Playing in the Sandbox: Developing games for children with disabilities.

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ABSTRACT

Many researchers believe that special games are needed for people with special needs. However, this study highlights some of the issues surrounding computer games and disabled children by conducting interviews to ask them what games they would like to play. Interestingly, they wanted to play the same games that everyone else did. What they do need is a way of interacting with these games, especially those on Xbox and Playstation consoles, which require two very dexterous hands to control. This paper is the start of an ongoing project to investigate input devices for disabled people, to allow them to interact with other players through playing commercial multiplayer games. The study also considers the issues of using computer games to test the abilities of disabled people in an attempt to integrate them into mainstream society.

Keywords

Input devices, Cognitive abilities, Disabled players, Multiplayer, Research

BACKGROUND

With academics having opposing views as to what the attributes that game designers should focus on are, critics often turn discussing what affect the games have on the children playing them. Subrahmanyam, Kraut, Greenfield, and Gross [7] discuss various reports on the impact of computers and computer games on a child's development. The majority of these are qualitative, and Subrahmanyam et al. admit that the findings of these studies are only suggestive. They cite several papers that suggest links between inactivity playing computer games and child obesity, and promote the view that games such as first person shooter games, can lead to

aggressive behaviour. They discuss the question of increased academic performance through playing games yet admit that there is no systematic research to support a firm conclusion. However they do highlight multiplayer games, where communities are formed and in-game communication between players occurs, as an area where social relationships and psychological well being may be affected; however, they neither make conclusions nor offer any rigorous research.

Nevertheless, one study has been completed into this area, and offers some tangible results: Attewell, Suazo-Garcia, and Battle [1] studied 1,680 school children in the UK, between the ages of four and thirteen. They included social aspects, such as self-esteem and obesity, as well as performance factors like cognitive abilities in academic competence. The results of their study show that children who used computers not only scored significantly higher on cognitive tests, but also spent more time reading books than those who didn't use a computer. However, the difficult question is not answered of whether or not children who read more and have higher cognitive abilities are naturally attracted to computers. Attewell et al. noted that computer users also scored higher in the self-esteem tests, but this was only for children that used a computer for less than eight hours per week. Children that used a computer for more than eight hours tended to suffer from obesity and had low self-esteem, possibly as a result of the weight problem. Interestingly, Attewell et al. also found that television had a detrimental effect on outdoor activities, where as computer usage did not. They concluded that modest use of computers by children was significantly beneficial, both socially and academically. They also highlighted the fact that the majority of the children's computer usage was for playing computer games. Wylie [10] concurs with these findings. In a study of 500 children in New Zealand between the ages of five and ten, she found that television impacted adversely on children's reading where computers did not. Wylie also found that children's visual skills were increased from playing computer games. She maintains that no adverse social effects are seen when playing moderate amounts of games, but notes that other researchers claim that aggression is linked to excessive playing time (more than thirty hours per week).

Wartella [8] found that 70% of households with school age children in the United States have home computers, and that the most common use of these computers is playing computer games. Wartella noted that as children grow older, they prefer not to play games that are educational by design; opting for action/adventure and role-playing games. She states that although many researches suggest that cognitive skills are increased through the use of computer games, there is very little solid research to back this claim. According to Wartella, one of the driving factors of parents buying home computers is for connection to the Internet and learning from multimedia information. She postulates that this, and the extra attention given to these children by their involved parents, may be that reason for the increased learning ability. Wartella also reviewed claims from other studies suggesting a link between action games, such as first-person shooters, and aggressive behaviour in children. She admits that evidence is limited and further research is warranted. She discusses multiplayer role playing games and how these may affect a child's development and whether or not children can differentiate between fantasy and reality. Wartella agrees that a child's

fantasy and role-play is important for their social development, but is undecided whether the digital version of this adds to emotional and social development.

Russ Holland, the program director for the Alliance for Technology Access at Microsoft, suggests that the most popular game for people with disabilities are simulated sports games. He suggests that for children with disabilities "they may not be able to get down in the sandbox, but if we can simulate the sandbox in a game, they can have some of those same experiences" [5]. He also suggests that games are the easiest way to teach students about computer skills, however for many children with disabilities, it is not about learning to use a computer. These students enjoy playing car racing games because it was the nearest that they will ever come to driving a real car. They are convinced that it will help them learn control of their motorised wheelchairs and perhaps even drive a car with special disability controls. Interestingly, many of the companies that fit hand controls to automobiles, use commercial computer games to test the hand-eye co-ordination of the potential driver; commercial car-racing games that are not designed for anything except entertainment. However, there is a general theme throughout the literature that suggests a relationship between emotional and social development, cognitive abilities, and environments such as computer games.

