**Representations of Self in Classroom Virtual Worlds: a case-study of pupils on the autism spectrum.**

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Key Words: Games for change (games for social change), Emergent media for GBL (virtual worlds) & Teaching strategies (guidelines for successful experience)

**Abstract:**

Autism is a condition that affects about one per-cent of the population (Baird et al 2006; Green et al 2005) and is classified as a spectrum condition, ranging from classic autism, with severe learning difficulties, to high functioning autism and Asperger's Syndrome where normal levels of cognitive ability can be expected (Kerr 2002). However, either condition can mean children and adults lack social-understanding and communication skills. Baron-Cohen & Bolton (1993) state that autism is a condition that can affect children from birth or early childhood, and is a condition that leaves them unable to form normal social relationships or normal communication (Scott 2002; Bolton et al. 1994). As a result of this the child may become isolated from human contact and absorb the world in a repetitive, obsessive manner (Baron-Cohen & Bolton 1993).

Several studies have been carried out that consider the use of virtual environments (VEs) for users on the autism spectrum. These include: Parsons et al 2005; 2006; 2009; Parsons & Cobb 2011; Fabri et al 2005; Cobb et al 2002; Cheng & Ye 2009; Charitos et al 2000; Bignell 2008. Findings from these studies highlight the affordances of VEs for users on the autism spectrum, and can be summarised as (1) people with autism accept computer technology and input devices; (2) the experiences of using computers increases enjoyment of tasks; (3) people (particularly children) become immersed in VEs; (4) recognition of facial expression in VEs (through avatars) is comparable to that of real-life faces; (5) the use of computer technology (VEs, CVEs for example) can aid emotion recognition; (6) using VEs can help to slow down communication exchanges, helping users process and think before answering; (7) VEs provide a basis to undertake social skills training to some success; (8) users with autism are more likely [than typically developing peers] to feel comfortable in VEs and as a result 'try' / 'test' social situations; (9) VE interfaces help users on the spectrum perform appropriate behaviours when interacting with others; and (10) that VEs can be used to help increase cognitive ability through training scenarios. In addition to the mentioned affordances there are very specific reasons for using VEs to aid users with ASCs. These included: Social skills rehearsal; sense of community; safety to make mistakes; a space to make friends and personally develop; and a place to share information.

However why many studies have considered the use of VEs, and bespoke systems in their studies, very few studies have considered virtual worlds as a modality. Moreover avatar design of users with autism has not been studied in the context of virtual worlds. This current study sought to modify an existing off-the-shelf program (Second Life), with a view to designing a safe space where participants were free from social complications, provided with a form of computer mediated communication (CMC), and all embedded into a classroom context.

This presentation reports on findings from the development and use of a virtual world as a teaching tool in a Secondary classroom, which had the particular aim of studying the in-world visual representations created by children on the autism spectrum. The findings of this work better enable developers of similar systems to anticipate and configure their software to enable greater effectiveness and enjoyment [motivation] for the autism community. Data to be presented will include three areas of research: (1) development and inclusion of virtual world technology in schools (implications and best practice); (2) representation of self in-world; (3) computer use patterns.

The study was conducted in a UK school for a period of six-months in total. During this time a virtual world was designed (with input from various stakeholders) and implemented into an ICT class. The emphasis was to ensure participant motivation and enjoyment, so some game play characteristics were identified and implemented (group collaboration and open-ended exploration). Further game mechanics were considered and embedded. These included: Achievements (providing a sense accomplishment and something to talk about after playing, specifically collecting items); community collaboration (working together to solve a problem through practical assignments & developing social networks); and personal customisation (choosing avatar designs and items in the environment, thus investing themselves in the world). It is through these aspects that several game-play elements were considered and tested in a case study with the aim of understanding (from a user's perspective) the rationale behind the avatar customisation, level of engagement in tasks, and communication channels used. The overall computer use and habits of the group were also considered. Results presented will highlight the differences between the look and style of avatars designed by participants on the autism spectrum compared to their typically developing peers. Data will also

highlight the case study user groups' preference for ICT use (including gaming devices). This will lead to conclusions of how children on the autism spectrum, in this study, differed from their typically developing peers.

Data from this research are mainly qualitative using questionnaires and observations to interpret meaning. Moreover data such as video clips, still images, in-world activity all provided data that were included in the analysis. While a rich set of data were collected from a series of planned and structured case studies, findings from this work would be difficult to generalise, although some aspects of this work, it will be argued, could be typically expected of the users studied and are thus generalisable. Notwithstanding, this work provides an insight into the ways in which users with autism wish to present themselves through avatars, revealing aspects of technology use that are not currently well understood but which might usefully inform the future design of educational virtual world systems for this particular group of users.

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Nigel has experience spanning 3D animation, digital media, research activity, and most recently virtual worlds. He has developed his work through industry appointments, research projects and outreach activities with local communities and schools. He is currently a researcher at University College Dublin completing his PhD. Prior to this he was at the University of Greenwich, where he was Senior Lecturer in Digital Media and convener for undergraduate and postgraduate programmes. He has experience in designing, validating and running programmes of study coupled with industry experience in the design and production of media content for a variety of contexts. Nigel has a BSc in Multimedia Technology and a Master's in Education and interests in assessment, e-learning and higher education policy. He is a reviewer for the Higher Education Academy (HEA), and involved in consultancy work for universities and colleges in the UK.

Nigel has helped to initiate special interest groups with the British Computer Society; in particular an Animation and Games/Virtual Worlds group. He has also just completed a book chapter (with Dr Sarah Parsons and Dr Simon Wallace) for Brookes Publishing on using virtual-reality technology to support the learning of children on the autism spectrum. This is in addition to conference proceedings published at national and international conferences, and journal publications.

His PhD research examines the roles virtual worlds can have in the development of social skills and communication for children on the autism spectrum. He also has several papers and articles in preparation that stem from his PhD research. His work with children with autism, using virtual worlds, has been recently recognised (in June 2011) by HEFCE and UnLtd, where he was awarded: 'Outstanding Teaching Staff Social Entrepreneur'. This included being invited to present a keynote speech on his work.