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The proceedings of the first International Conference on Interactive Technologies and Games 2008 are placed in alphabetical order of first author whether authors have submitted a full paper or abstract only. Please note that the selected best conference papers that were subsequently published in the Special Issue of The Journal of Assistive Technologies (Volume 3 issue 2 June 2009) have been removed from this publication. These are:

PJ Standen, F Rees and DJ Brown. Effect of playing computer games on decision making in people with paper intellectual disabilities, Volume 3 issue 2 June 2009, p6-14.

David J Brown, Nicholas Shopland, Steven Battersby, Alex Tully and Steven Richardson. Game on: accessible serious games for offenders and those paper at risk of offending, Volume 3 issue 2 June 2009, p15-29

Lindsay Evett, Steven Battersby, Allan Ridley and David Brown. An interface to virtual environments for people who are blind using Wii technology – mental models and navigation, Volume 3 issue 2 June 2009, p30-38.

Lesley Axelrod, Geraldine Fitzpatrick, Jane Burridge, Sue Mawson, Penny Probert Smith and Tom Rodden. The reality of homes fit for heroes: design challenges for paper rehabilitation technology at home, Volume 3 issue 2 June 2009, p39-48.

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Abstract
As young gamers become more competent in their ability to utilise digital media and the internet to exchange and communicate ideas, there is now potential in allowing these target users of games-based-learning activities to instruct, monitor and evaluate the learning of their peers. Knowledge sharing can now be observed in popular Massively Multiplayer Online Games (MMOs) such as World of Warcraft and via collaboration and competition involving increasingly younger participants. But what motivates these young gamers to participate in such practices? Some suggest it is a quest for greater social status that encourages players to learn through exploration to then share knowledge acquired during this experience with others. Respect from your peers is priceless in today's gaming culture and so the ability to trade knowledge for power may provide an answer for motivating young gamers to engage with games-based learning activities.

Current research within the Interactive Systems Research Group at Nottingham Trent University is investigating the pedagogies of these young gamers by collaborating with Derbyshire Libraires and a potential focus group of volunteers aged 11-16 years to design new games-based learning software via after school workshops. This paper documents the conceptual design of this investigation including its inspiration, methodology and goals and will discuss the premise that video games provide a useful platform for educational activities.

Key words: video-games; games-based-learning; children's education; modding; MMOs.

Playing to Win: motivation for teaching and learning in today's gaming culture.

Introduction

"Where the field of games, learning and society is pushing us forward is in identifying and studying how games cultures themselves work, and then designing learning systems based on these properties" (Squire, 2007).

By their definition, games seek to engage us in an activity for amusement and diversion from our daily lives. The collective term 'video game' now encompasses those played on both computers and home video-consoles (Gee, 2003) and represents one of today's most lucrative forms of interactive media. The creation of such games requires inspiration and large investments of both time and capital. Development companies now advertise their products, often months in advance of their release, much similar to their motion picture counterparts. This anticipation motivates gamers to contrast design ideas and story speculation via online discussion boards creating gaming communities. Video games inspire collaboration, bridge generations and traverse genders making gaming as much of a social experience as it is a personal hobby.

Gee (2003) identifies social gaming as that played in three main scenarios; locally on home consoles, over local area networks such as cyber cafes or remotely using the internet. Social gaming has roots in the coin-operated arcade machines of the 80s and early 90s where gamers would observe their peers investing limited funds in pursuit of perfecting skills to build scores and climb increasingly difficult leader boards. This extrinsic motivator of competitive play has built relationships and formed gaming hierarchies. Social gaming is now participatory with digital authoring tools and distribution networks changing the ways in which we interact today (Squire, 2007). Gamers are now encouraged to express themselves by modifying the rules of play via access to the underlying mechanics of a game. This can range from basic multiplayer level design popular in the late 90s to full creative freedom via extensive authoring tool-kits and access to 3D game engines.

MMOs and modification

The process of manipulating computer games beyond their original purpose to produce and share new content with other players (known as game modding) has evolved. We are now witnessing the formation of online social networks to discuss and compete in Massively Multiplayer Online Games (MMOs) such as World of Warcraft. These MMOs represent neutral 'third places' where gamers can enter and leave without permission or invitation (Steinkuhler & Williams, 2006) and unite global gamers with common interests and motivations of play. Within these gaming communities, players have the opportunity to scaffold the gaming experience of others through various cognitive processes such as collaborative problem solving. This system allows young gamers in particular an opportunity to interact with professionals as equals, separated only by the

interface of a fantasy context and user created avatars. MMOs act as “push” communities allowing young learners to engage in the discourses required to understand and build complex communities acquiring skills which can be utilised in science and research at a later stage (Steinkuhler, 2008). This introduces young gamers to the value of community structures and allows these gamers to build their own identities within them.

MMOs are now expanding beyond their computer centric role-playing roots and can now be found in current versions of classic home video-console multiplayer games. Players of Mario Kart Wii, for example, can develop ‘friend’ communities in a similar fashion to how online chat rooms were constructed and maintained in the late 1990s. These and similar gaming groups can compete in global challenges, compare racing times and exchange ‘ghost’ data recordings of their skills and achievements for the viewing pleasure of their online peers. It is within this data exchange that gamers are participating in teaching and learning exercises while being motivated by an ambition to know all secrets and be the best. Respect from your peers is priceless in today’s gaming culture and so the ability to trade knowledge for power may provide an answer for motivating young gamers to engage with games-based learning activities.

Educational or ‘serious’ games are concerned with the development of non entertainment uses for gaming technology. Researchers seek to increase learning by exploring categorised games and conducting direct comparisons to other forms of media. This approach is criticised by Squire (2007) as neglecting ethnographic research into gaming societies and discounting the long term benefits of re-useable game tools and digital distribution. Squire suggests a more naturalistic approach to research, treating digital media as a tool and examining what users actually do with it.

Commercial video games have been explored as motivators for learning in the classroom. The research group Futurelab has challenged the generalisation that simply playing computer games is a good educational motivator for children and suggest that successful use of games-based-learning activities relies on the individual teaching pedagogies used to integrate such activities into classroom exercises (Sandford et al, 2006). Robertson and Howells (2007) suggest shifting the role of a teacher in such an environment towards a ‘facilitator’ of knowledge exchange while allowing the pupils themselves to disseminate their newly acquired knowledge amongst their peers. Therefore, the instructional strategies used to scaffold the use of a game in education are as important as the play that occurs within that game (Squire, 2007).

Kafai (2006) argues that a change in design perspective is required to facilitate constructive play within educational games. By contrasting instructional and constructional approaches to games design, Kafai highlights the potential of editing tools within today’s commercial games and concludes that these and other constructionist tools have yet to be fully explored with young gamers. She

also considers that such activities provide young gamers with a 'technological fluency' providing not only an awareness of games creation tools but also inspiring new ideas on the best uses of those tools. Carbonaro et al (2007) highlight the potential in a constructionist pedagogical approach to motivate games via a process of learning by designing.

Exploring games design with young learners represents a new area of research within serious games. The role playing game Neverwinter nights has been used to create landscapes, characters and dialogue as a form of interactive story authoring (Robertson & Howells, 2008) while the intuitive authoring tools found in Stagecast Creator have been used with 7-11 year olds to explore intrinsic games design via after school workshops (Hapgood et al 2005). When young learners are allowed access to the design of a video game through modification features they develop a 'projected identity' (Gee, 2003) through experimentation of ideas in the game world. This allows players to express their ideas and ambitions through their virtual avatars and hopefully learn from the in-game experience.

Steinkuehler (2008) has found that participants in MMOs express a 'collective intelligence' by producing unofficial online user manuals for these games *'…far more accurate than official ones.'* These can take the form of complex online tutorials and cultivating in-game apprenticeship systems that act as social scaffolds for newcomers to a game. Steinkuehler suggests that it is a competitive element that motivates gamers to participate in these practices. Conversation plays a key role in this social scaffolding whether during local play in the classroom or remote play over the internet. This conversation has now expanded beyond the game world and encourages constructive chat in both official and unofficial game related forums (Steinkuhler & Williams, 2006). These observations must now be experienced in the classroom if games are to be considered a viable motivator and facilitator of knowledge in mainstream education.

Learning through play can be a probabilistic strategy for educationalists as there is no guarantee that children will complete key learning objectives in an open ended explorative session. Serious games require extensive justification for their place in curriculum based education and a fine balance must be found between learning through play and instruction. This idea is especially true when using game authoring software with children as learning through explorative play is considered a key motivator and contributor to the impact that such software can have on teaching and learning with young gamers (Robertson & Howells, 2007).

The idea that fantasy elements within games design are a sufficient motivator for teaching and learning is questionable (Hapgood et al, 2005) and more emphasis should be placed on the effective design of a game's mechanics including effective rule systems that produce meaningful game play experiences. Intrinsic fantasy games are defined as those in which the learning content of a game is fundamentally related to the fantasy context in which that content is placed.

Hapgood suggests that children do not naturally select intrinsic fantasies to deliver educational content and found that 26% of 7-11 year olds create extrinsic fantasy games where the learning content is arbitrary to the fantasy setting of that game. This demonstrates that children (7-11 years) design computer games backwards and map instructional content into a pre-conceived fantasy context. Whether this is the case for young adult gamers (aged 11-16 years) requires further investigation.

Research

Current research within the Interactive Systems Research Group (ISRG) at Nottingham Trent University (NTU) is investigating the hypothesis that tuition systems created through young learners modding games-based-learning software can have an equal if not greater educational effect than those created by educationalists and serious games designers. This will examine the motivations for play with a sample of young gamers and will explore how these gamers impart their gaming knowledge onto their peers.

Collaboration with the Derbyshire Libraries group is allowing the ISRG access to a broad range of ages and abilities to help test the above research hypothesis. Derbyshire Libraries (consisting of over 40 individual libraries) wish to promote the idea that libraries can be places of social interaction which house a variety of media to both entertain and educate. The group is investigating the potential of working with children to construct a new web-based serious game to inform and instruct young adults regarding the potential of libraries as educational and social resources. Success of such software will be measured as its ability to facilitate a potential user in fulfilling the following learning goals as outlined by Derbyshire Libraries:

- Have a functional knowledge of how to access information and library services.
- Be aware that [a user] can find content that can enthuse and excite them.
- Have explored why [a user] would want to use a library and examined the alternatives.
- Have had the opportunity to engage creatively with the library.

By studying the above learning objectives, it is clear that the main learning outcome should be a long term ability to understand the purpose and potential of a library. Educators such as Derbyshire Libraries seek not to simply instruct users through ‘skill and drill’ exercises but to allow these users an opportunity to construct their own knowledge.

This research is based on methods of ‘co-operative inquiry’ (Druin, 1999) via a multi-disciplinary design team of researchers and educators meeting regularly with children as equal members of team. Meetings should take place in the form of after school activities or clubs and involve discussions and brainstorming exercises while recording ideas and observer notes in journals. Co-operative inquiry is an example of a methodology that was developed during an

investigation and which adapts to the real time observations and requirements of an investigation with children. Druin found that children aged 7-11 years made ideal prototyping partners for research due to the expressive nature of this age group and no inclination to adhere to pre-conceived notions of *'…the way things are supposed to be'*.

A recruitment scheme was conducted by Derbyshire Libraries in May 2008 to create a focus group of young gamers aged 11-16 years. Using opportunity sampling, a poster advertising campaign for the project was launched and visits were made to local secondary schools. These recruitment exercises received over 30 email applications from the south Derbyshire to attend monthly after school workshops at a central library in the south Derbyshire area. These workshops were used to discuss current examples of educational games found on the internet and ran between June and October 2008.

An internet blog was created for use by the focus group during the investigation to encourage participants to communicate outside of the monthly workshops. This creates a 'developer's diary' idea of data capture where the design ideas and examples of current work from the focus group can be discussed to encourage reflective learning during the design process (Carbonaro et al, 2007). Observations of physical interactions and discussions with the group were recorded via pen and paper notes.

A major risk to the project was identified as the longevity of a voluntary focus group of children. This could include members no longer wishing to participate with the project due to unavailability through other commitments or due to a potential lack of interest through a lack of incentives for participation. An initial focus group of 30 participants steadily dissipated over a four month period leading to many questions over the suitability of conducting the investigation with a voluntary focus group. This reduction in interest was also experienced on the project blog as discussion threads created to stimulate interest in the project reduced from 19 comments in May 2008 to just 6 comments in September 2008.This demonstrated that young gamers (11-16 years) are enthusiastic to discuss ideas for games design but display a short attention span to long term projects of this nature as can be expected with young adults. Ideas to address this issue include modifying the investigation location to utilise local secondary school computing suites via after school workshops. The methodologies employed by Druin (1999), Hapgood et al (2005), Steinkuhler (2006) and Robertson and Howells (2008) will be used in these workshops to further investigate the motivations of play and knowledge sharing between young gamers.

Bartle (1996) distinguishes between motivations for playing games by identifying two main types of game player; 'achievers' who play to improve their game status (points, ranking etc) and 'explorers' who play to build their knowledge of the game and its mechanics to then share (read: trade) this knowledge amongst the

gaming community. Explorers are increasingly common in MMOs as players compete to better understand the gaming environment whilst providing the goal driven achievers cryptic clues to succeed in what they consider a meaningless quest for accolades. Similarly, achievers consider explorers as eccentric but useful to assist with game related issues. This relationship demonstrates that player types and motivations for play within MMOs are dependent and that designing interactive media to solely facilitate either of the above player types would significantly alter the state of play within MMO communities. This research will further investigate these motivations for play to uncover whether these observations can also be experienced in software of an educational nature. Important questions to be addressed include:

- Whether young gamers teach simple progression objectives or the underlying educational content whilst interacting with educational software (playing to learn vs. playing to win).

- Whether the motivation of young gamers for sharing such knowledge is part optimising an overall group performance or a method of promoting a member's individual social status within that group.

Sandford et al (2006) revealed a major limiting factor in the educational potential of commercial video games to be in their ability to run effectively on limited hardware such as that found in the computing suite of a secondary school or library. Poptropica (www.poptropica.com) represents an MMO delivered as a simple 'web-game' requiring no additional software or user subscription. Developed by Pearson's Education for ages 6-15 years and launched in September 2007, the game has motivated players to exchange their gaming knowledge by distributing home-made guides to the game's complex tasks on popular internet forums and the digital media distribution website YouTube. This game will be used as inspiration for serious games design and to investigate whether the social aspects of game play experienced in large scale MMOs can also be experienced in software of much smaller scope.

This co-operative inquiry into games design will be followed by a process of 'participatory design' (Druin, 1999) encouraging participants to explore their design ideas by interacting with authoring tools. The selection of suitable authoring tools is critical to effectively contrast the prototype designs of target users with that of their educational gatekeepers. And so such tools must be accessible and appealing to children yet extensive enough for adults to explore. Sims Carnival (www.simscarnival.com/view/create/gamecreator) represents a new suite of development tools aimed at children and teenagers allowing them to create new digital media via an intuitive user interface. Materials created via this method can then be distributed and discussed over the internet. Focus group participants will be introduced to the Sims Carnival via instruction based learning and issued 'homework' style tasks of explorative learning (Robertson & Howells, 2008). This assistance will ensure that a user's ability to transfer knowledge into

interactive media is on par with that of their teachers. Records will be made of the games produced by the focus group will be recorded at the end of every workshop to create a development history of work over the project (Hapgood et al, 2005).

Steinkuehler (2006) adopted a cognitive ethnographic research approach to the MMO Lineage where researchers participated within the virtual world over a 24 month period to investigate how participants in the game consider both their own actions and the actions of others. This involved recording instant messenger chat within the game to form a transcript of conversation which would be analysed via discourse analysis. Using Steinkuehler's ethnographic approach as a model, this investigation will produce transcripts of conversation from videotaped footage of the focus group interacting with software during both the co-operative inquiry and participatory design investigation components to provide not only a dialogue of conversation but also visual evidence as to the physical gestures exchanged between focus group participants during interaction with this software. This will include the proximity of members when communicating and the physical gestures used for communication. As the investigation will rely on real-world exchanges between participants during the workshop exercises, the use of video footage in this investigation will mimic the fieldwork studies of Steinkuehler but allow these ethnographic methodologies to be performed in a physical environment.

Conclusion

Researchers must embrace that constructive learning is occurring naturally within today's inter-connected gaming world and should seek to uncover the motivations for this practice in order to maintain pace with this ever evolving culture of gaming. The importance of granting a learner the tools to facilitate their own construction of knowledge should not be underestimated in the design of educational software. A deeper understanding of the mechanics that propel gamers to display the cognitive activities uncovered in commercial MMOs (Steinkuehler, 2004; 2006) will allow educationalists to update the rules of serious games design to cater for an emerging digital media fluent generation of gamers. Success for this research will be to inform on future games design regarding the potential of game modification as an educational tool and to prove that the social scaffolds experienced in large scale MMOs can also be experienced in activities of much smaller scope and funding. It is hoped that serious games can now become part of an augmented reality where young gamers are motivated to develop epistemologies within virtual environments and bring them to fruition in the physical world.

