A BRIEF REVIEW & CASE STUDY:
The use of virtual environments for improved communication and social skills - for people with autism

Nigel Newbutt
Lecturer, University College Dublin, Ireland
Visiting Senior Lecturer, University of Greenwich, England
OVERVIEW

- Introduction
- AT and Virtual Spaces
- Virtual Worlds
- Case Study
- Future Directions
- Conclusions
BEFORE WE START

- Some aberrations and acronyms used in this presentation:

  - AT = assistive technology
  - ASC = autism spectrum condition
  - VE = virtual environment
  - CVE = collaborative virtual environment
  - VW = virtual world
  - VR = virtual reality
  - SL = Second Life
  - ToM = Theory of Mind
INTRODUCTION

• AT have helped to aid communication for children and adults with autism

• VR, VE, CVE, 3D avatars

• Virtual spaces to help people with autism

• Explore, interact, understand

• Generalise social meaning and interaction
Assistive technology is technology used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible.

Can include mobility devices such as walkers and wheelchairs, as well as hardware, software, and peripherals that assist people with disabilities in accessing computers or other information technologies.

(University of Washington 2006: 1)
Some researchers have considered the use of VR technology as a form of AT, and in considering the definition on the previous slide, we can see how the two link together.

- Research in fields including:
  - Neurological rehabilitation; see Rose et al (1996)
  - Instructional procedures; Dotterer (2000)
  - Autism and Asperger’s; Moore et al (2005); Parsons et al (2005)
REVIEW OF VIRTUAL SPACES

- VR - as a learning tool to help engage children with autism
- Responsive to computer technology
  - acceptance of this technology
  - immersed themselves
  - hand and head controls coordinated
  - learning and interaction
  - used across a variety of scenes

More recently Wallace et al (2010) considered an Immersive Virtual Environment (IVE)

- This included a ‘Blue Room’ where participants were almost totally immersed
- Similar responses between TD and ASC groups
- Judging social situations was still poor for ASC participants
- Positive feedback from all participants and parents
• CVEs

• CVEs to enhance and improve communication / emotional recognition in people with autism

• Embedded a 3D face

• Considered the theories of Ekman - 6 universal expressions
• Proposed using as a virtual head in their work (7-16 y.o):
  • emotions can be visualised with limited facial features,
  • recognition rates (of virtual faces) are comparable to real-life images,
  • some expressions are easily recognisable and potentially build a basis for emotionally expressive avatars in CVEs,
  • 88% of the participants were able to recognise expression(s).
• VEs and CVEs in conclusion can be used as:

  • an assistive technology

  • educational technology

  • a means to address ToM

(Fabri and Moore 2005)
• VE - Parsons et al / Cromby et al (15 y.o)
  • treated like a game
  • generalisation of skills
  • shopping task + cafe - eg.
  • teach transferable skills
  • single-user environments

• from this body of work we know that:

• users are able and happy to use computers as an interface

• the first time VEs are used in a classroom context

• involve qualitative analysis (considering ‘their’ views)

• interviewed participants after using a VE in a cafe and on a bus - then compared to their responses in ‘real-life’

• concluded that VEs can help to teach social skills
WHAT DOES THIS TELL US?

• People (children) on the autism spectrum are:

  • able to use VEs, CVEs, VRs

  • happy to accept VEs as representations of reality

  • able to become immersed (compared to typically developing peers)

  • able to communicate and adhere to some social conventions
WHAT DOES THIS TELL US?

• Graphics can (and should) be made as realistic as possible

• Some skills are generalisable (only a few so far)

• Design should involve users (to some degree)

• Integrating to a school setting is desirable - to achieve best outcomes (aligned to educational goals)

• In summary...
CONCLUSIONS

• Advantages afforded by VRTs:
  • Increased focused attention
  • Increase in-seat behaviour
  • Role play
  • Testing social / communication skills
  • Control of input and navigation
  • Secure and free from ‘social’ complications

• Some possible issues:
  • Agitation
  • Lack of immersive behaviours
  • Graphics can hinder immersion and ‘playability’
  • Only off the shelf VEs available (bespoke)
  • Limited design input from ASC users

My future school can fly and we play and eat a lot. It is 100 miles away in the future. It is a pizza school and we can eat the school.

Tuesday, 14 February 2012
VIRTUAL WORLDS?

