

Evaluating the potential of the Nintendo Wii to support disabled students in education



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This paper describes a new project aimed at identifying the potential of the new generation of games consoles to support learners with disabilities. The Nintendo Wii represents an innovation in the way players interact with games through the use of a remote control device that provides a more intuitive and realistic means of control and interaction. By selecting simulations, team and adventure games and evaluating them with focus groups based on students with particular types of disability, the objective is to evaluate and identify the accessibility of this type of games console and evaluate its potential for supporting disabled learners in an educational context.

Introduction

The *Nintendo Wii* is one of the latest generation of video games consoles and incorporates a number of innovative features designed to target a broader demographic of users than other gaming systems. Its distinguishing feature is the wireless controller, the Wii Remote which contains a sensor able to detect motion and rotation in three dimensions. The wireless controller is not based on the traditional gamepad controller design, but instead assumes a one-handed remote control-based design. This control method is intended to make motion sensitivity more intuitive, the remote design is suited perfectly for pointing, and to make the device seem more familiar to the non-gaming public. It allows players to control elements of the game, such as swords or tennis rackets, by pointing at the image on the screen and moving their arm and hands.

This level of physical interaction with the games is innovative in mainstream gaming, and this, combined with the nature of the games available for the Wii (such as *Wii Sports*), has specific considerations in terms of accessibility and engagement as well as the social aspects of gaming.

The objective of this project is to effectively research and evaluate the accessibility of the games consoles and control devices and the interaction afforded with the games by the controllers. A number of games will be used to evaluate the potential for supporting different types of disability. A maximum of four Wii Remote controllers can be attached to one Wii console, this will facilitate examination of the social and collaborative aspect of using the games consoles in an educational context.

Background

The use of video games in an educational context is an area of increasing research interest. The use of a virtual environment such as those found in games has the potential for users to participate on equal terms regardless of academic achievement and to some extent, disability. Research has consistently shown that playing computer games increases reaction times, improves hand-eye co-ordination and raises players' self-esteem (Lawrence, 1986).

Studies suggest that important skills such as communication and collaboration (e.g. Bailey et al, 2006) may be built or reinforced by video games through their capacity to offer a more social approach to learning and collaboration. Video games have been used to help develop social skills in children and adolescents who have severe cognitive disabilities and developmental problems such as autism (Sedlak et al., 1982; Gaylord-Ross et al., 1984; Demarest, 2000). Although autistic children can have serious deficiencies in language and understanding, video games are one activity they can excel at, it can assist in the development of language skills, social skills and basic mathematics and reading abilities.

Videogames have been used to train small groups of children with multiple disabilities to make scan and selection responses, skills which were transferred to a communication device (Horn, 1991). Other research has shown that videogames can help children with learning disabilities develop spatial abilities (Masendorf, 1993), complete problem solving exercises (Hollinsworth & Woodward, 1993), and mathematical ability (Okolo, 1992a). Other researchers have suggested how best to use computer

technology to improve achievement and enhance the motivation of individuals with learning difficulties (Blechman et al., 1986; Okolo, 1992b).

Video games have been used as a form of physiotherapy or occupational therapy, such rehabilitation of mobility problems, with many different groups (Szer, 1983; King, 1983; Sietsema et al., 1993; Krichevets et al, 1994). Games have also been used to encourage physical activity in wheelchair users (O'Connor et al, 2000), and as a muscle training aid for young patients with muscular dystrophy (Vilozni et al., 1994). Video games used in this context can be beneficial by removing some of the boredom associated with making a series of repetitive movements and can act as a distraction from pain. Research has demonstrated that videogames can be used to improve children's health care after playing health education and disease management video games (Cahill, 1994; Brown et al, 1997; Thomas, Cahill, & Santilli, 1997; Lieberman, 2001). Griffiths (2003), suggests that provided care is taken in the design, videogames used in the right context can have the potential to be used as training aids in classrooms and therapeutic settings, and to provide skills in psychomotor coordination, and in simulations of real life events.

One of the major problems with this area of research is that reported positive effects from video games in a health and fitness context, is that bespoke games were used, rather than those that were commercially available. In addition, much of the previous research dates from the 1980s and early 1990s and therefore may not be as relevant to modern games consoles and games, particularly considering the interactive nature of the Wii. The research on the social aspects of video games will build upon a project previously carried out by the research group concerned.

Project description

The project will investigate the accessibility of the Nintendo Wii and selected games for students with disabilities (principally physical and learning disabilities). The objective is to explore and evaluate the system's potential for supporting disabled students in the educational context.

The rationale for the project is that the innovative features of the Wii console have different accessibility considerations in terms of the physical interaction the user has with the console and new engagement mechanisms compared to previous games consoles. The physical nature of the interaction may engage particular groups in individual and collaborative activities, which they otherwise may not previously have been able to take part in.

Taking a range of games we will observe focus groups of disabled and non-disabled students to determine the accessibility of the Wii in terms of physical interaction and the extent to which disabled students are able to participate in the games. Focus groups will be drawn from different age groups and with different types of disability and their experiences observed and recorded. We aim to identify the types of game and elements within those games that are appealing and provide support to disabled students in achieving the stated goals of the games. We will also explore the physical requirements of games using the Wii controller for operations such as push, pull, lift, throw and the extent to which people with physical disabilities are able to carry out these actions using this console.

Three types of game will be used in this evaluation:

- Simulation of real life activities in a fun and safe setting (Cooking Mama, Wii Play):
These games will be evaluated in terms of their success and potential for supporting young adults with learning difficulties and students with physical disabilities in developing transferable skills in a safe environment. Cooking Mama focuses on cooking skills such as chopping, peeling, slicing and following a recipe, while Wii Play provides simulations of a number of sport or game based activities.
- Online team game (Mario Strikers: Charged Football, Wii Sports)
These games will be evaluated in terms of their opportunities for the development of collaboration, communication and group decision making skills as well as for their physical requirements. Mario Strikers in particular incorporates strategic elements in its gameplay. Both games have multiplayer modes for up to four participants. The focus here will be on students with social/emotional and/or learning difficulties, and those with physical disabilities.
- Adventure game (Wing Island)
The focus of this evaluation will be in the games potential for providing players with experiences they might not otherwise have (such as flying) and its potential in the educational context for supporting activities such as field trips and work experience. The game features a collaborative two player mode,

the potential of which to support collaborative learning will be examined. The student focus groups will include those with physical and learning disabilities.

These observations will enable us to identify and evaluate the accessibility of the console and in particular, the input device; evaluate the potential of these Wii games for developing key skills, such as communication, collaboration, decision making, and to support physical activity; and to suggest areas for further investigation to translate these games and gaming principles to the educational context.

Conclusion

The results of our evaluations will enable us to report on the accessibility of the Wii games console and selected games for people with different disabilities. We will produce an outline specification for games that can be used in an educational context and the ways that these games might be used, for instance for therapeutic/physiotherapy purposes, for simulation of real life activities in a safe environment; and for supporting the development of key skills such as collaboration, communication and coordination. We anticipate that this project will contribute to the body of research on the use of video games in education in the context of next generation gaming and will provide a starting point for potential cross disciplinary research including, Computing, Sports Science, Health and Education.

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