Findings indicate that the participants and caregivers benefited in different dimensions.
Health improvements: Most of the participants were able to improve their physical abilities, e.g. improvements in gait, coordination, mobility, balance and stability. These results are further complemented by the promotion of cognitive abilities that were observed with people with dementia, in terms of learning effects and fostered memories.

Benefits for caregivers: In addition to the benefits for people with dementia, the relatives benefited from the use of the system, for instance by supporting the daily routines, gaining more leisure time and decreasing physical and emotional stress resulting from care. Furthermore, informal and professional caregivers recommend the ICT-system as a permanent feature at home and in day-care centers.

Impacts on daily life: The findings also illustrated social impacts induced by using the system. Participants developed a strong sense of advanced social collaborations. By integrating strength training, balance games and creative exergames into the daily routines and activities in their familiar environment, as well as into the day-care facilities of people with dementia, existing family and friend relationships have been strengthened, intergenerational exchange happened and therefore social responsibility was regained, and general social interaction increased.

Well-being and social interaction: Participants showed strong motivation and enthusiasm, initiated learning processes, collaborated and understood the underlying concept of the exergames and its content.

Workshop Goals

After two years of working in the research project and setting, the workshop will be used to present:
- results from the field study,
- methodological background,
- barriers and challenges from "on the ground"-field work

Furthermore, the workshop can serve to discuss and reflect the results, challenges, as well as the research questions and underlying methodological framework on a theoretical and practical perspective.

The following question will serve as an orientation for discussion:

- How to integrate people with dementia in different stages of research?
- How to develop user or stakeholder-centered technology with regard to the special needs of this sensitive target group and their related professional and informal caregivers be relieved by integrating the system into the different settings?
- How to deal with the emotional challenging situations with this special target group with respect the mood-instability, anxiety, repressed memories, and emotional reactions like sensitive setting and deterioration of physical and cognitive capabilities, from researcher perspective?

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