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Penny Benford and Penny Standen. The Internet: A comfortable communication medium for autistic people? A study to investigate how people with Asperger syndrome (AS) or high functioning autism (HFA) experience the Internet as a communication medium.

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The Internet: A comfortable communication medium for autistic people?

A study to investigate how people with Asperger syndrome (AS) or high functioning autism (HFA) experience the Internet as a communication medium.

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Abstract

This study builds on previous survey research by the investigators, as well as anecdotal reports, which imply that, despite having social interaction and communication difficulties, Internet communication (via email, chat rooms, newsgroups and bulletin boards) is welcomed by some people with high functioning autism (HFA) or Asperger syndrome (AS). Qualitative data about individual experiences, perceptions, and motivations regarding Internet based communication was obtained from 23 adults with HFA or AS, mainly via email interviewing, but also by conventional mail. Analysis based on grounded theory revealed how the sample were able to use the Internet to lessen the emotional, social and time pressures experienced in offline situations. Aspects which contributed to the perception of the Internet as a potentially more comfortable communication medium included visual anonymity, a different and more flexible pace of communication, and the permanence of text. Overall the complexity of communication was lessened, and a greater sense of control could be achieved.

Keywords: Asperger syndrome, high functioning autism, Internet, computer-mediated communication (CMC), uses and gratifications

The Internet: A comfortable communication medium for autistic people?

A study to investigate how people with Asperger syndrome (AS) or high functioning autism (HFA) experience the Internet as a communication medium.

Introduction

Autism affects an individual's social interaction, communication and imagination. Autistic people fall along a spectrum with, at one end, "high-functioning" individuals of normal or superior intelligence, often described as having Asperger syndrome. These people are highly verbal but have difficulty with nonverbal aspects of social communication, for example facial expression, gestures, eye contact, and tone of voice; aspects which modify meaning, convey emotion, provide indications of status and role, and support conversational turn taking and other aspects of communicative fluency. Their social interactions may be inappropriate or odd, lacking empathy and characterised by difficulties managing their own emotional responses. Other characteristics include an almost obsessive desire for sameness of environment and routine, unusually narrow and engrossing "special interests", difficulties processing and retaining verbal information and understanding non-literal language (jokes, sarcasm, turns of phrase), and peculiarities of attention and perception. The social impairment of autism is such that people at the high-functioning end of the autistic spectrum are often disadvantaged in terms of obtaining and sustaining employment (Barnard et al., 2001), particularly jobs commensurate with their intellectual strengths. They are at risk of social isolation, marginalisation, and psychological problems such as low self-esteem, stress, anxiety and depression (Attwood, 2003;

Ghaziuddin, 2005). Because of their intelligence and, for some, the ability to hide their social impairment in straightforward situations, the needs of high-functioning autistic people may receive insufficient recognition (Frith, 2004). Additionally they are not easily accommodated or prioritised by existing support services (Macleod, 1999), although research indicates that the availability of a supportive social network (family, employment, social services) is an important determinant of quality of life for high-functioning autistic individuals (Renty & Roeyers, 2006). Hence their social exclusion may be compounded by an underestimation of their needs and a lack of appropriate support services.

Anecdotal reports indicate that the Internet has encouraged high-functioning autistic people to communicate with each other via chat rooms, bulletin boards and discussion lists (Blume, 1997). The impact of the Internet on high-functioning autistic adults has been likened to that of sign language on the deaf community (Blume, 1997). It has also been credited with facilitating the emergence of autistic culture and self-advocacy, and being an essential means of communication by which autistic individuals may offer each other emotional and practical support (Dekker, 1999). However there is very little empirical research into the use of the Internet by people with autism.

An initial survey, to discover the extent of Internet use among people with autism and investigate their motivations for using the Internet, was carried out by the authors, obtaining responses from 138 people with Asperger syndrome (AS) or high functioning autism (HFA) who were contacted via a number of relevant organizations, publications and professionals. Results indicated a high level of

computer and Internet use amongst respondents and implied that asynchronous forms of communication, particularly those which are text based (email and conventional mail), were preferable to synchronous forms of communication (face to face, online chat or telephone).

There was a significant positive association between how often people exchanged emails with online groups and how often they took part in chat rooms. Although these two forms of interaction differ in terms of synchronicity, their shared features are the absence of face-to-face communication and the necessity to deal with non-verbal interaction, as well as the potential to contact new groups of people. Respondents who participated in online groups or chat rooms tended to be those with a lower level of social contact with friends.

The survey provided broad contextual information about the extent of and reasons for Internet use by autistic people. It was followed by an interview study to explore in more depth issues and questions raised by the introductory survey. In particular we were interested to see how features of internet based communication helped or hindered the communicative approach characteristic of autism. Could findings be seen from a uses and gratifications perspective (see Caplan et al.,2007) which posits that people use particular communication channels to satisfy their individual needs and motives?

Methods

Participants

23 adults (over 16 years of age) with HFA or AS and were selected from a substantial number of the survey respondents who had indicated an interest in

taking part in the second stage of the project. A purposive approach to sampling was taken aiming to obtain a group reflecting diversity in terms of personal demographic factors (age, sex, employment status, residential status), level of social contact, and Internet-based communication factors such as frequency of use, format used, place of access and personal communication preferences. 19 people were interviewed by email and four responded by conventional mail.

Data collection

By means of semi-structured interviews data were collected pertaining to participants' experiences, motivations and perceptions regarding Internet based communication. Interviews were conducted by email or conventional mail, which were found to be the most widely acceptable ways of communicating with friends and non friends for the survey sample. They were guided by a protocol of pertinent topics or "points of departure" (Charmaz, 1995), whilst being sufficiently flexible in terms of the content, wording and order of questions, thus allowing the interviewee more freedom in how they told their story and permitting unanticipated themes to emerge, be discussed and noted for inclusion in subsequent interviews. The element of structure was also predicted to be more comfortable for autistic people in terms of communicative style.

Interviewees were sent an introductory email or letter inviting responses to the first broad topic question. Depending on the responses received the interviewer then sent follow up questions to explore the answers in more depth or to clarify points raised. Email interviews involved between 22 and 82 postings back and forth, and took from 6 to 38 weeks to reach their conclusion.

Data analysis

Following the principles of grounded theory (Glaser & Strauss, 1967) the initial stages of analysis involved close and repeated reading of the data to identify "units of meaning" (Maykut & Morehouse, 1994), incidents which could stand by themselves and serve as the basis for defining larger categories of meaning as more data were analysed and similar incidents were group together. The process was iterative, involving continual comparison, development and refinement of categories as data were collected. Some concepts evolved into core or higher order categories around which others were configured. Possible connections between categories were explored, relating for example to contexts and consequences.

There was interaction between emergent categories and the data collection process in terms of topics and questions raised subsequently during interviews, and some sampling for contradictory cases for further illumination of existing categories.

This highly interactive analytic process continued until theoretical saturation had been achieved, that is when categories were well developed and did not change through new comparisons.

Findings

The overarching theme that emerged from analysis was the interviewee as observer, feeling detached to some degree from mainstream interaction, like an outsider. From this perspective they offered their analysis of the complex process of communication, online and offline as they experienced it, highlighting key

aspects of the Internet in relation to their own needs, ones which made it a unique form of communication.

Three subthemes were subsumed under this (see Figure 1) but for the purpose of this paper only those findings from the theme of *communication needs* will be presented to illustrate how, from a uses and gratifications perspective, the analysis provides not only a model of the relationship between computer-mediated and autistic communication, but a wider view of the potential of CMC to fulfil *individual* needs and motivations.

Four aspects of communication which were identified as problematical: control of a complex and interactive process; clarity of communication; nonverbal communication; and the role communication plays in maintaining social contacts.

Figure 1 should go here

Control

This theme encompassed two related aspects. First of all it included reference to the interviewees' need for control and how aspects of the Internet gave them this. Secondly, interviewees discussed how internet based communication could encourage them to lose control.

One's success as a communicator depends on how much control one can exert over the interaction. Communication is a complex process and there are many interconnecting levels at which control can be lost. As one interviewee commented:

> *Communicating is like your first driving lesson; so many things to do and it all feels so unnatural and like you'll never manage to do all of these things together* (Simon)

The effect for many was that the Internet could fulfil their need for a more controllable and less stressful communication situation, with benefits for self-expression:

> *Also, while I still have to exert some energy into my work, it is not quite as stressful as trying to muddle my way through social encounters. Internet communication therefore takes away much of the frustration and incomprehension I experience with face to face encounters.* (Alison)

There were various aspects of online communication which contributed to this perception, the most prominent being its narrow bandwidth, permanence, and flexibility in terms of pace of interaction.

In contrast to deficit or compensatory models of CMC (see Thurlow et al., 2004) for people with ASD the perception is that the restricted bandwidth of CMC may in fact benefit interpersonal communication by simplifying the processes involved and lessening the burden on their impaired cognitive capabilities.

Similar to the participants in studies by Egan et al (2006) and Todis et al (2005) who had acquired cognitive impairments, the interviewees in this study reported feeling under less pressure online, with more time to process and construct messages, and therefore bypass the disabling effects of autism.

> *…and we have more time to try to make sense of the other person rather than being rushed and bombarded by lots of different sensory information in real time.* (Andrew)

Having more time also gave the communicator more control over the structure of conversations in terms of pace, topic and turn taking:

> *You can take as much time as you like - ie not under pressure You have total control (my favorite) - the conversation goes where you want, often people will move it away too soon or once moved be reluctant to go back as though it was all finished. I'm not known for my lightning intellect - only once things have had a chance to sink in and gell a bit can come out with a thought out* (Tessa)

The Internet enabled people to take time to "cool off" from strong emotions and to distance themselves from the overwhelming responses of other people. Having time to plan and edit their own messages also enabled them to communicate more appropriately or tactfully than they would be able to do when in a face-to-face situation. With reference to online groups, rules and moderation were identified as ways in which the likelihood of interactions becoming excessively overcharged could be reduced.

The loss of control associated with sensory overload, due to extraneous sensory stimuli as well as the stimuli involved in communication may be alleviated by online communication, particularly in a group situation:

> *Also when chatting in a chat room, I don't hear lots of people talking at once. There is no noise at all. When talking to someone in a room full of people, I also hear lots of other people all talking at once. It just sounds like a noisy babble. I am not able to tune this out, so I have to really concentrate on what the other person is saying which is very tiring for me after a little while.* (Claire)

Many of the interviewees valued being able to control their availability to others by their use of online communication:

> *The final and one of the best benefits of online communities is that when I simply don't feel like chatting, I can switch off! Nobody can infiltrate my space unless I allow them to so I'll never have to put up with pointless comments such as 'cheer up love it might not happen' on days when I simply don't feel sociable.* (Nicola)

Additionally, the simpler nature of online communication could offer more choice and control over how one was perceived:

> *…perhaps the self I express online is more what I would like to be, whereas I am constantly aware of the need to protect myself offline.*

In contrast to the perception of control over interpersonal interactions, there was also the possibility that individuals may fail to regulate their online behaviour due to the liberating effect of a more comfortable communication medium. Some interviewees reported excessive amounts of time spent online resulting in financial problems or negative reactions from family, friends or employers.

There were comments which resonated with Caplan's cognitive theory of problematic Internet use (PIU) and well-being, which posits that people who are more at risk of PIU are those who have difficulties with social interaction, see themselves negatively in terms of their interpersonal skills and are more likely to develop a preference for CMC, perceiving it to be less threatening and more satisfactory than face-to-face interactions, indeed quite possibly liberating (Caplan, 2003).

Some interviewees were concerned they may lose control over self-disclosure when online bringing potential personal vulnerability, particularly when communicating with unseen or unknown people who may engage in undesirable behaviour. The social impairment of autism is such that individuals with the disorder may be more susceptible to the deceptive behaviour of others online. However interviewees' comments regarding this type of risk prompt speculation that perhaps the element of invisibility of CMC may serve to alert individuals to the possibility of deception by others, something which they would perhaps be less aware of in a face-to-face situation. They may also be afforded more time, and a less complex communication situation to weigh up the online behaviour of others:

> *I have also found, and believe this to be one of the positive things about AS, that by asking the right questions I can catch people out if they are not being honest with me while not causing them any offence if they are genuine.* (David)

Clarity

People with autism have a tendency toward literal interpretation and interviewees confessed to struggling with the fact that others are not always precise and accurate in what they say and how they say it. Social chit chat was also a source of difficulty, a way in which the efficiency of communication could be impeded.

There was a feeling that the Internet lends itself to more, considered, concise and clearer communication:

> *Generally there is less waffle with written messages and so with any luck I have more chance of understanding people and feel much more equal to them.* (Jane)

The role of non verbal communication

The absence of nonverbal communication online was mentioned by many of the interviewees as a way in which the struggle of communication was lessened. However, the relationship between absence of nonverbal social cues and people's communication preferences was not a straightforward one, as the survey results had also indicated. Interviewees' comments indicated that many of them felt there was some benefit to be gained from visual nonverbal communication, in terms of indicating turn taking and emotional states, albeit to a lesser degree than people without autism. Therefore Internet based communication had its limitations.

The loss of visual cues had more impact in synchronous forms of communication. Although some interviewees were using chat rooms others did not like the real time element of these forms of CMC. Telephone communication

was seen as particularly difficult, more so than face-to-face communication and live online chat:

> *Telephone is the* worst - *it's in real time, plus you have to rely on voice alone. (I suppose videoconferencing would be a* bit *better, I've never tried it. There'd probably still be slight voice and face distortion.) If I have to have a real-time conversation, I prefer face to face, because you can see the lips move.* (Pat)

Interviewees also mentioned the permanence of text, which permitted extra processing time, as an advantage of online communication.

The social role of communication

From the analysis it seemed that the interviewees had struggled to clarify the interaction between their communicative abilities and their relationships with other people. In line with the findings of studies by Muller et al (2008) and Jones and Meldal (2001), some desired relationships but were hindered by their struggles with face-to-face communication. Others were less concerned about social interaction per se, but needed ways of keeping in contact with others on their own terms, with minimal pressure on their communicative difficulties. This may be achieved through shared interests and structured activities, or by the use of Internet-based communication. As one interviewee commented: "*It's a way of keeping in touch without being full on."*

As well as enhancing personal control and reducing communicative stress, there were other ways in which Internet-based communication may alleviate the social

disability of autism, ways which are also evident in empirical studies and theories pertaining to the use of CMC by other groups, for example shy people report feeling better able to express themselves and more confident online (Roberts et al., 2001; Stritzke et al., 2004; Yuen & Lavin, 2004). In accordance with a self-presentational theory of shyness (see Stritzke et al., 2004), this phenomenon has been attributed to the lack of nonverbal feedback online, as well as anonymity and greater control over message construction to the benefit of how one is perceived by others. These perceptions were certainly evident in the interviewees' responses. There was a sense of being judged on one's words and not the impressions which may be given in a face-to-face situation.

> *In cyberspace, you are protected against the misleading messages given out (without your knowledge) by your body, your face, your voice and your lifestyle. You can convey what you* want *to convey. You can be seen as yourself.* (Pat)

Similar insights emerged from research into CMC and shyness (Roberts et al., 2001) and also disability (Bowker & Tuffin, 2002; 2007; Todis et al., 2005), implying that online people had "the opportunity to enjoy a more socially valued subjectivity and a more positive identity" (Bowker & Tuffin, 2007). By avoiding the superficial, negative, or prejudiced perceptions of others, the potential for comfortable social interaction is improved. Additionally, interviewees in this study indicated that the Internet helped them to find similar or like-minded others, people with whom there was a common interest.

> *One huge advantage is the ability to find like minded people by doing keyword searches on members' directory profiles and through online groups, something almost impossible in the real world.* (David)

Similar to the suggestions of Amichai-Hamburger and Furnham (2007) regarding the potential benefits of the Internet for socially inhibited individuals, this was seen as a way of improving the prospects of cultivating positive relationships with other people. The Internet was also supportive to some of the interviewees when disclosing their diagnosis to new acquaintances online, enabling them to direct others to websites to explain the condition and its implications.

Other advantages of CMC which emerged as significant for the social interactions of the interviewees in this study pertained to online groups, where it is easier to vary one's level of engagement, perhaps to "lurk," in a way which would be unacceptable in spoken communication situations. This affords individuals more choice over their level of involvement, as well as time to evaluate and adjust to the dynamics of the interaction. Additionally, the availability of explicit rules to guide interaction and moderation to ensure adherence to group norms were seen as ways in which group participation could be eased for people with ASD, who struggle to discern the tacit rules of social interaction:

> *In real life you are expected to know how to behave socially once you reach the age of about 12 so after that people would think you were odd or being funny if asking for guidance! As people are new to online chat all*

the time there is no stigma about getting things wrong and folks are always happy to explain it to you. (Nicola)

Similar to writers who warned of the inferior nature of online relationships (for example Cummings et al., 2002) and the risk that CMC may exacerbate the problems of less socially confident individuals (Erwin et al., 2004), the limitations of online social communication and relationships were highlighted by several of the interviewees in this study, for whom online interactions were not seen as adequate substitutes for offline relationships and opportunities to use and practice face-to-face communication skills.