• Virtual ‘spaces’ can contribute to expressive and immersive behaviours of people with ASCs

• Virtual Worlds are being used by these communities, but to date no formal studies have identified how and why users with ASC interact and behave

• It can be argued that superior graphics, expressive tools, and engaging interfaces could offer something to the ASC community but offering something more (a greater number of people to interact with), group interactions, testing a broader set of social skills, etc...
• In a very brief correspondence Fusar-Poli et al (2008) hypothesise that Second Life could be used to “develop social and communicative skills of autistic people”

• They go on to suggest affordances for users with autism -- along the same lines as researchers such as Cobb, Parsons, Moore, Fabri, do:
VIRTUAL WORLDS?

• “...it allows anonymous social interactions, and provides high levels of social interactivity but without complex linguistic and social-behavioural processing necessary for face-to-face conversations”

• “levels the playing field for autistic people” in that it offers a new space to rehearse social skills
Some others working in this area include:

- Bignell (SL)

- DeAngelis (SL) - therapy intervention

- Gillen et al (Teen Grid) - communication, teamwork, leadership, creativity

There are spaces/places in SL for people with ASCs (awareness centre, groups, support groups)
• Worked with a school in Surrey (Linden Bridge, Worcester Park)

• Established a case study group (15-16 year olds)

• Aim to provide an appropriate tool, that would last (legacy)

• Ensure technical barriers and issues were overcome and roadmaps provided for others in this area
PROJECT OVERVIEW
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CASE STUDY

• Description of case study:
  • 15-16 y.o (ASC and TD)
  • 6 male, 2 female (8 total)
  • SL
  • Embedded to classroom
  • Designed with users
  • Safe and secure
  • Several spaces on the island to include: cafe, shops, zoo, fairground, train, station, underwater world, etc...
CASE STUDY - VW CONSIDERATIONS

• Deciding on a platform:
  • Evaluation of VWs are important
  • Identify user-needs and contextual needs
  • Provide a platform that works and will not become problematic
Users were asked to work in pairs, and carry out a task (involving some form of educational outcome or social interaction)

• Initiation, sitting in a cafe, queuing for a drink, turn taking, etc.
CASE STUDY

Representation of Self:
1. How do users on the spectrum graphically represent themselves through the creation of an avatar?
2. What aspects of a virtual world do children with autism identify as useful for communicating – and why?

Communication and Interaction:
3. Do children with autism focus on particular elements in-world that differ from their typical interactions in a classroom?
4. Will children on the autism spectrum use communication tools available within a virtual world, and if so use them in a socially appropriately manner?

Reflection:
5. To what degree are children with autism able to reflect on differences through their interactions and approach to communication with others?
Some observations

• Mirroring of behaviours (in some instances) -- which is the opposite of what VE/CVE studies have shown

• Increased conversation and communication (teachers being able to converse with students for the first time)

• Increased collaboration between peers (through work tasks; zoo)

• Identification of basic social-norms (able to identify and maintain social norms; in some instances)
CASE STUDY

• Representations of self (avatars)
  • This varied
  • Some went to extremes and others not so
  • This included creative use of the design tools
  • Customisation of clothes and face
FUTURE CONSIDERATIONS
This study considered:

- Design of avatar/s
- Engaging tasks - group and collaborative tasks (with school facilitators)
- Embed into the classroom - and maybe beyond?
- What students might like to see in VWs
- Further qualitative information/data to support the above notions
- Cont.....
VWS CAN OFFER...

• Easy to use and access emotion tools - expressive
• Easy to navigate and locate people / places
• Provide a ‘safe’ space for children with autism
1. How can virtual worlds be modified and introduced into a classroom setting, in schools for children with autism?

2. How can virtual worlds be used to encourage learning and participation in children with autism?

3. Can social skills (including emotional expression and recognition) be taught through the use of a virtual world?
Having considered previous and current studies:

- VRT has proven to be and is proving to be a useful tool for users with ASCs

- They have been used in many contexts and with different technology

- Potential for these technologies increase as the availability and costs of technology decrease
• Need to think about long-term integration

• Develop a platform that can be used by schools (if and when)

• Design material that makes it easy to use; and integrate to schools

• Help ‘train’ and convince teachers/schools of the benefits (and of course parents and children)

• Understand that even though there are some cognitive impairments [in these user groups] -- teenagers are more than able/prepared to engage with digital media
USEFUL WEBSITES...

www.lindenlab.com
www.virtaut.co.uk
www.secondlife.com
www.hao2.eu

http://www.guardian.co.uk/society/2006/mar/08/guardiansocietysupplement
...AND READING


Nigel Newbutt

Lecturer and Researcher

University College Dublin
www.ucd.ie

nigel.newbutt@ucd.ie
00353 (0) 1716 7945
SL: Melish Effingham
Skype: nnewbutt

SMARTlab Research Institute
www.smartlab-ie.com