METHODOLOGY

Qualitative interviews were conducted with cerebral palsy students between the ages of 18 and 21, who were in their last year of attending a centre attached to a mainstream high school. The interviews were in the form of an informal conversation with each student, some communicating through a pathway talking machine. A structured conversation with the student's teacher was completed after conversations with each student. Student answers and their observed emotion were discussed with the teacher, and the teacher's comments and reaction to these were noted. The following section is an excerpt from the documented interviews [3];

One student commented that he would very much like to play Microsoft Xbox games but said:

"I can't use the controller with one hand. Can you make me one for one hand? I would really like to play Xbox games."

Unlike many computer games designed for the personal computer, Microsoft Xbox and Sony Playstation games allow up to four players in the one game, on the same screen – the perfect multi-player environment for these students. However, Xbox and Playstation controllers are designed to be used with two hands, and at least normal

dexterity with each hand, something cerebral palsy sufferers often do not have.

Another student got visibly excited when talking about computer games. His passion was car-driving games. He talked about the Playstation game *Gran Turismo* and how much he liked it. He said the car games make him feel happy, especially the fast cars. It was not clear if he had actually played these games or just watched someone playing them. I suspect that it was the latter, although he may have had some input to the game with someone else helping him play. He said:

"it feels like I am learning to drive."

Although this student had severe cerebral palsy, I observed him controlling in powered wheelchair. The chair is controlled using a head control instead of a joystick. He drove like an expert. He went fast, he was accurate, and the staff said that they often had wheelchair races with each other.   This participant believed that playing car racing computer games would enable him to:

"drive my wheel chair better."

Another student interviewed had some use of one hand, and although verbal communication was difficult, he appeared to be comfortable with a computer mouse. His desire was to be able to play Microsoft Xbox games, specifically multiplayer games. He suggested that playing with others was important socially. He said that:

"games provide fellowship."

Both the staff members and I were surprised that he should choose such a word as fellowship, but it appeared to be important that he used this word. He also liked the competition that two player games provided, but unfortunately was unable to use an Xbox or playstation controller.

DISCUSSION

Wilson, Foreman, and Stanton [9] suggest that although children with restricted mobility have a reduced spatial awareness, they found a correlation between a virtual world and the real world where the skills learnt in one could be transferred to the other. They developed a tests using a three dimension virtual world and although the disabled children scored lower than the able-bodied children, they found that the "disabled children's spatial memory and judgement can improve from training in several virtual environments" (p4).

The participants interviewed cannot drive a car or even kick a football. They struggle to interact at even the most basic levels with other students. However, in the three dimensional virtual world of computer games, they are free to be whoever they wish and do what ever they want. These students perceived that they learnt from playing computer games. They also perceived an increase in social acceptance when playing with others. It made them feel happy and increased their self-esteem. Brittan [3] suggests that "students must believe they have the right and obligation to understand things", and that "students gain intelligence through socialization". They agree that computer games, especially multi-player games, will help with socialization for these students.

However, this research highlights that students with cerebral palsy do not necessarily want specific games developed for them, they want to play the commercial games that other students play; especially those designed for Xbox and playstation with multiplayer modes. What they need is an input device that allows them to play with one hand, or even a head control. Such a device would need to be highly configurable to allow for differences in physical abilities and dexterity.

There are currently several devices on the market such as the one hand controllers from Third Party and Ascii Grip. Both of these devices appear to have been designed for use with one hand by a two handed, able body person, as they are difficult to use for people with disabilities. KYE Enterprises produce a joystick for the game consoles, which is mouth controlled for "for people who have limited use of their hands due to Spinal Cord Injury Quadriplegia" [4]. This device is expensive and appears cumbersome, although it does fulfil a need. Sony's Eyetoy is a perfect example of a simple device that allows players of all levels to interact with virtual worlds. Denise Reid, from the University of Toronto, has worked with cerebral palsy children in which she focuses on Virtual Reality (VR) environments using equipment similar to Sony's Eye-toy. Reid found that participants in the research experienced an increase in self-esteem [6].

Research is being undertaken at Unitec's game development and research laboratory, Unicave, to develop a simple device that is configurable for different levels of disabilities. The device will be compatible with all consoles as well as adaptable for PC games. A similar unit is being configured to emulate the hand-controls in a disabled driver's car. This device will be used in-conjunction with driving simulators to assist with hand-eye co-ordination.

CONCLUSION

Commercial computer games for both PC and consoles provide the player with an environment to not only learn within, but also a world where experiences can affect emotional and social development. Access to these games through configurable and useable input devices would, by their own admission, enhance the lives of children with disabilities such as cerebral palsy.

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