However for others the Internet had been instrumental in decreasing loneliness and expanding social networks, as well as gaining support from others either in the context of a supportive group or on a one-to-one basis.

Limitations of the study

Consideration must be given to the influence of the principal researcher and project interviewer, who had a background in speech and language therapy, over the interviews and the research findings should be interpreted within this context. Additionally, although a purposive approach to sampling was taken, the perspectives of this small group of research participants cannot be assumed to be representative of all people with HFA or AS. The sample was biased toward Internet users, who typically have higher incomes and are more highly educated. Analysis of interviews with a different group of individuals may have differed to the one reported from this study, in which negative perceptions and experiences of CMC were less evident than endorsements of its utility. Informal comments

from the parent of a potential survey respondent, as well as the professional coordinator of a social support group for people with AS or HFA, were less positive in their outlook on the safety and appropriateness of CMC for this group of individuals.

Due to the rapid rate of technological progress since the commencement of the project, the reported findings cannot give a full account of the use of CMC by people with HFA or AS, as it stands at the time of writing. Data were collected at a time when instant messaging, webcams, mobile access, multimedia applications and social networking sites were less widely used.

Practical implications

This study has identified the potential of the Internet to benefit the communication of people at the high-functioning end of the autistic spectrum. The Internet is an established feature of the developed world, and its penetration into people's the everyday lives continues to grow. However some sections of the population are disadvantaged in their access to the Internet, for example people of low income and people with disabilities. People with HFA or AS are therefore more likely to be excluded from accessing the Internet, and the opportunity to alleviate their difficulties with social interaction and communication. The proportion of respondents to the survey who accessed the Internet at home was lower than in the general population implying that access was less available to this group.

There is a need for service providers and policy makers to consider the potential of improved Internet access to enhance opportunities for the social inclusion and empowerment of high-functioning autistic people, whilst being mindful of potential

risks. There may be clinical implications, one possibility being the provision of Internet based support and counselling, in particular cognitive behavioural therapy which has emerged as particularly suitable for people on the autistic spectrum (Ramsay et al., 2005) as well as the online format (Rochlen et al., 2004). As well as an alternative mode of communication for therapeutic counselling, the Internet may also provide a structured environment in which people with AS or HFA may learn new social skills and gradually transfer them to offline situations. Amichai-Hamburger and Furnham (2007) propose a model in which socially inhibited people progressively lose the feeling of total control which they experience online and equip themselves to cope with the relative loss of control in offline situations.

The wider availability of online communication could improve access for people with AS or HFA to other primary and secondary clinical services, lessening the stress of making an initial approach. CMC may also provide a forum in which individuals with AS or HFA may express their opinions and needs more effectively, with implications for self-advocacy and participation in research.

Conclusion

This study has identified the ways in which a group of people at the high-functioning end of the autistic spectrum may capitalise on the serendipitous (Roulstone, 1998) benefits of the Internet to address their communication needs and break down some of the social barriers which permeate their lives. The visual anonymity, flexible timing and permanent nature of the Internet serve to diminish the social, emotional and time pressures of interpersonal

communication and also the cognitive complexity of the processes involved. The drive for greater control over social communication was a major motivation for the use of Internet-based communication. As well as being able to interact in a potentially less stressful situation, individuals are afforded more possibilities and choices to expand their social networks. Online forums with rules and moderation could also provide structure and guidance for social interaction in a group situation.

The Internet therefore may be liberating in its effects for individuals at the high-functioning end of the autistic spectrum, expanding the potential to explore and express their identities, and opening up possibilities in terms of access to employment, education, social interaction and support. Although their experiences and perceptions of the Internet as a communication medium were largely positive, interviewees also raised the negative aspects of losing self-control when online, as well as the risks of communicating with unseen or unknown people.

The beneficial effects of Internet based communication for people with HFA or AS could be threatened, if future technological developments and commercial influences transform the Internet into a medium with less emphasis on the textual mode, one in which video streaming is commonplace, thereby diminishing those features of online communication which are possibly empowering to autistic users, but only tolerated by the neurotypical[1] community.

[1] This term is used widely in the online autism community and was invented to refer to people without neurological conditions such as autism (Dekker, 1999)

Despite being of normal or superior intelligence people with AS or HFA are subject to social disadvantage. With respect to employment they are arguably a wasted resource; there is a loss to society as well as the individual as a result of their poor employment prospects. On a personal level there are risks of economic disadvantage, social isolation, marginalisation, and psychological problems such as low self-esteem, stress, anxiety and depression. It seems imperative that the potential of the Internet to bypass or lessen some of the social barriers of their everyday lives is acknowledged and acted upon.

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Anne Emerson . An examination of Facilitated Communication through the use of eye-tracking and video analysis: The potential for eye-gaze communication for people with disabilities

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An examination of Facilitated Communication through the use of eye-tracking and video analysis: The potential for eye-gaze communication for people with disabilities

Abstract
Facilitated Communication is a controversial technique initiated by practitioners working with people with learning disabilities. Proponents of the technique claim that people with severe communication impairments, who do not have independent pointing skills for communication, can significantly increase their ability to communicate when given physical support by a skilled facilitator. There has been extensive research to investigate whether these claims are valid, most of which has indicated that it is not, and which has frequently attributed the phenomenon to the unwitting influence of the facilitator over the communicator. A recent research project has used eye-tracking technology to investigate the link between looking and pointing. If communicators are found to look at letters they subsequently point to, before moving towards them, this would indicate their active participation in the process. This could also have implications for the use of eye-gaze technology as a means of communication for severely disabled people.

Keywords
Learning disability
Communication impairment
Eye-tracking
Facilitated Communication

An examination of Facilitated Communication through the use of eye-tracking and video analysis: The potential for eye-gaze communication for people with disabilities

The history of Facilitated Communication (FC) to date shows a continual cycle between practice, research and back to practice. Its use as a means of communication for people with severe communication impairments developed from the discoveries of practitioners and flew in the face of research and accepted understanding about disability, assessment of ability and communication impairment. Research in the field has mostly focused on whether the claims of practitioners could possibly be justified, and since most research has indicated that they cannot other questions about the phenomenon are mostly unexplored.

Background

Descriptions of individual practitioner's discoveries that they could physically support the pointing, and thereby the communication, of their clients have been published since the 1970s (Oppenheim 1974; Schawlow & Schawlow, 1985). Crossley and McDonald (1980) and Biklen (1990) developed the use of physical support as a technique in Australia and the United States respectively, initially for people with cerebral palsy and then for those with autism, Down Syndrome and other forms of learning disabilities. Proponents claimed that people who could not communicate independently could do so, at surprisingly complex levels, when given physical support to

type. People who had been assessed as having severe learning disabilities and who were not expected to have literacy skills were reported to be able to spell words and sentences when 'facilitated'.

The technique consists of a facilitator holding the hand or arm of the communicator and offering resistance against the forward movement of the FC user as they point. The pointing can be to pictures, symbols or words, using high and low-tech communication aids but most research has focused on the remarkable claims that people previously assessed as having limited verbal understanding and no literacy skills can be facilitated to point to letters, spell words and communicate in sophisticated language.

The reaction of researchers to these apparently outlandish claims from practitioners was to test their validity. Experiments were conducted where what was seen or heard by the communicator could be controlled to be either the same or different to what was seen or heard by the facilitator. A series of research papers described that in most cases FC users were not able to report what they had seen or heard when it was different to what had been shown to the facilitator (Hudson et al, 1993; Wheeler et al, 1993) and frequently what the FC user typed was what had actually been seen or heard by the facilitator (Eberlin et al, 1993; Vazquez, 1994). Some organizations which had previously adopted the use of FC for their clients reacted to research evidence of invalidity and facilitator influence by

banning the use of FC. However many individual facilitators had witnessed indications that the research evidence was not telling the whole story and continued to practice, and in some cases research, FC.

Practice

Facilitated Communication continues to be used in many countries around the world despite the lack of supportive evidence. In some countries (particularly Italy and Germany) FC is used widely in institutions and funded by the state. Facilitators are motivated to continue using FC by the small number of individuals who have achieved independent pointing skills through the gradual withdrawal of facilitation, who usually have a high profile through videos and conference attendance. In their own practice facilitators see positive changes in relation to communication, challenging behaviour and social relationships (Wheeler et al, 1993; Emerson & Grayson, 1996; Emerson et al, 1998). Perhaps the most compelling and puzzling phenomenon, particularly given the research evidence, is the willingness of severely disabled people to engage in an activity for long periods of time, when they normally do not participate in other equivalent tasks.

By introducing FC practitioners aim to do a number of things: first to offer the possibility of communicating at a higher level than the person is capable of independently, thereby increasing quality of life; second to teach the motor skill of coordinating looking and pointing, through scaffolded support

which is gradually faded leading to independent communication. They do not normally set out to teach literacy skills but rather to access what the person has already learned. It is evident that the practice of communicating involved allows development not only of motor skills but also of linguistic and literacy skills.

Research

A large number of studies investigating the validity of the technique were published in the 1990s but since that time there have only been occasional reports in peer-reviewed journals. Reviews of authorship studies show very small numbers of FC users have produced evidence of valid communication (Felce, 1994; Green, 1994; Mostert, 2001).

Another thread of research was to look for a theoretical understanding or underpinning of the phenomenon. Leary and Hill (1996) reviewed research which suggested a similarity between the movement impairments of people with Parkinson's disease, Tourette's syndrome and catatonia to many of the difficulties reported by people with autism. They suggested that although autism is mostly described as being a result of cognitive differences and impairments, aspects of autistic behaviour appeared to be governed by neurological disorders. They suggest that people with autism can be viewed as having difficulties with stopping, starting, switching and combining which impact on their motor skills, perceptions and thoughts. Grayson

(1997) framed this in a different way by suggesting that facilitation assisted people with their executive functioning, considered to be impaired in people with autism.

Some writers also suggested that FC could be found more acceptable if viewed as supporting the collaborative forming of communication. Facilitators initially are key in the production of messages, physically, emotionally and cognitively, but could gradually fade the degree to which they supported their partner leading to greater independence of thought and movement. The ideal of gradually fading support has been a facet of FC from the beginning.

Eye-tracking study

Facilitators wanted to know whether they were indeed influencing and if so to what extent and whether there were ways of recording non-influenced information. They observed that people had individual ways of communicating as far as movements were concerned and topics and 'turns of phrase' that were frequently repeated and appeared to be typical only of the individual concerned. This led to research in timings and movement patterns and vocabulary use (Grayson and Grant, 1995) and formed the basis for an innovative eye-tracking study.

The data reported in the presentation are taken from a large two year investigation of the link between looking and pointing. The study was mainly interested in addressing the issue of authorship but the findings also have implications for practice. Participants were recruited according to several criteria: they had to be confident long-term users of FC who could spell sentences, with a regular facilitator willing to take part; they needed to be able to sit still in front of a computer; they had to tolerate wearing a baseball cap (where a sensor was placed to assist the eye-tracking camera in finding the eye); and they ideally needed to have a diagnosis of autism. A total of 31 people were recruited, from England and Germany, but ultimately it was only possible to gather analysable data from 9 of the participants, due to the complex technological requirements of the research. All of these 9 people have severe communication impairments linked to apparent severe intellectual disabilities. A few of the participants are able to use a small number of Makaton signs and a few spoken words. Some, but not all, are able to undertake basic self-care. They are all people who require 24 hour care and support. None of them were known to have literacy skills prior to the introduction of FC, other than two people who were thought to be able to recognise some single words by their mothers.

Participants were asked to sit in front of a computer monitor with an adjacent eye-tracking camera. The participant wore a cap on their head attached to which was a small sensor which assisted the eye-tracking

camera to find their eye. A video camera recorded pointing movements from the side. A series of small images were shown on the screen in nine different positions to effect a calibration of the eye. This proved the most difficult aspect of the research as participants had to be able to sit still and stare at the screen for long periods. None of our participants were able to tell us when they were looking at the image on the screen, necessitating a judgement on the part of the facilitator. As soon as a reasonable calibration appeared to have been achieved on at least some of the nine points the data collection started. A letter board was projected on to the screen and participants had to alter their normal movement pattern by pointing up at the screen rather than down onto the table. All were able to do this but it probably caused greater stress and fatigue than in typical situations.

The study allows us to make observations about the relationship between the looking and pointing behaviour of the participants, which is clearly relevant to the question of whether or not they are really authoring the communications that are being attributed to them. It may also be the case that some of the participants could learn to use eye pointing to access appropriate software to enable them to communicate directly in this way.

Conclusion

The use of eye-tracking as a research tool promises to make a constructive contribution to the literature in this controversial area, and may also play a role in developing eye pointing as an AAC technique for people with severe communication impairments.

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Mark Griffiths. Internet help and therapy for addictive behaviour

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Abstract

Counselling and psychotherapy have entered the computer age. Psychological advice, help and treatment for those with addictive behaviours are no exception. The paper overviews the main issues in the area and approaches the discussion acknowledging that online therapy has to be incorporated within the overall framework of the need for clinical assistance. The paper also provides brief overviews of what types of online help and therapy are available. This paper makes particular reference to online help for problem gamblers and will overview a recent study that evaluates the effectiveness of an online help and guidance service for problem gamblers.

Keywords: Online therapy; Online help; Addiction; Problem gambling; GamAid

Internet help and therapy for addictive behaviour

Many therapists remain suspect about the new and growing field of 'behavioural telehealth'. Some have claimed that Internet therapy is an oxymoron because psychotherapy is based upon both verbal and nonverbal communication (Segall, 2000). Since online relationships can be as real and intense as those in the face-to-face world (Griffiths, 2001a), there is little surprise that clinicians are beginning to establish online therapeutic relationships.

To date there have been a growing number of non-empirical papers about various issues concerning online therapy including challenges and initiatives in this growing field (Sanders & Rosenfield, 1998; Griffiths, 2001a), ethical issues (Bloom, 1998), mediation of guidance and counselling using new technologies (Tait, 1999), and perspectives on family counselling (Oravec, 2000). There have also been a growing number of empirical reports utilising online therapy. These include its use in treating anxiety and panic disorders (Klein & Richards, 2001), eating disorders (Zabinski, Pung, Wilfley, *et al*, 2001), post-traumatic stress disorder (Lange, Van De Ven, Schrieken, *et al,* 2000), and individuals with recurrent headaches (Stroem, Pattersson & Andersson,

2000). Every one of these empirical studies showed significant improvements for those treated using online therapy.

Psychological advice, guidance, help and treatment for addicts are no exceptions. This paper therefore overviews some of the main issues involved. The paper also makes particular reference to online help for problem gamblers and overviews a recent study by the author that evaluates the effectiveness of an online help and guidance service for problem gamblers.

Background: Online therapy and addictive behaviour

For the fifth time in a week, a 32-year old man comes home very late from a 12-hour drinking session. Unable to sleep, he logs onto the Internet and locates a self-help site for alcoholics and fills out a 20-item alcohol consumption checklist. Within a few hours he receives an e-mail that suggests he may have an undiagnosed drinking disorder. He is invited to revisit the site to learn more about his possible drinking disorder, seek further advice from an online alcohol counsellor and join an online alcoholism self-help group.

On initial examination, this fictitious scenario appears of little concern until a number of questions raise serious concerns (Rabasca, 2000a). For instance, who scored the test? Who will monitor the self-help group? Who will give online counselling advice for the alcohol problem? Does the counsellor have legitimate qualifications and experience regarding alcohol problems? Who sponsors the website? What influence do the

sponsors have over content of the site? Do the sponsors have access to visitor data collected by the website? These are all questions that may not be raised by an addict in crisis seeking help.

The Internet could be viewed as just a further extension of technology being used to transmit and receive communications between the helper and the helped. If addiction practitioners shun the new technologies, others who might have questionable ethics will likely come in to fill the clinical vacuum. It has been claimed that online therapy is a viable alternative source of help when traditional psychotherapy is not accessible. Proponents claim it is effective, private and conducted by skilled, qualified, ethical professionals (King, *et al,* 1998). It is further claimed that for some people, it is the only way they either can or will get help (from professional therapists and/or self-help groups).

Types of 'Online Therapy'

There appear to be three main types of website where psychological help is provided - information and advice sites, websites of traditional helping agencies and individual therapists (Griffiths & Cooper, 2003) although in this paper, sites will be categorized in terms of their primary function. That is: 1) information dissemination, 2) peer-delivered therapeutic /support / advice (such as a self-help support group) and 3) professionally delivered treatment. Psychological services provided on the Internet range from basic information sites about specific disorders, to self-help sites that assess a person's

problem, to comprehensive psychotherapy services offering assessment, diagnosis and intervention (Rabasca, 2000a).

Information dissemination: These are sites mainly dedicated to educational and consciousness raising issues. They are often in the form of webpages that provide easily understandable pieces of helpful information on a range of disorders, self-help checklists, and links to other helpful websites. There appear to be numerous places to get information about addiction and addiction-related problems. Quality information websites are hosted by a variety of sources including individuals who serve as their own 'webmaster' to not-for-profit organisations to private companies. Some illustrative examples of these are listed in the next section.

Peer-delivered therapeutic support and advice: These sites are often set up by traditional helping agencies that have expanded their services to include an online option for clients. Typically, this is done by e-mail and is usually free of charge (for example, the Samaritans). Other examples include various 12-Step groups who meet online. Many online therapy services are available for those suffering almost any kind of addiction. In the world of online therapy, a person can be alone in their living room while they attend an AA meeting joined by a couple of dozen people from various countries, or be visiting an Internet counsellor in the United kingdom without having left their home in the United States. There are a number of 12-Step groups that meet regularly in this way and they are often open for 24 hours a day. Cooper (2001) reported that about

70% spoke of how they benefited from their exposure to and involvement with GAweb, an online peer support group.

There are a number of very good reasons why the Internet is an excellent medium for most forms of self-help. Research has consistently shown that the Internet has a disinhibiting effect on users and reduces social desirability (i.e., users do not alter their responses in order to appear more socially desirable). This may lead to increased levels of honesty and, therefore, higher validity in the case of self-disclosure. As well as disinhibition effects, the Internet is a non-face-to-face environment that is perceived by many users to be anonymous and non-threatening. The Internet may, as a consequence, provide access to 'socially unskilled' individuals who may not have sought help if it were not for the online nature of the self-help group.

There are also generalist type services (usually e-mail only) in which people usually require a one-off piece of advice from someone who may have no psychological training. These services are usually (but not always) free of charge and may be part of an online magazine. It is highly unlikely that the sort of general advice given at these sites will be of much help to addicts as their problem is, by its nature, very specific. The most help they would probably get is an onward referral (e.g., to a face-to-face self-help group such as AA, GA, etc.).

Professionally delivered treatment: These sites are becoming more and more abundant and can be set up by individual counsellors and/or psychotherapists. They usually

operate in one of two ways - either by written answers to e-mail inquiries or a real time conversation in an Internet chat room. Professionally delivered treatment is mainly available from individual practitioners' websites. There are a few examples of not-for-profit organisations beginning to offer these types of services. Thus far, for-profit companies appear to primarily use the Internet for information dissemination and for promoting their face-to-face services.

Many therapists have now set up their own Internet sites to deliver behavioural services although the number of sites that specialize in addictions appears to be growing all the time. The kinds of services offered vary in type and expense. They can include 'ask five questions for free'-type sites, therapists moderating a group chat online, e-mail correspondence, private instant messaging, and/or video-conferencing.

Advantages of Online Therapy for Addicts

There are many advantages and disadvantages of online therapy. The main ones have been overviewed elsewhere (Griffiths, 2001a; Cooper & Griffiths, 2003) and are outlined below in relation to gambling addicts to give the reader specifics in relation to a particular type of problem. However, it is assumed that almost all of these advantages and disadvantages apply to other types of addiction. Here are the main advantages:

Online therapy is convenient: Online therapy is convenient to deliver, and can provide a way to seek instant advice or get quick and discreet information. Online therapy avoids

the need for scheduling and the setting of appointments, although for those who want them, appointments can be scheduled over a potential 24-hour period. For gambling addicts who might have a sense of increased risk or vulnerability, they can take immediate action via online interventions, as these are available on demand and at any time. Crisis workers often report that personal crises occur beyond normal office hours, making it difficult for people to obtain help from mental health clinicians and the like. If a problem gambler has lost track of time at the casino only to depart depressed, broke, and suicidal at 4am in the morning, they can perhaps reach someone at that hour who will be understanding, empathic and knowledgeable.

Online therapy is cost effective for clients: Compared with traditional face-to-face therapies, online therapy is cheaper.. This is obviously an advantage to those who may have low financial resources. It may also allow practitioners to provide services to more clients because less time is spent travelling to see them. Since there are financial consequences for a gambling addict, cheaper forms of therapy such as online therapy may be a preferred option out of necessity rather than choice. The cost factor is particularly important in countries where people are often forced to pay for health care (for example, in the United States). Arguably, one needs Internet access, but this too is becoming more freely available, and conceivably, even those who are homeless would be able to utilize such services through places like public libraries.

Online therapy overcomes barriers that otherwise may prevent people from seeking face-to-face help: There are many different groups of people who might benefit from

online therapy. For example, those who are: (i) physically disabled, (ii) agoraphobic, (iii) geographically isolated and/or do not have access to a nearby therapist (military personnel, prison inmates, housebound individuals etc.), (iv) linguistically isolated, and (v) embarrassed, anxious and/or too nervous to talk about their problems face-to-face with someone, and/or those who have never been to a therapist before might benefit from online therapy. Some like those with agoraphobia and/or the geographically isolated, might be more susceptible to activities like online gambling because they either tend not to leave home much or they do not have access to more traditional gambling facilities (like casinos, bingo halls, racetracks and so forth). It is clear that those that are most in need of help (whether it is for mental health problems, substance abuse or problem gambling) often do not receive it.

Online therapy helps to overcome social stigma: The social stigma of seeing a therapist can be the source of profound anxiety for some people. However, online psychotherapists offer clients a degree of anonymity that reduces the potential stigma. Gambling may be particularly stigmatic for some because they may find it is a self-initiated problem. Others have found that the issue of stigma has caused some problem gamblers to avoid seeking treatment (Hodgins & el-Guebaly, 2000). Furthermore, in an exploratory study, Cooper (2001) found that there was a correlation between higher levels of concerns about stigma and the absence of treatment utilization, and that lurking (i.e., visiting but not registering presence to other users) at a problem gambling support group website made it easier for many to seek help including face-to-face help.

Online therapy allows therapists to reach an exponential amount of people: Given the truly international cross-border nature of the Internet, therapists have a potential global clientele. Furthermore, gambling itself has been described as the 'international language' and has spread almost everywhere within international arenas.

It would appear that in some situations, online therapy can be helpful - at least to some specific sub-groups of society, some of which may include addicts. Furthermore, online therapists will argue that there are responsible, competent, ethical mental health professionals forming effective helping relationships via the Internet, and that these relationships help and heal. However, online therapy is not appropriate for everyone. As with any new frontier, there are some issues to consider before trying it. The next section briefly looks at some of the criticisms of online therapy.

Disadvantages of Online Therapy

The growth of online therapy is not without its critics. The main criticisms (Griffiths & Cooper, 2003) that have been levelled against online therapy include:

Legal and ethical considerations: Since cyberspace transcends state and international borders, there are many legal and regulatory concerns. For example, client/doctor confidentiality regulations differ from one jurisdiction to another. It may not be legal for a clinician to provide chat-room services to patients who are in a jurisdiction in which the clinician is not licensed. Furthermore, some patients may be excluded from telehealth

services because they lack the financial resources to access the Internet. One potential ethical and legal dilemma is the extent to which service quality can be ensured. It is possible that individuals who register to provide counselling services online do not have the qualifications and skills they advertise. They may not even be licensed to practice. There are also issues regarding the conduct of practitioners engaged in all forms of telecommunication therapy. For example: issues of informed consent, the security of electronic medical records, electronic claims submissions, etc. (Foxhall, 2000).

Confidentiality: Online therapy may compromise privacy and confidentiality, particularly if a skilled computer 'hacker' is determined to locate information about a particular individual. No online therapist can confidently promise client confidentiality given the limitations of the medium. However, there are some sites that offer secure messaging systems that offer the same level of protection as banking institutions.

Severity of client problems: Some clients' addiction problems may be just too severe to be dealt with over the Internet. To some extent, there can always be contingencies, but because people can come from anywhere in the world and have a multitude of circumstances, online clinicians may be hard-pressed to meet everyone's needs.

Client referral problems: One obvious difficulty for the counsellor is how to go about making a referral for an addict in a faraway town or another country.

Establishing client rapport: It could perhaps be argued that there might be difficulty in establishing rapport with someone that the therapist has never seen. This is an interesting area where clearly more information is needed. One might also argue that because the addict is in a more equal relationship with the therapist, they will feel more comfortable. Coupled with this, online therapy leads to a loss of non-verbal communication cues such as particular body language, voice volume and tone of voice. Furthermore, the lack of face-to-face interaction between addict and therapist could result in a wrong referral or diagnosis.

Commercial exploitation: Consumers theoretically are not always as anonymous as they might think when they visit health sites because some sites share visitors' personal health information with advertisers and business partners without consumers' knowledge or permission (Rabasca, 2000b). In relation to gambling addicts, this is a real issue. By virtue of posting to places such as GAweb with an accurate e-mail address shown, online casinos have the potential to collect such information in order to later send junk e-mail promoting their casino websites.

Convenience: Although convenience was outlined as an advantage in the previous section, it can also have a downside. For instance, it may mean that the addict is less likely to draw on their own existing coping strategies and use the online therapist as a convenient crutch (something which is actively discouraged in face-to-face therapy).

Online help for problem gamblers: The *GamAid* case study

Wood and Griffiths (2007) reported one of the first ever studies that evaluated the effectiveness of an online help and guidance service for problem gamblers (i.e., *GamAid*). The evaluation utilized a mixed methods design in order to examine both primary and secondary data relating to the client experience. In addition, the researchers posed as problem gamblers in order to obtain first hand experience of how the service worked in practice.

GamAid is an online advisory, guidance and signposting service whereby the client can either browse the available links and information provided, or talk to an online advisor (during the available hours of service), or request information to be sent via email, mobile phone (SMS/texting), or post. If the problem gambler connects to an online advisor then a real-time image of the advisor appears on the client's screen in a small web-cam box. Next to the image box, is a dialogue box where the client can type messages to the advisor and in which the advisor can type a reply. Although the client can see the advisor, the advisor cannot see the client. The advisor also has the option to provide links to other relevant online services, and these appear on the left hand side of the client's screen and remain there after the client logs off from the advisor. The links that are given are in response to statements or requests made by the client for specific (and where possible) local services (e.g., a local debt advice service, or a local Gamblers Anonymous meeting).

A total of 80 clients completed an in-depth online evaluation questionnaire, and secondary data was gathered from 413 distinct clients who contacted a *GamAid* advisor. Wood and Griffiths (2007) reported that the majority of clients who completed the feedback survey were satisfied with the guidance and "counselling" service that *GamAid* offered. Most participants agreed that *GamAid* provided information for local services where they could get help, agreed that they had or would follow the links given, felt the advisor was supportive and understood their needs, would consider using the service again, and would recommend the service to others. Furthermore, the addition of being able to see the advisor via a web-cam was reassuring. Being able to see the advisor enabled the client to feel reassured, whilst at the same time, this one-way feature maintained anonymity, as the advisor cannot see the client.

The evaluation found that the majority of those who responded to the online feedback survey agreed that *GamAid* helped them to consider their options, made them more confident in help, helped them to decide what to do next, made them feel more positive about the future, provided useful information for local help which they intended to follow up through the links provided.

An interesting aside is the extent to which *GamAid* was meeting a need not met by other gambling help services. This was examined by looking at the profiles of those clients using *GamAid* in comparison with the most similar service currently on offer, that being the UK *GamCare* telephone help line. The data recorded by *GamAid* advisors during the evaluation period found that 413 distinct clients contacted an advisor. The types of gambling engaged in and the preferred location for gambling showed little

similarity to the data collected in the two British national prevalence surveys to date (Sproston, Erens & Orford, 2000; Wardle, Sproston, Orford, Erens, Griffiths, Constantine & Pigott, 2007). Unsurprisingly (given the medium of the study), online gambling was the single most popular location for clients to gamble with 31% of males and 19% of females reporting that they gambled this way. By comparison, the *GamCare* helpline found that only 12% of their male and 7% of their female callers gambled online. Therefore, it could be argued that the *GamAid* service is the preferred modality for seeking support for online gamblers. This is perhaps not surprising given that online gamblers are likely to have a greater degree of overall competence in using, familiarity with, and access to Internet facilities. Problem gamblers may therefore be more likely to seek help using the media that they are most comfortable in.

GamAid advisors identified gender for 304 clients of which 71% were male and 29% were female. By comparison, the *GamCare* helpline identified that 89% of their callers were male and 11% were female. Therefore, it would appear that the *GamAid* service may be appealing more to women than other comparable services. There are several speculative reasons why this may be the case. For instance, online gambling is gender-neutral and may therefore be more appealing to women than more traditional forms of gambling, which (on the whole) are traditionally male-oriented (with the exception of bingo) (Wardle et al, 2007).

It is likely that online gamblers are more likely to seek online support than offline gamblers. Women may feel more stigmatised as problem gamblers than males and/or

less likely to approach other help services where males dominate (e.g., GA). If this is the case, then the high degree of anonymity offered by *GamAid* may be one of the reasons it is preferred. Most of those who had used another service reported that they preferred *GamAid* because they specifically wanted online help. Those who had used another service reported that the particular benefits of *GamAid* were that they were more comfortable talking online than on the phone or face-to–face. They also reported that (in their view) *GamAid* was easier to access, and the advisors were more caring.

One of the key strengths of the study was that it used a variety of methods to collect data and information including an online survey, secondary data from online advisors, and anonymous trials and testing of the services. Although there are clearly issues surrounding self-selection, online questionnaires are particularly useful for the discussion of sensitive issues that participants may find embarrassing in a face-to-face situation (such as problem gambling). The nature of this medium means that a relatively high degree of anonymity can be maintained, and participants may feel more comfortable answering sensitive questions on their computer than in a face-to-face situation. The survey data were necessarily self-report although the collection of the data online may have lowered social desirability and increased levels of honesty. *GamAid* appears to meet the stated aims and objectives of the evaluation. However, it is evident that a longer-term follow-up evaluation study is needed to determine the effectiveness of the service over time.

Conclusions

Online therapy may not be for all addicts and those participating should at the very least be comfortable expressing themselves through the written word. In an ideal world, it would not be necessary for those in serious crisis - some of whom could be addicts (where non-verbal cues are vital) - to need to use computer-mediated communication-based forms of help. However, because of the Internet's immediacy, if this kind of therapeutic help is the only avenue available to individuals and/or the only thing they are comfortable using, then it is almost bound to be used by those with serious crises. Rigorous evaluation studies are needed (particularly given the rate at which new sites are springing up). These refer not only to sites that specifically deal with addictions, but all sites.

It could be the case that online therapy's most effective use might be as either a way of communicating information in response to clients' statements and questions, or a form of 'pre-therapy'. This latter suggestion is interesting as it has traditionally been assumed that for 'pre-therapy' to occur, the client and practitioner had to be in the same room. However, it could equally be argued that websites could be used to augment treatment. Websites could provide cognitive information to supplement treatment or provide instant peer support groups when addicts need most help. For instance, chat rooms can be used by addicts desiring more anonymity than is possible at a 12-Step meeting. Furthermore, public message boards and e-mails can provide greater efficiency and productivity than in-person visits to a self-help group.

There is a paucity of empirical data that assesses the efficacy and feasibility of online therapy for addicts. To date, the limited studies carried out (mostly with very small sample sizes) have focussed on client and provider satisfaction with the technology rather than the effectiveness of the technology in delivering services. Future research should address the following areas (all of which could involve addiction research):

- The differential effects of various online therapeutic interventions among clinical populations. There would be great benefit from learning much more about counselling versus online peer-support groups.
- The effect online therapy has on therapeutic relationships. Such relationships will be much more equal in future with the therapist being more of a coach to a much more informed consumer.
- Whether providers and consumers find online therapy interventions accessible and desirable.
- Do demographic characteristics (like socio-economic status, ethnicity, culture, geographic location, age and gender) affect a patient's access to and acceptance of online therapy and if so, how and why? The same questions could also be applied to therapists regarding their acceptance and receptivity. Miller (1989) has written about how positive expectancies of therapists have contributed to improved patient outcomes. If clinicians do not believe in online help but were forced to provide it by their employer, would this be subtly communicated to the clients and their treatment undermined?

This paper has demonstrated a need for evaluative research regarding online therapy, particularly since there is a lack of an evidence-base to govern this growing practice. Furthermore, papers like this aim to help to engage consciousness-raising activities and thereby alert clinicians to the future possibilities of practice behaviour. After all, clinicians have been constantly striving to better serve their clients from the earliest days of mental health practice. It seems apparent that the Internet and computer-mediated communication are here to stay. Therefore, there is a need to focus on exactly how these innovations will impact on our field keeping clients' best interests in mind

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Claire Johnson . Creative Coding: developing programming skills in the secondary ICT curriculum through computer game authoring – a case study.

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Biography: Claire is Subject Leader for ICT at The Westgate School, Winchester. Her interests lie in how new curriculum activities, such as computer game authoring, can be effectively introduced into the secondary ICT curriculum and how to facilitate the 'new ways of thinking' that such activities engender.

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Title: Creative Coding: developing programming skills in the secondary ICT curriculum through computer game authoring – a case study.

Abstract: The secondary ICT curriculum is changing rapidly with the recent introduction of new courses in Digital Applications (Edexcel); iMedia (OCR); the Diploma in IT and Digital Cre8or (BCS). An emerging area of study common to these courses is computer game authoring, yet there is very little formal teaching of games authoring at KS3/4.

~~These new qualifications do not necessarily require that a game be developed. Where games engines are used, the software does not require sophisticated programming. However, there is a growing concern that the introduction of the National Curriculum for ICT more than 15 years ago, has 'usurped' computer science and computer studies curricula - programming is disappearing from the ICT curriculum to the extent that there are plans afoot to reintroduce a GCSE in Computing, which would reinstate programming as a key area of study.~~

This case study research aims to identify the learning affordances of computer game authoring and to develop a framework to support teachers and pupils in their encounters with such new activities. This framework would seek to strengthen computer programming in the secondary ICT curriculum by introducing game authoring as an applied, real world context, which is rooted in pupils' interests and gives them opportunities to bring their prior, out of school learning to bear in the classroom. Since game authoring is an extended activity, the research also seeks to identify which elements of virtual learning environments (VLEs) best support the learner in achieving their outcomes. Data is to be collected by digital voice records of pupils' learning conversations, pupil journals, electronic data drawn from the network and by interviewing a focus group. Pupils' progress will be tracked as they create successive versions of their games and a study of one pupil's work will enable a close examination of the game authoring process in its entirety.

Through the research, a better understanding of game authoring and its place in the ICT curriculum will be achieved. It will also lead to a better understanding of pupils' learning experiences, as they engage for the first time with an extended project of this type.
~~, and of how VLEs can be used to support them in their learning and in the delivery of the unit of work.~~

Keywords: game-authoring, programming, creativity, interactivity, ICT

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Title: Creative Coding: developing programming skills in the secondary ICT curriculum through computer game authoring – a case study.

This article presents a project description for a case study. The relevance of the proposed research relates to three broad areas: the ICT curriculum, ICT practice and pedagogy and ICT policy.

ICT Curriculum

The secondary ICT curriculum is changing rapidly, with the introduction of new courses in Digital Applications (Edexcel), OCR's iMedia, the Diploma in IT and the 14-19 agenda, with its focus on vocational learning. An emerging area in the

ICT curriculum, common to these new courses, is computer game authoring. Edexcel's Diploma in Digital Applications ~~course~~ invites pupils to create a game as part of a multimedia unit; a Digital Games Authoring unit (equivalent to one GCSE) is currently being piloted in some schools. OCR iMedia offers elective units in the Design and Testing of Computer Games, Computer Game Design and Computer Game Engines, the BCS has introduced a Digital Cre8tor unit, also including games authoring.

Although these courses are aimed at NVQ levels 2 and 3, there is very little formal teaching of games authoring at KS3 or KS4 and prior learning in games authoring cannot be assumed. Where this does occur, it is usually as enrichment or as an extra curricular activity. Neither the original framework for Key Stage 3 ICT (2000) nor the new National Curriculum for ICT (2008) refer to games authoring explicitly, although such activities fit well into the 'sequencing instructions' substrand, and to date (September 2008), there is only one, recently published textbook (Giles, Beard and Street 2007) which includes a unit in game authoring.

The emphasis of the tasks available in these new courses is on the *design* of computer games – produce a story and the dialogue for a game; produce game audio content; generate ideas for a game concept and produce game design documentation; understand and be able to use a 2D and a 3D games engine; play and review computer games, create a computer game, plan/write a proposal

for (but do not develop) a game, and identify technologies used for interactive games. It is not always required that a game be developed. Although pupils may need to use a games engine to create a level in a game, the software commonly used does not require sophisticated programming; objects, events and actions are selected from libraries of pre-programmed 'blocks' and compiled to create the game and its interactivity.

This research seeks to explore the learning affordances of this type of games authoring and to build on them by introducing a formal programming element. In so doing, a games authoring curriculum will be developed to support teachers and pupils with such new activities.

The new Secondary National Strategy refers to 'sequencing instructions' – which subsumes previous 'control'/programming elements - but in practice, very little 'traditional' programming is done at KS3. Popular software (Flowol 3, Crocodile Clips) used to cover the control element of ICT in many schools provides pupils with on screen simulations of computer controlled systems, which they then 'program' via flowcharts, but the language of programming is not explicit in this software (for example, loops, variables, feedback, procedures, sub-routines). At GCSE level there is no requirement to program, although it may be an optional coursework unit (ICAA GCSE ICT Specification) or may appear as a question in the externally assessed examination paper (AQA ICT (A) Higher Tier exam paper May 2005), where Logo-like commands are required to draw a specified shape.

Amongst stakeholders in further/ higher education and industry there is a feeling that 'ICT' has 'usurped' much of the content of latterday 'computer studies' programmes (Webb and Cox 2007). Increasingly there is a call to reintroduce a GCSE in Computing, so that the central concept of programming does not altogether disappear from the ICT curriculum.

The research is based on an awareness of the need to develop new opportunities for programming, whilst recognising the difficulty that pupils (and teachers) have with programming concepts. The development of game authoring software specifically designed for the education market introduces new possibilities for curriculum development - computer games are immensely popular and a significant cultural artefact and pupils need to be given the opportunity to be producers as well as consumers of computer games.

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ICT Practice and pedagogy

The personalisation of pupils' educational experiences and the promotion of e-learning through virtual learning environments (VLEs) and learning platforms (LPs) is an important factor in any development of the curriculum at this time (DfES 2004).

Game authoring is a sustained activity, unlike currently available units of work at Key Stage 3, which typically take 6 – 10 hours to complete. The research seeks

to establish which features of a VLE best facilitate the delivery of such an extended module of work.

The introduction of computer game authoring is not just a matter of delivering new curriculum content – it requires different attitudes/approaches to learning, presents extended activities and may encourage or require extended engagement with learning material/activity via VLEs, both in and out of the classroom.

The communication/collaboration features of VLEs may become important here because, since game authoring is an extended, creative activity, for pupils to properly engage with it they need to work beyond the confines of a one hour lesson, to experience 'flow' and continuity. A VLE enables them to work outside the classroom. It also gives them the opportunity of collaborating via chat/messaging/forum communication, which may support their learning more effectively. With more flexible digital environments available to them, pupils can upload their creations and expose their work to real audiences and receive feedback and support from real users. If pupils are willing to engage with learning during out of school time then it is important that classroom practice changes to accommodate this.

ICT Policy

The proposed research also has to situate itself within current education policy, in particular the Every Child Matters agenda. One of the key ideas behind this initiative is that children should 'enjoy and achieve' by experiencing a 'curriculum full of surprise and challenge'. 'If children are to enjoy learning they need to investigate deeply and widely, build on their own interests and aptitudes, confront the big ideas that shape the world …' 'Schools need to consider the specific needs of all their pupils before designing appropriate learning experiences across every aspect of the curriculum,' (DfES 2004).

A second initiative concerns the 'personalisation agenda'. Personalisation applies to schools but also to other contexts in which students can or could learn. Hence we see an increased emphasis on out-of-hours activity and e-learning and the emergence of VLEs. Personalised learning calls for 'assessment for learning and the use of data and dialogue to diagnose every student's learning needs; the development of the competence and confidence of each learner through teaching and learning strategies which build on individual needs; it presupposes curriculum choice which engages and respects students and it demands a radical approach to school organisation and class organisation based around student progress'(CERI 2006).

The third area of policy development which makes way for the introduction of computer game authoring is the Secondary National Strategy for ICT, revised in 2008. This framework is 'designed to increase pupils' access to excellent teaching and engaging, purposeful learning that will enable them to make good progress through Key Stages 3 and 4'.

There is also a concern that the number of students opting to do computer studies at tertiary level is falling. There are plans to reintroduce a GCSE in Computing which would include more programming and which would prepare pupils more effectively than GCSE ICT for 'A' level Computing courses.

Research Design

A case study is proposed since it allows the study of an evolving situation, that is, the introduction of a games authoring unit into the KS3 ICT curriculum, and will describe the situation from pupils' perspectives and allow for analysis and interpretation by the researcher.

Research Methods

A pilot study to test the research instruments is proposed for Autumn term 2008 with one group of Year 9 pupils (n = 23).

The main study will consist of collecting data with one Year 9 group (n = 23) in the Summer Term 2009 and a further 2 groups (n = 46) in Autumn term 2009.

The study will follow the delivery of a structured unit of work available to pupils as a VLE course~~/web based learning module~~.

Data Collection

Pupils will work in pairs to complete the unit of work.

i) Digital voice recorders will be used to collect data of pupils' experiences as they complete the unit of work.

ii) Individual pupils will reflect on their learning and evaluate their work in an ongoing journal (perhaps as a structured extended homework activity, via a VLE 'journal' module).

iii) Structured interviews will be a held with a focus group of 6 pupils (3 boys; 3 girls) where they talk about their game authoring experience with each other.

iv) 6 ICT teachers, who have experience of delivering games authoring, will be interviewed to test the 'patterns'/theories/hypotheses which emerge from the data collection.

v) Pupils' progress will be tracked as they create successive versions of their games.

vi) An ongoing study of one pupil's work/experience will be described.

Research Questions

The data will be collected from Year 9 pupils in one secondary school. The research seeks to explore a number of areas of interest:

- how game authoring uniquely supports pupils' intellectual development. How units of work which engage pupils in producing interactive games via programming enhance their cognitive development and make the conceptual content of ICT more challenging and rigorous.

- the value to pupils of authoring in interactive media (cognitive, motivational and/or technical)
- the value to pupils of authoring in coding or scripting (algorithm, precision, data structures, programming)
- the implications for the study of visual learning in this interactive screen-based environment.
- the developing ICT curriculum and the drivers for that change.
- the attitudes of pupils and/or teachers to such new curricula.
- what 'new ways of thinking' game authoring explicitly affords
- what conceptual difficulties pupils have with i) game authoring ii) programming
- what learning path/ units of learning need to be covered in a game authoring unit
- what features of a VLE best support pupils in their learning about game authoring, given that it is an extended, creative, iterative activity which perhaps is not best delivered via traditional linear teaching methods/time constraints (eg 1 hour lessons)
- assessing learning in game authoring

Research Cchallenges

One of the first tasks of the research is to establish which game authoring tools offer pupils of all abilities the most accessible opportunity to develop

programming skills and to create satisfying outcomes in the time available – 20 – 30 hours.

To identify a program which satisfies the needs of the ICT curriculum is problematic. Some games authoring software, such as Immersive Education's 'MissionMaker' (www.immersiveeducation.com) focuses on the narrative development of games and offers limited scope for pupils to control or make things happen.. Characters and locations are selected from a finite set and a set of finite actions and effects can be applied to characters and objects. Pupils create rules of an 'If….then' construction to introduce interactivity to their games, but this same sequence is then reapplied to all objects in the game, so learning, in terms of programming, is not advanced beyond that. Game authoring here becomes to do with the narrative coherence of the game and whether the game offers good game play – and although these are important concepts to consider in game authoring, they may be termed as 'media' or 'narrative' concepts – arguably just as relevant to the English/Media curriculum.

Other tools, such as Adobe 'Flash' (www.adobe.com/uk/products/flash) are arguably too difficult for KS3 pupils to create games with – the Actionscript which is used to create interactive games in Flash is not intuitive and there would not be sufficient curriculum time to teach and learn Flash so that KS3 pupils could use it independently – moreover, the program's difficulty would exclude those at the lower end of the ability range. 'GameMaker' (www.yoyogames.com) allows

pupils to create 2D games, either by selecting icons which perform certain events and actions when attached to objects, or by writing scripts to program objects. But the latter involves teachers and pupils in learning a programming language (GML). 'Scratch' (http://scratch.mit.edu) and Alice (www.alice.org) are other 2D and 3D programs which enable the creation of games. Here pre-programmed 'building blocks' are combined to produce scripts which control the events and actions in a game.

Another problem regards teachers' programming skills and curriculum knowledge; teachers are unlikely to have had any formal training in games authoring or to have much experience in programming. Furthermore, although the word "game" may make the activity more attractive to many pupils, it may also cause concerns for some teachers and school management teams or parents and pupils who regard computer games as frivolous.

Available curriculum time is also problematic. Creating a computer game is a sustained, practical, creative activity and the typical curriculum time allocated to ICT (1 hour per week at KS3; 2 hours per week at KS4) does not make it easy to achieve the 'flow' necessary for successful learning. Pupils are accustomed to units of work which span 6 – 10 hours at KS3 and may find a project which takes much longer than this to complete problematic.

Finally, the creative processes adopted by the games industry are not well understood and not easy to integrate within the secondary ICT curriculum. To create a computer game involves pupils becoming game designers (understanding and learning about what constitutes good game play, learning how to develop player motivation, learning about different types of games). Game authoring also involves pupils in becoming storytellers, composers, sound engineers, graphic artists and programmers - and while this offers an exciting and challenging breadth of study, it is clear that the curricular and pedagogical challenges involved may compromise the potential of such activities.

Existing Research in Games Authoring

Much research has been published on the benefits to learning of playing commercial, off-the-shelf computer games, or in game based learning, but less interest has been shown in computer games authoring. Where studies have been concerned with games authoring, the focus has been on how it supports narrative or literacy development at primary level, or how it adds to the Media Studies curriculum. The research in this project proposal hopes to situate games authoring as an important area of the secondary ICT 'control and programming' curriculum.

Significant research has been done at primary level using game authoring as a context in which to improve pupils' literacy and narrative skills, using 'Adventure Author' and 'NeverWinter Nights', for example, 'Adventure Games for Learning

and Storytelling' (Dillon 2004); 'Story Creation in Virtual Game Worlds' (Robertson & Good 2005); 'Children's Narrative Development through Computer Game Authoring' (Robertson & Good 2004); 'An Analysis of the Narrative Features of Computer Games Authored by Children' (Robertson 2004); 'Computer Games Authored by Children' – a Multi-perspective Evaluation (Good & Robertson 2004).

Again at primary level, the educational content of computer games made by children has been the subject of research which seeks to determine whether they use intrinsic or extrinsic fantasy in their creations - 'The Educational Content of Digital Games Made by Children' and 'Intrinsic Fantasy: Motivation and Affect in Educational Games Made by Children' (Habgood, Ainsworth, & Benford 2005).

Researchers at The Institute of Education, London, have studied the use of 'MissionMaker' in secondary schools, ~~but again~~ from the angle of media literacy – for example,
'Making Games – Game Design and media literacy' (Buckingham & Burn 2007), 'Game Literacy in Theory and Practice' (Buckingham & Burn 2007) and 'Making Games - Developing Games Authoring Software for Educational and Creative Use' (Pelletier, Burn, & Buckingham 2006), which describes the development of 'MissionMaker', its design, uses and benefits.

In the US, current research activity refers to programming in ‘Scratch’, not in the context of the formal, taught ICT curriculum, but as part of an after school program for ‘underserved’ communities – where the focus is on programming artefacts in the ‘media arts’, rather than games authoring per se. This research is described in ‘Creative Coding: Programming for Personal Expression’ (Peppler & Kafai 2005) and ‘Programming by choice: urban youth learning programming with Scratch’ (SIGCSE 2008). Prior research into how primary pupils create games to help them understand concepts in other subjects is well documented in ‘Minds in Play – computer game design as a context for children’s learning’ (Kafai 1995) – but research findings here do not refer to the use of current games authoring software or the revised UK secondary ICT curriculum.

Research publications relating to ‘Alice’ focus on how it supports computer science/programming courses at undergraduate level, for example, ‘Teaching Objects-first In Introductory Computer Science’ (Cooper, Dann, Pausch, 2003). No research has been published, to date, in how this software has been used in UK secondary schools to deliver games authoring/programming as part of the formal ICT curriculum.

Conclusion

The proposed research aims to explore, via a case study, the learning affordances of computer game authoring as a means of strengthening pupils’ understanding and application of programming skills in the UK secondary ICT

curriculum, since this particular area of focus has not received much research attention to date.

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Gary Priestnall and Jack March: The Geospatial Widgets Project: Interactive Visual Tools to Support Spatial Thinking

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The Geospatial Widgets Project: Interactive Visual Tools to Support Spatial Thinking

Abstract
This paper describes the GeoSpatial Widgets project, which aims to produce exemplars of interactive visual learning to support the teaching of certain geographic topics which have proved problematic, either being complex to explain or where it is difficult to create a practical component to complement a lecture. The project was funded by the Visual Learning Lab (VLL), a HEFCE-funded Centre for Excellence in Teaching and Learning (CETL) based within the school of Education at the University of Nottingham. All applications produced in the Geospatial Widgets where developed using the multimedia authoring environment Macromedia® Director®, being made available via the web as Shockwave® executables. This had the advantage of ease of access as with Flash but also allowed interactive 3D content to be added, a fundamental requirement of many of the topics under study. We present summaries of a number of applications, their curriculum fit and some initial observations about their deployment. We conclude by identifying the importance of careful design and the need for this type of practical exercise to be carefully contextualised so the student gains maximum benefit from their use.

KEYWORDS: Interactivity, 3D Models, Spatial Thinking, Teaching and Learning

The Geospatial Widgets Project: Interactive Visual Tools to Support Spatial Thinking

1. The 'GeoSpatial Widgets' project

This paper introduces the GeoSpatial Widgets project, which aims to produce exemplars of interactive visual learning to support the teaching of certain geographic topics which have proved problematic, either being complex to explain or where it is difficult to create a practical component to complement a lecture. The project was funded by the Visual Learning Lab (VLL), a HEFCE-funded Centre for Excellence in Teaching and Learning (CETL) based within the school of Education at the University of Nottingham. The VLL aims to research and develop effective visual learning practices and technologies and raise awareness of these across a wide range of disciplines. The GeoSpatial Widgets project has its origins in a VLL-funded project led by Ed Lester in the School of Chemical and Environmental Engineering at Nottingham called *Visual LabWidgets*. This project focussed on the development of a series of virtual laboratory experiments designed to both test and develop users' 2D and 3D visual and spatial skills while at the same time providing training in fundamental science and engineering concepts, strategic thinking and problem solving skills. All applications produced in Visual LabWidgets and Geospatial Widgets where developed using the multimedia authoring environment Macromedia® Director®, being made available via the web as Shockwave® executables.

2. Background

As with the earlier Visual LabWidgets project, the GeoSpatial Widgets project aimed to use interactive visual technologies to fill certain gaps in the teaching which, it was felt, were not being addressed in a satisfactory manner. These gaps included specific topics which involve some combination of;

i) Complex spatial interrelationships

ii) Multi-dimensional representations

iii) Concepts where practical demonstration was not possible for financial or logistical reasons.

The word *widget* is used here to mean a discrete interactive visual learning application, although elsewhere it has a more specific meaning as a component of an interface. They were designed to accompany lectures on specific topics where experience had shown that much 'arm waving' was usually required to communicate a particular topic, supported by static graphics or textual descriptions. Elsewhere in the curriculum, some topics would ideally be supported by a practical exercise but this is often unrealistic, for example when exploring personal navigation using new mobile mapping technologies. Incorporating visual elements into teaching is usually seen as yielding positive results (Stokes, 2001), the potential for interactive multimedia to enhance learning is clear (Najjar, 1998), albeit with caveats (Ainsworth, Bibby and Wood, 2002), and designing for certain contexts of use is considered important

(Goldman, 2003). Examples of domain-specific web-based interactive learning tools such as those for teaching physics described by Perkins *et al* (2006) aim to improve student engagement in what can be traditionally difficult subjects to teach. Establishing a 'common picture' of a concept between student and teacher is seen as vital, whilst ensuring that the domain concept remains uppermost when the students are using the interactive media. Yeo at al (2004) suggest that students should be taught how to learn from interactive tools in the same way that they can be taught how best to extract knowledge from textbooks.

An element of playfulness is seen by Chou (2003) as one component of a design recipe for web-based interactive learning packages. There are many examples of using 'game-like' visual interactive applications in support of teaching, from multi-player games (Shang et al, 2006), the engineering themed Java-based games described by Crown (1999), to the simulation games explored by Leutner (1993). The boundary between games and simulations can be rather blurred. Visual simulations like the landform evolution models in Lou, Stavers, and Duffin (2005) allow students to *play* with parameters of a hillslope model and see the results of their actions visualised immediately on a pseudo 3D block diagram.

Through the Geospatial Widgets project the intention was to create visual, interactive, game-like tools to complement certain areas of teaching where engaging students through traditional methods alone was difficult. Although the tools would be used in lab sessions after lectures, they were designed to be web-based to increase ease of access and allow further exploration by students in their own time. There was a requirement for 3D graphics because the domain

area related to geographic representation including terrain modelling. The development environment chosen was Director® which enabled bespoke web-based game-like applications, with 3D interactive elements, to be designed and deployed via the easy to install Adobe® Shockwave® Player web-browser plugin. A summary of the main tools developed during the GeoSpatial Widgets project and their curriculum context follows:

- ***Cats and Dogs*** – A simulation of water flow through a river catchment. Used as an illustration of a water flow algorithm in a Masters-level computer programming module and as an example of a computer simulation of a dynamic landscape in the undergraduate year 1 module 'The Digital Earth'
- ***Go with the flow*** – Complementing *Cats and Dogs* this is deployed in a Masters-level computer programming module to help explain the way in which a water flow algorithm can be coded and how programming constructs can be used to scan through a grid-based Digital Terrain Model deriving flow direction to neighbouring cells.
- ***Locata*** – Designed to be deployed in several ways, including a pre-fieldtrip orientation device, but also in 'The Digital Earth' as an introduction to 3D landscape models and visualisation techniques. Students are shown 3D images from a landscape and have to attempt to locate the position and direction from where the view was generated.

- ***Virtualeering*** – Complementing *Locata* this application explores map reading and way finding skills and is effectively a simulation of the sport of orienteering.
- ***GeoCode*** – This combines an exploration of wayfinding, with an emulation of a mobile phone based mapping application and also an introduction to the emerging technology of QR codes, 2D barcodes which are increasingly used by mobile phone users to access decoded information about products and places. This example emerged from a need to illustrate concepts which could not reasonably be accomplished with real phones and large groups of students.

3. Examples of widgets developed.

Some of the main applications developed in the Geospatial Widgets project are described below.

3.1 Cats and Dogs.

A 3D model of a river catchment allows the user to place and move a rainfall event over the terrain model and alter parameters such as the size and intensity of the event. A grid-based water flow model was implemented such that the water can be routed through the catchment dynamically. The volume of water through time passing a user-defined gauging station is displayed as a flood hydrograph in the upper right of the interface as shown

in Figure 1. The aim is to allow students to explore the interplay between extreme rainfall events, terrain and flooding. It was motivated in part by 3D graphics used during news bulletins reporting events such as the flash flooding in Boscastle, UK, August 2004. These were very compelling, yet generalised, graphics with no underlying process model involved. By creating an application with an underlying model the students would be able to interact with various parameters of the model and see the results of their actions immediately visualised as water flow over a 3D surface model.

Insert Figure 1

3.2 Go with the Flow

The computer algorithm to calculate the direction of water flow over a digital terrain surface as used in *Cats and Dogs* has been the focus for a Masters level computer programming module for a number of years. This introduces the concept of creating a program to scan through a gridded terrain model cell by cell, row after row, querying the heights of neighbouring cells to establish the direction of water flow from each cell. The programming constructs necessary to implement this involve nested loop structures which can be difficult to explain to students new to programming.

In a similar way Naiman (1996) presented examples of interactive modules for teaching computer graphics which allowed students to manipulate

variables in a range of different algorithms which would otherwise be difficult for students to implement.

The aim is therefore to complement a regular programming lecture with an interactive tool to visualise each step through the programming code on a pseudo 3D representation of the terrain model as in Figure 2. The sensitivity of the results to varying the choice of algorithm could also be explored by studying the different flow maps resulting from varying the nature of the processing.

Insert Figure 2

3.3 Locata

Locata explores the ability of users to associate a perspective view of a landscape with a map-like representation, which is one component of spatial thinking as described by Golledge (2003). The application also introduces students to Digital Terrain Models as representations of a region they will visit on a field trip, and in so doing familiarise them with the major physical features of that area. Various types of 2D map can be switched on and off to assist them in locating the view, and all user interactions, with timings, are logged into text files. Figure 3 illustrates the overall process flow of the application.

Insert Figure 3

Users can drag a location/direction icon over the map on the left and hitting *Render* will produce a 3D view dynamically from the underlying terrain model, scoring it against the known location and orientation of the view presented in the top right of the interface. A web-based high score table gives students a target to aim for and is designed to make the game more engaging. A second version of *Locata* allowed other images to be displayed in the top right panel, for example landscape sketches and paintings. Finally a fully configurable version to allow new terrain models and images to be used is being tested. *Locata* is described in more detail in Priestnall and March (2008).

3.4 Virtualeering

Taking inspiration from the sport of orienteering (McNeill, Cory-Wright and Renfrew, 1998), *Virtualeering* allows the user to navigate around a 3D virtual environment from a first-person perspective, visiting a series of markers in the shortest possible time.

Insert Figure 4

A map showing the locations of the markers is displayed as and when the user requests it, and as a help option their own location can be displayed on the map. All such interactions are logged in text files to allow for future exploration of user's abilities to read maps of various kinds.

3.5 GeoCode

GeoCode is a mobile phone mapping emulator which mimics the operation of a map-based navigation system and a QR (Quick Response) Code application, and is deployed in the context of a first year lecture on Location-Based Services and the future of mobile mapping. This topic is an example of where it is difficult to develop a practical exercise to illustrate such concepts as this would require the purchase of a GPS-enabled mobile phone for each student, and class sizes could be between 50 and 150.

The 3D model of campus on the left of the interface (shown in Figure 5) can be navigated as in first-person computer games, whilst the mock-up of a phone displays various dynamically rotating and panning maps centred on the current user location. The idea is that the user must find a series of 5 hidden QR codes on walls of buildings, and take a photo of the QR code which is then interpreted as a text string describing the location of another QR code around campus. QR codes are already popular devices in Japan where code images placed on product posters can be used to direct a user to their website if the user takes a photo of the code and has the necessary software on their device (http://qrcode.kaywa.com/). A research development planned for the future is to develop a real world version of this game whereby way finding in the real world could be compared to way finding in virtual environments.

Insert Figure 5

4. Experiences so far

Simplicity of design has proved important, as has a blended approach to placing such interactive tools alongside more traditional teaching techniques. The deployment of the widgets in various modules has been done with caution, mindful that student attitudes to computer assisted learning packages can be very different to those of the staff using them (Spellman, 2000). Without enthusiastic staff engagement, and carefully delivered pre-exercise discussion and explanation, the purpose of using the widgets may be lost. This has implications for the nature of support materials which should accompany such web-based widgets if they are to be made more widely accessible beyond the specific curriculum context for which they were designed.

Chou (2003) describes the ability to monitor users as important and this has always been an important component of the GeoSpatial Widgets project. The logging of data for all applications is felt to be a powerful mechanism for exploring some of the underlying issues regarding spatial thinking in various contexts. The log data has so far only been used to help us understand if there are any patterns in user's actions but should provide a platform for further research, for example in how users can use maps to locate a 3D view as in Locata. There is potential to explore the recommendation of Chou in using such data to re-present something back to the user. Apart from the web-based high score tables, the widgets currently in use perhaps do not feedback to the users

as much as they could. For example certain domain specific concepts could be re-enforced at certain points in the application rather than relying on pre and post lecture to fully contextualise the interactive application. This would echo the reflections of Kemp (1993) who noted some success in providing more extensive and effective feedback on students' performance in the area of knowledge-based simulation.

In the case of the Locata application, early observations of the first runs of these applications suggests that students working in pairs and verbalising their thought processes will give interesting insights into how they build mental models from various types of 2D map-like representations. This will complement ongoing work to explore the design and use of maps for use on mobile devices and as aids to lab-based visualisation. Observations and log data from GeoCode will complement such activities and might form a useful test bed for research into orientation and way finding.

These exercises differ from many skills-based or problem centred practical exercises commonly associated with Geographical Information Science (GI Science) modules and required careful design and contextualisation for students to appreciate their value. Having said this, there is already strong anecdotal evidence that the applications have helped to make practical elements of certain modules more attractive (and even fun) than they have been before.

5. Conclusions

The Geospatial Widgets project has created several game-like web-based applications to support the teaching of certain concepts relating to 3D geographic representation and spatial thinking. They offer case studies of how interactive visual learning can be introduced alongside more traditional teaching techniques where complex, dynamic or technologically new concepts need to be communicated. Early experiences suggest that the nature of such exercises differs sufficiently from more traditional GI Science practicals that careful explanation of the purpose and style of the applications is required to ensure they are seen as valuable and relevant.

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FIGURES

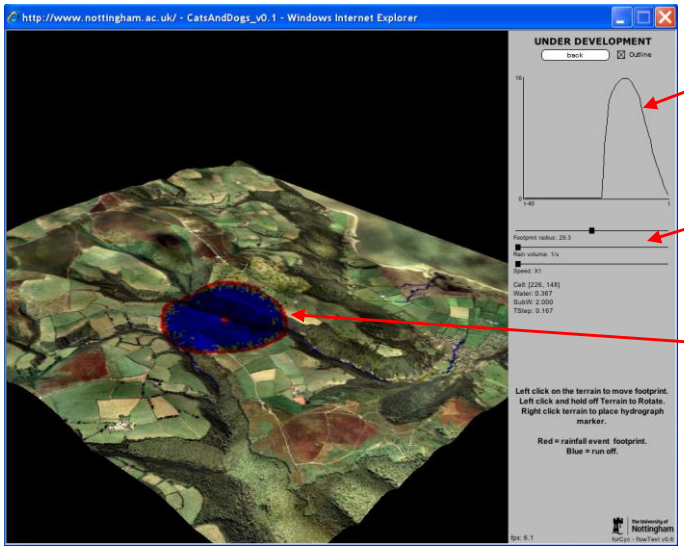

Figure 1 – The 'Cats and Dogs' interface

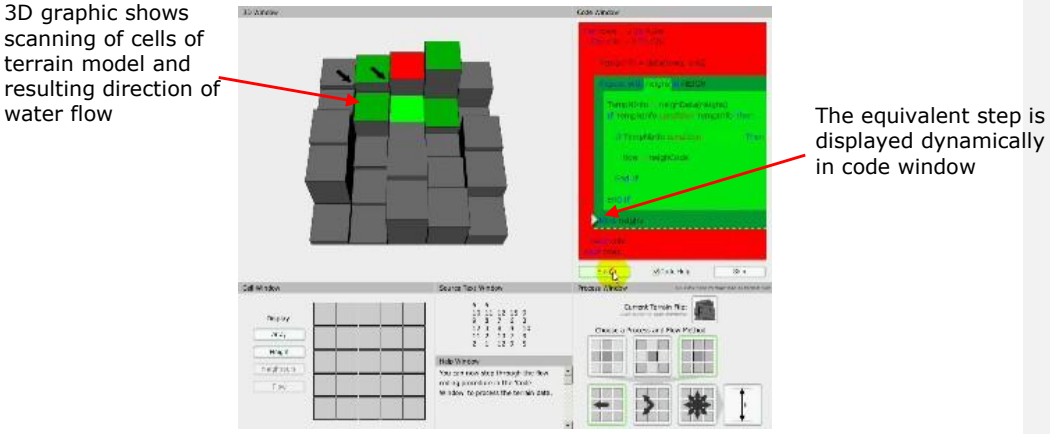

Figure 2 – The 'Go with the Flow' interface

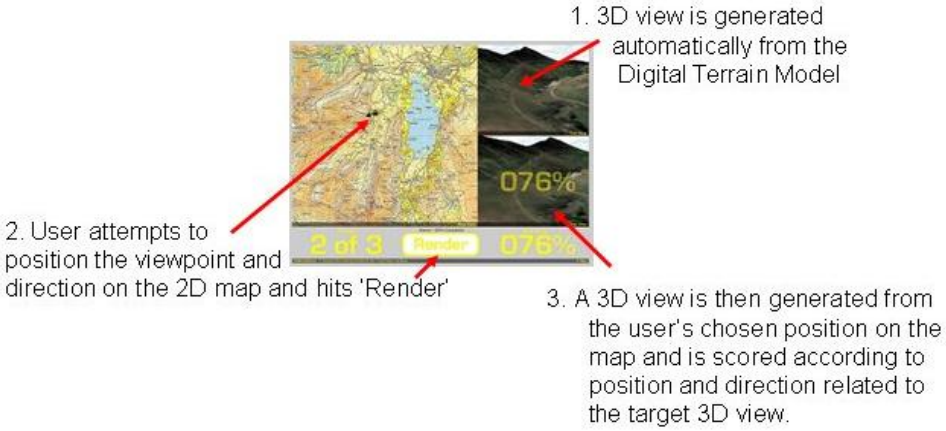

Figure 3 – 'Locata' Interface

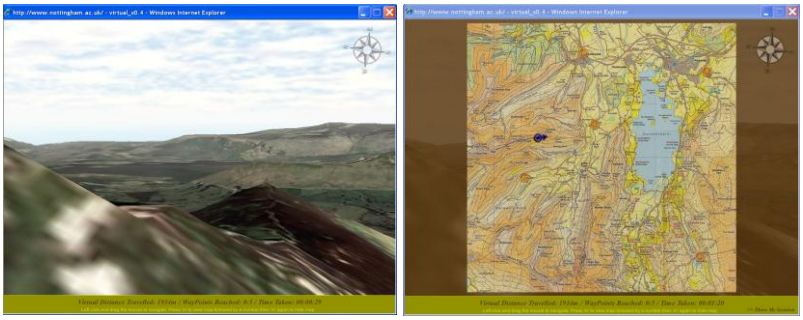

Figure 4 - Virtualeering interface: navigable virtual model (left), location map displayed when user requires assistance (right).

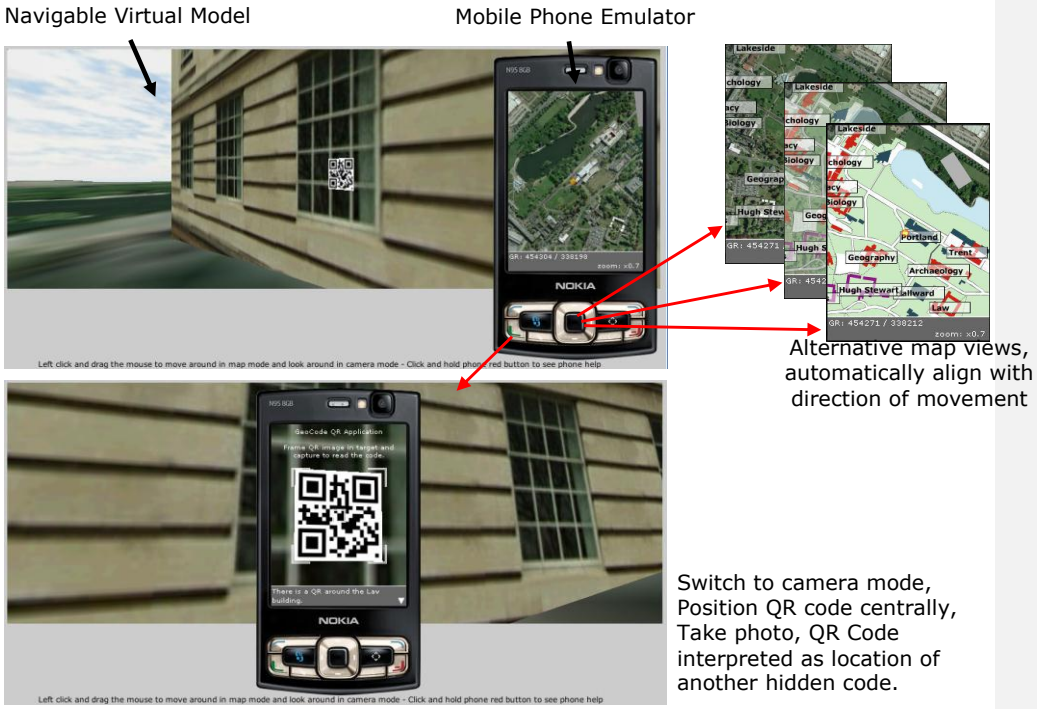

Figure 5 – 'GeoCode' interface

Robertson, Z.C. Expanding the peer network for students who use communication aids via video conferencing

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Expanding the peer network for students who use communication aids via video conferencing

Abstract

The aim of this work has been to explore the use of video conferencing technology to expand the peer network for students who use communication aids. Evidence indicates that users of communication aids often have a different mix of communication partners to their speaking peers (Reinhart, 2005) and that their partners tend to be skewed towards adults (McConachie *et al*, 1999).

This project is considering whether video conferencing can aid users of communication aids in meeting and getting to know peers (both speaking and non speaking) and lead to a change in the balance of their communication partners.

This project is still at an early stage and the work presented here describes the initial sessions and the outcomes. Networking sessions were performed as an activity within school time and linked students at four schools via a video conferencing tool (Skype). Feedback from students and staff was collected following these sessions and and indicated that students enjoyed the experience and liked meeting students from other schools.

The results of these sessions have suggested that video conferencing could be a useful tool in expanding peer networks for users of communication aids and currently a research project is being planned to more formally evaluate the effects of the use of this tool.

Keywords: AAC, Communication Aids, Video Conferencing, Peer Interaction

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Expanding the peer network for students who use communication aids via video conferencing

Introduction

Speech is a key part of social interaction between human beings and for people who have a communication disability, social interaction can prove very challenging. Communication aids are part of a range of augmentative and alternative communication (AAC) techniques that can be used to support people with communication disabilites and allow them to communicate with others. Even highly competent users of communication aids often have a slower communication rate than people speaking and this can make conversation challenging for both the communication aid user and the communication partner (Todman *et al*, 1997, Arnott, 2005). In addition research suggests that young communication aid users' interactions are skewed towards interactions with adults (McConachie, 1999) and that in conversations between adults and young people using communication aids there is "asymmetry of participants' actions" leading to people who user communication aids playing quite passive roles in interaction (Clarke *et al*, 2007).

Blackstone (Blackstone *et al*, 2001) identified the Circles of Communication Partners, see figure 1, which identifies that the people users of AAC communicate with can be classified into five groups. The circles are as follows:

Circle 1 – defined as ‘containing the augmented communicator’s life partners. These relationships exist “no matter what” and may include parents/guardians, spouse, siblings, children and grandchildren (Blackstone *et al*, 2001).’

Circle 2 – defined as ‘the people whom augmented communicators trust and with whom they spend time and share thoughts, feelings and ideas. Relationships in the second circle are heavily dependent upon language and communication skills (Blackstone *et al,* 2001).’

Circle 3 – defined as ‘favourite neighbours, colleagues and acquaintances. These relationships are often dependent on mobility and require language skills for communication with a wide range of partners about a large number of topics. They reflect how active a person is able to be outside their home (Blackstone *et al,* 2001).’

Circle 4 – defined as ‘including people who are paid to interact with the augmented communicator. The family doctor, dentist, neurologist, speech-language pathologist and occupational therapist as well as personal attendants, instructional assistants, teachers and others (Blackstone *et al*, 2001).’

Circle 5 – defined as ‘the universe of unfamiliar partners (Blackstone *et al*, 2001)’.

Research has shown that AAC users tend to have a number of people in their first and fourth circles but reduced numbers in the other circles (Reinhart, 2005).

In addition Light (Light *et al*, 2003) identified four domains in which AAC users need to develop skills in order to achieve communicative competence. One of

these four domains is identified as the Social Domain and highlights the need to develop appropriate sociolinguistic skills, (e.g. conversational turn taking, terminating conversations appropriately), and sociorelational skills, (e.g. being responsive to partners, showing interest). Finding ways to develop these skills and challenge users of communication aids in these areas can be difficult, especially in terms of providing real communication situations where they perceive a need to use their communication aid. It is also these skills of communicative competence which would aid users of communication aids when meeting people and developing relationships with people classified in circles 2, 3 and 5 of the Circles of Communication Partners.

This research was the theoretical construct behind the work presented in this paper, as the aim of this work is to use interactive communication technology (video conferencing) to facilitate peer communication (circles 2, 3 and 5) and to practice key communication skills by giving a real communication environment in which to practice.

Developing a supportive communication environment

This project was initiated following work with teenages who use communication aids in Barnsley. Although still in its early stages, intitial indications are of a number of applications and benefits. The teenagers in Barnsley attend a special needs school and within the school there are a handful of communication aid

users of different ages. These teenagers communicated that they were eager to meet other communication aid users who were the same age or older.

Within the South Yorkshire peer networking between people who use communication aids has been facilitated via ‘Communication Mornings’ which are held once an accademic term. These mornings bring together communication aid users from different schools and the hosting of the morning rotates around schools. Activities are organised for the morning which aim to encourage commuication and socialising. These mornings have proved successful (Robertson & Judge, 2007) and have enabled students to meet other peers. However, these mornings are relatively irregular because of the organisational and practical challenges of running them. A key reason for investigating the use of video conferencing was that it may lend itself to more regular sessions between peers without the large staff and transport requirements of a Communication Morning.

The hypothesis of the current project was that interactive communication technology (video conferencing) could facilitate links between students more regularly and give access to a wider range of students.

Method

Skype is a video conferencing tool that runs on a computer and works over the internet. Skype was chosen as the tool for this network because of it's pervasiveness and relative ease of use. In addition it is free software and requires relatively little equipment to set up.

The idea of the Skype network was launched at one of the Communication Mornings within South Yorkshire. Links were set up between a school in Wolverhampton and a college in Mansfield and students attending the Communication Morning were able to chat to students at these places.

At the initial session a forty five minute link was held between the Communication Morning and the school in Wolverhampton and a one hour session was held between the Communication Morning and the college in Mansfield. At the school and college the same students stayed for the whole session however students from the Communication Morning swapped in and out.

The theme of the Communication Morning was describing people and it was decided that the first video conferencing session would focus on the students introducing themselves and what they like doing and that their would be no formal structure to the session. Staff were present with the students to help facilitate.

Following the initial session further sessions have been held between these

schools. The first of these again had no formal structure but it was then decided that it could aid the students if the sessions had a theme and if they had an opportunity to explore some of the potential vocabulary around that theme prior to the session. To aid this for the later sessions a theme was planned and two or three key questions given to the students to prepare prior to the session. The guidance given was that students should prepare to be able to ask these questions and answer them when asked. It is important to point out that the idea of these questions is to provide a starter to the session and not to limit what the students can talk about.

Results/Discussion

The initial session proved highly successful and identified key opportunities and benefits. One key benefit is that because the technology has both video and sound channels the students know that the other person is there even when there may be periods of quiet when messages or words are being formulated. In addition, the nature of the medium requires the students to use their communication aid. One of the staff involved commented “When our students communicate with their family and school, they can use a variety of techniques to get across what they mean. When using Skype, many of their communication methods will not work so they have to dig deeper and develop better use of their communication aid.” Another member of staff involved in the initial session reported “It was a really useful exercise in spotting holes in our learners’ communication skills”

Another benefit is that the sessions so far have also enabled different aged users to link up so expanding communication networks beyond direct peers. One example of this was two male students at residential college chatting to two primary school aged male students. The students chatted about computer games and football which they all seemed to enjoy. A recent study (Light, 2007) asked a group of normally developing children to develop designs for new communication aids. The children in the study came up with ideas which had a strong focus on social interaction and promoting a positive image of the person using the technology, so highlighting the importance of these features from their point of view. When using the video conferencing the focus for the students is social interaction rather than focussing on practicing using the communication aid and communicative competence – practice of these skills should be a by product of the social interaction.

Clarke and Kirton (Clarke and Kirton 2003) investigated interaction between AAC users and their speaking peers. They found that turn taking was more equal than in adult-child studies and that some of the interactions studied showed a large proportion of what the study defined as shared/self expression e.g. laughter. This further highlights the importance of peer relationships and that social interaction with peers could as a by product enhance communicative competence.

As discussed in the method the initial sessions tended to be based on the users introducing themselves, saying what they like doing, where they live, whether they have pets etc. The principle behind these sessions was to get the students used to the idea of communicating via the computer. These sessions provided the basis for future contacts and have also allowed ideas to be developed for ways in which the future sessions could be designed and facilitated in order to practice the sociorelational and sociolinguistic skills required for communication competency. Tools for allowing development of these skills may include activities such as games which provide a means of giving clear indication of whose turn it is to speak, for example a quiz. Recent sessions have included telling jokes and playing music over Skype and the students discussing the music (likes, dislikes etc.).

Two of the students were asked whether they liked using Skype to which one of them replied “yes, fantastic”. They reported that they enjoyed talking to other students and that it was “really, really fantastic” to speak to students from other parts of the country. They were also asked if they would like to speak to older students and they were keen on this idea. A member of staff who works with one of the students has also reported that his confidence with his peers and adults has grown since using Skype.

Use of the internet to communicate via video, speech and text is becoming increasingly common and mainstream and so the use of it for such a network is

not only practical but also has the benefits that it could be used in different settings, (school, college, home) and for different purposes. The sessions carried out so far have been facilitated and more recently themed sessions and although this is one of the ways that video conferencing could be used by this group of people it is envisaged that there could be many others:

1. Structured links between school communication groups, in particular those working towards achieving AAC City and Guilds qualification.
2. Social use for example a lunchtime group or individuals linking with other users for less structured sessions.
3. Peer support network for people who use communication aids in mainstream school giving them contact with other people who use communication aids and also giving other children the chance to have a broader experience of interacting with people who use communication aids.
4. Aiding transition between schools, or between school and college.
5. Links with people who use communication aids in the community, both between people of similar age, with similar interests etc. but also potentially as role models for young people within schools.
6. Links between mainstream schools and people who use communication aids.
7. Links between communication aid users and their family and friends.

All of these potentially provide a motivating real environment for communication using communication aids.

Conclusions

Intial results suggest that the use of video conferencing may offer an effective way of promoting peer interaction and development of communication skills for students using communication aids. People who use AAC who have been involved so far have really enjoyed the experience and are eager to attend other sessions after an initial session and in some cases have requested for Skype to be set up at home.

It is hypothesised that setting up a regular series of video conferencing sessions could increase a student's communication competence. Future research will aim is to use internet-based video conferencing tools to provide a network for people who use AAC and provide a real communication environment in which they can both practice their communication skills and hopefully make friends and expand their peer network. This future research will use more formalised data collection tools to evaluate the use of video conferencing for this application.

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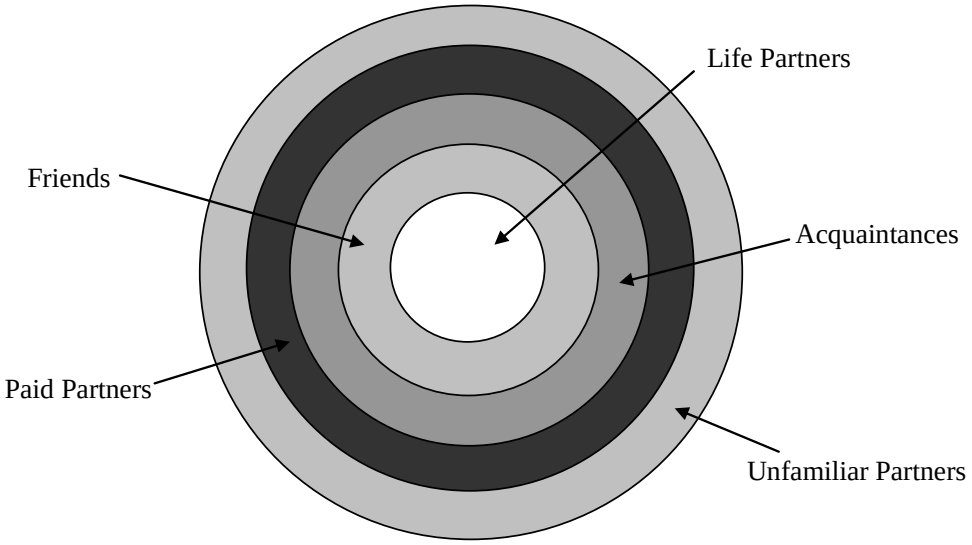

Figure 1 - Illustration of Sarah Blackstone's 'Circle of Communication Partners'

Pauline A Smith, Naomi L Ducat and David J Brown. A Human Factors Approach to Assessing the Usability of Assistive Technology Devices

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A Human Factors Approach to Assessing the Usability of Assistive Technology Devices.

Abstract

In recent years multimedia has undergone intensive development in order to produce virtual environments as safe simulations for those with learning difficulties. However, these developments have given rise to the need for equally effective human-computer interfaces. As a number of people with cognitive difficulties also suffer from motor difficulties, input devices must be designed so as to be operable by these people.

This paper presents a set of usability metrics based on the ISO requirements for non-keyboard input devices and uses these to evaluate the usability of a particular assistive input device (VR-1) for users with cognitive and motor disabilities. Results show that the device is best suited to those users assessed as having “moderate” physical disabilities. These results lead to a number of suggestions for improvements to VR-1 which should improve its compatibility with users and their expectations.

Key words: assistive technology, ordinal usability metrics, virtual environments, disability

A Human Factors Approach to Assessing the Usability of Assistive Technology Devices.

1. Introduction

The Department of Health states that approximately 25 people per thousand have mild or moderate learning disabilities and four or five people per thousand suffer from severe learning disabilities (Department of Health, 2001). It is improbable that this proportion of society will attain a recognised level of independence and education.

Multimedia, encompassing text, graphics, animation, audio and video, has increased our learning capacity by stimulating our sight and hearing senses. Over recent years multimedia has undergone intensive development in order to produce virtual environments (VEs) as safe simulations for those with learning difficulties.

Cromby et al. (1996) drew attention to three characteristics of VEs which made them particularly applicable to people with cognitive disabilities. Firstly, they provide a comforting environment for people to learn through making mistakes without fear of humiliation or harm. Secondly, these simulations are less demanding than real life tasks, and finally rules and concepts can be conveyed visually rather than through text book learning. Applications of VE for people with severe cognitive disabilities have included the simulation of activities of daily

living (Brown et al, 2005a; Standen et al, 1998; Brown et al, 1999; Shopland et al, 2004), development of communicational skills (Standen and Low, 1996), and as preparation for potentially challenging real world situations (Laczny, 2001). Tutoring agents have been embedded within adaptable VEs to scaffold the learning of people with severe cognitive impairments (Shopland et al, 2004). User sensitive approaches are prevalent in the development of VE and associated technologies to ensure that the specific development needs of this target audience are factored into design (Battersby et al, 2004; Brown et al, 2002; Lannen et al, 2000; Lannen et al, 2002; McCrindle et al, 2002; Standen et al, 2001).

In response to usability issues directly observed in special classrooms, research was also conducted into how people with disabilities could most effectively control VEs. As stated by Standen et al (2002) "*until this access problem is solved, exploiting the benefits of virtual environments for this client group will be problematic*". A variety of devices are employed for controlling VEs, but Hall (1993) recommended that for navigation, a joystick limited to two degrees of freedom had the greatest utility. Using a spaceball with six degrees of freedom people with severe cognitive disabilities frequently became lost. Brown, Kerr & Crosier (1997) favoured the use of a joystick, finding it more suitable than the keyboard for navigation tasks. For interaction tasks, if drag-and-drop was not required, the touch-screen and mouse were equally effective, although the touch-screen was difficult to calibrate. Other researchers (Bing Kang, 1998) reported

problems with the ‘obtrusive’ nature and training time required by more conventional methods of navigating within VE (keyboards, hand-held input devices such as joysticks, mice and trackballs, and hand-worn data gloves), whilst reporting that these devices were mostly adequate.

Studies have classified keyboard difficulties for interaction tasks for people with motor disabilities (Trewin and Pain, 1999), identifying significant user correction times. Difficulties with all aspects of mouse usage were observed, particularly pointing and dragging. The results are consistent with the Brown, Kerr and Crosier study (1997). Even the joystick (for navigation) and two button mouse (for interaction) are not without their usability problems. Many people with intellectual disabilities also experience fine motor difficulties as they suffer from conditions in which damage has been caused to the central nervous system, such as cerebral palsy, multiple sclerosis, muscular dystrophy, and dyspraxia. These complex and multiple conditions can make even the joystick and mouse difficult to use.

Clearly the broad range and complexity of disabilities each results in a separate set of user requirements. It is not possible to accommodate each user, not through lack of technology, but because of low demand and high manufacturing costs for each design. It is likely that there is no one, ‘best’ design of interaction device because the selection of an appropriate appliance must take into consideration the characteristics of the device, user and task. This is illustrated by the range of interaction systems that are currently in development. Coyle et al

(1998) developed a non-contact head-controlled mouse emulator for use by quadriplegic operators to control VEs; whilst Bates and Istance (2004) are developing a reliable system for eye-based VE interaction. For these groups of more physically disabled users, studies on haptic feedback have led to greater control (Smyth and Wann, 2000) and improvement in selection times (Langdon et al, 2002). Foyle and McCrindle (2004) concentrated on interaction within VEs via motion observation, whilst other researchers (Probert et al, 1996) concentrated on assisting the interaction of blind users in VEs using ultrasound to provide navigational information.

An alternative approach might be the one suggested by Brown, Kerr and Crosier (1997) in that future design should ensure that these devices could be designed in such a way as to make them usable with a range of users, over a range of settings and for a range of tasks. They report that such devices should be operable by people with fine motor difficulties, modifiable, robust, easy to calibrate, and affordable. The ability of a device to automatically adapt to specific user needs and tasks (Brown et al, 2005b) and to provide user assessment for a variety of requirements (educational progression, enhanced technology prescription) is a natural extension of this approach.

This paper proposes a set of usability metrics (derived from European Standards ISO 9241-9) that might be used to assess the usability of such assistive input

devices, and demonstrates their use in the evaluation of one particular assistive device with a range of participants with differing physical and cognitive problems.

2. Ordinal Usability Metrics

The European Standards ISO 9241-9, 'Requirements for non-keyboard input devices' considers a number of usability goals, of which three (operability, controllability and biomechanical load) apply to this study. These are further sub-divided into basic ergonomic principles as shown in Table 1.

TABLE 1

From each of these factors a set of twenty usability specifications was derived as a starting point for a practical usability assessment of assistive input devices. Firstly, a usability specification was devised from each of the ergonomic principles considering how they could be measured and any conditions that would apply during testing (see Table 2)

TABLE 2

Factors 4, 13, 14, 15, 17 and 18 were measured using simple tallies and factors 7 and 8 used time data. For the remaining factors ordinal attainment levels were devised to convert the quantifiable data into representative qualitative equivalents as shown in Table 3. Four attainment levels for each measure were

considered sufficient to gain a considerable spread of data whilst maintaining clear differentiation between the levels. In each case ‘1’ represents the best result or maximum performance, and ‘4’ the lowest performance level.

TABLE 3

The specified attainment levels can be considered as usability metrics due to their quantitative nature. Each attainment level indicates that the objects in one category of the scale are not only different from another category, but also related to them. The relations among the categories indicate a higher level, which is more difficult to achieve. Given the relation ‘>’ (is greater than) holds true for each pair of classes, it indicates that a complete rank ordering between classes emanates thus culminating in an ordinal or ranking scale.

3. Usability evaluation of VR-1

Using the ordinal measures outlined above, experimental work was undertaken to assess the usability of the assistive technology input device VR-1 designed and developed by Lannen (Lannen et al, 2002). VR-1 (Figure 1) is an assistive input device which supports virtual mapping for navigation controls and a joystick for interaction movements. The navigation controls are designed to look similar to bicycle handle-bars to enforce direct mapping, thus the movement of the user is mapped directly to the screen and no transformation is required between the

two planes of the horizontal desktop and the vertical computer screen. Interaction within the VE is performed by a joystick, positioned on top of the navigation unit.

VR-1 allows eight navigation movements; forwards, backwards, turn left, turn right, side-step left, side-step right, and a pitcher which changes the point of view of the user's sight either up or down. The device can be calibrated in such a way that the pitcher can be used on either handlebar or switched off altogether. The VE software can also be calibrated in a number of ways to affect the use of the device, in particular altering the speed and dead zone and turning selected movements off.

FIGURE 1

3.1 Participants

The participants were drawn from students attending the Shepherd School in Nottingham. The participants were a diverse sample of 7 male and 6 female students ranging in age from 7 to 17 years, who differed in ability with respect to cognitive and physical difficulties, co-ordination and motor skills; and their experience of using virtual environments.

Table 4 shows results obtained when a test was performed to assess the receptive English vocabulary, which correlates highly with verbal intelligence. The results use the British Picture Vocabulary Scale (BPVS –II) to assess the

score range. Ages are represented in years and months, where 8:04 is interpreted as eight years, four months.

TABLE 4

Table 5 displays the results of a Matrices Analogies Test – Short Form (MAT – SF), performed to gain data about non-verbal reasoning. The results are assigned a stanine score, an assessment method which ranges from 1, very low non-verbal reasoning, to 9 which indicates a very superior level of non-verbal reasoning.

TABLE 5

Table 6 shows the results from a Quick Neurological Screening Test (QNST – II), designed to observe the control of gross and fine muscle movements, motor planning and sequencing abilities.

TABLE 6

3.2 Equipment

For this study VR-1 was used in conjunction with the Virtual Factory. The virtual factory is a simulation of a factory which users can explore without the added dangers that might occur in a real-life factory. The simulation starts with the user

outside the factory doors where the user has to manipulate him/herself through the doors in order to enter the main building. Once through the initial doors the user is in a safety room, which is empty apart from a cupboard. The user is required to dress in the correct clothes, which are stored in the cupboard, before they are allowed to enter the main factory. Once the user is in the main factory they are allowed to explore at their own free will. The aim of the VE is for the user to identify as many dangers as possible and report them to the factory manager. This is achieved by identifying a danger and then clicking on the manager's head, which is positioned in the bottom left hand corner of the screen. An explanation of the danger is then given and the situation corrected. The user proceeds to identify any further dangers. As the VE is designed to simulate a real factory, a moving vehicle is present which runs through the middle of the factory. It moves between two lines which are indicated by gaffer tape on the floor of the factory. If the user crosses either one of these lines the factory manager says "watch out for any dangers". If the user does not move off the danger area the cart will hit them and they will be put back to the starting position, outside the factory. A scene from the virtual factory is shown in Figure 2.

FIGURE 2

3.3 Environment

The evaluation was conducted at the Shepherd School in Bilborough, Nottingham. The tests were carried out in a spare classroom which was substantially free from distractions.

3.4 Procedure

Each participant was asked to perform a set of devised tasks (as shown in table 7) with a maximum time limit of 15 minutes for each session. They were each tested three times using VR-1 and once using the traditional joystick and mouse, so a comparison of the methods could be made. During the first session with VR-1 the users were left to explore the device by themselves before any prior instruction was given, this ensured that the pre-condition for the first measure regarding obviousness was satisfied. After the initial play the user was given a demonstration of VR-1, where each of the device's moves were exercised and the equivalent responses in the VE explained. The user proceeded to complete the tasks, where verbal and physical assistance was constantly available. In subsequent sessions with VR-1 a demonstration was not given unless the subject appeared to be incurring difficulties. None of the subjects required a demonstration regarding the use of the joystick and mouse. Throughout every session notes were made, in order to gain both the quantitative and qualitative data for the forthcoming analysis. The entire evaluation was filmed using a standard video camera and tripod. After each member of the user group had completed the three sessions with VR-1 and a session with the joystick and mouse they were asked to complete a questionnaire. The questionnaire was

administered in order to gather the users' direct responses and opinions concerning the two methods.

TABLE 7

3.5 Experimental design

The usability evaluation took the form of a "within subjects" experimental design. Owing to the nature of the evaluation, the sample from which the data was drawn and the ordinal measures devised, the evaluation utilised non-parametric statistical tests (Siegel, 1956). The Wilcoxon matched-pairs signed-ranks test was used to compare performance with VR-1 to the traditional joystick and mouse approach. The McNemar test for the significance of change was employed to test performance levels between the first use of VR-1 and following sessions.

4. Results

The measures specified in Table 2 Usability Factors have been logically derived from the European Standards, but can be categorised into two separate groups. Firstly, those measures to assess the ergonomic aspects of the device, relating to the physical properties of the device and of the user. Secondly, those measures to gauge the usability of the device.

4.1 Ergonomic factors

Initially, the ergonomic aspects were assessed. These aspects include factors concerning the physical match between the user and the device. These measures lend themselves to comparative measures between the use of VR-1 and the joystick and mouse method. Due to the presence of two related samples which are different, the statistics to compare the methods employed the Wilcoxon matched-pairs signed-rank test wherever possible. This test assesses if there is a significant difference between the medians of two variables, considering both the direction of the differences and information about the rank orders.

The ergonomic aspects were evaluated to assess the physical match between the user and the device. On average the tests favoured the physical match between the user and the joystick and mouse method (see Table 8). The tests which indisputably supported the joystick and mouse were measures 5, 14 and 19, regarding the anthropometric difficulties, the amount of physical support required, and the position, manipulation and grasp of the device. Tests 9 (concerning the users' comments about the effort exerted to manipulate the device) and 18 (regarding the amount of slipping which occurred during use) both favoured VR-1.

Test 6 was designed to assess the biomechanical load and whether users' muscular activity was even when using the devices. The test could not be performed as the sample size was too small, however by observation it was seen that the three users who incurred difficulties only experienced them with VR-1.

Similarly, the test for the amount of interference caused by the device, test 17, could not be tested due to the sample size though observed results showed VR-1 to be favoured. The final test was to assess the posture of the user while using the device. The results gathered for this test worked out exactly equal and below the required sample size, so again Wilcoxon's test could not be performed.

TABLE 8

4.2 Usability aspects

The usability aspects of the device were further categorised using Shackel's (1986) usability dimensions of effectiveness, learnability and attitude. The flexibility factor is not relevant in the study of VR-1 because it primarily relates to the design of software, and is not a particularly desirable feature of an input device. A number of the usability goals overlap and were used to assess more than one usability dimension. This however, was considered beneficial as it encourages a thorough evaluation.

4.2.1 Effectiveness

The relative effectiveness of the devices was again assessed, where possible, by employing Wilcoxon's signed-ranks test to compare the performance of VR-1 and the joystick and mouse method (table 9). Where statistical tests were not feasible the data has been considered descriptively.

TABLE 9

The results from the measures concerning the effectiveness of the device are very much in favour of the joystick and mouse method. Of the seven tests which employed Wilcoxon's method, five of them resulted in support for the joystick and mouse. VR-1 was only favoured once, when assessing the frequency and type of rectification required.

4.2.2 Learnability

The learnability of VR-1 was evaluated by comparing users' first and third sessions with VR-1, and concentrated on change in performance over a period of time. This was assessed by McNemar's test for the significance of change or by a simple count of occurrences. The measures considered to be associated with learnability are represented in table 10.

TABLE 10

In general the tests demonstrated an increased or improved level of performance in the users' third sessions with VR-1 compared to their first thus confirming the learnability of VR-1.

4.2.3 Attitude

The final usability dimension suggested by Shackel was the assessment of the users' attitudes towards the device. This was assessed through use of questionnaires. Two versions of the questionnaire were produced to suit varying levels of cognitive ability. Participants with higher cognitive abilities were asked to rate their opinions of VR-1 on a multi-point scale; those of lower cognitive ability were simply required to respond "yes" or "no". When the users solely concentrated on assessing VR-1, it was determined that it was really liked, easy to use, comfortable and great fun. The only negative feeling expressed about VR-1 was that it was considered quite tiring to use.

4.3 Summary

The evaluation showed that the physical properties of the joystick and mouse were more compatible with the users. This result is not surprising given that the users are more familiar with the joystick and mouse, and consequently are more aware of the physical effort required to manipulate them. However, the qualitative information gathered in the questionnaires showed that VR-1 was strongly the preferred device, where it proves advantageous in all aspects such as comfort, enjoyment and satisfaction.

It should be borne in mind that patterns identified in the results will not solely be due to one influence as there were a number of external factors involved, in particular:

- The evaluation was performed using a prototype of VR-1 which was less robust than intended. The more the device was used the more it became damaged. Nearing the end of the evaluation the interaction stick ceased to return to the central position, requiring the user or an evaluator to correct it. The potentiometer also appeared to incur some damage, resulting in the device veering to the left when it was meant to be central. The movement was very slight; however it may have had an effect user performance. The navigation movements also indicated overuse as the whole unit became stiffer to manipulate towards the end of the assessments.
- To distinguish between the learnability of the device and the learnability of the VE, the same tests would have to be performed in a new VE. This would provide a more comprehensive picture of the learnability of VR-1.
- Each student differed with respect to their motor control abilities which necessitated different speeds and settings of the functions on the computer interface tool.

5. Conclusions

The results of the usability evaluation showed that while the majority of participants found VR-1 enjoyable and comfortable to use it was nevertheless quite tiring. Furthermore, the physical properties of the joystick and mouse were

shown to be more compatible with the participants and their expectations. These results led to a number of suggestions for improvements to VR-1:

- Increasing the level of resistance the device offers and integrating a variable level of resistance into each movement would allow the device to be adjusted to suit each user's motor control abilities.
- Reducing the size of the device would make it more compatible with the body dimensions of users; however it would be vital to ensure that stability was maintained.
- Explicitly conveying the movements of the VR-1 (for example by using arrows to indicate movements) would improve the obviousness of the device.
- Removing the pitcher from the navigation handle and positioning it on the top of the unit would avoid users confusing the pitcher with forward movement.

There is a wide range of disabilities which may require some form of assistive input device, so to aim a product at the entire range is a difficult task. The results of this study highlighted that the more physically able users were extremely proficient with the joystick and mouse hence the use of VR-1 conveyed little benefit other than novelty. The least physically able users, who were generally wheel chair bound, incurred many difficulties using VR-1 as the device required a high degree of manipulation. VR-1 proved most beneficial to the users with

moderate physical disabilities and hence should be targeted at this more limited user group.

It became apparent during this study that not all the measures suggested are necessary to produce a comprehensive usability analysis. Many of the factors overlap (e.g. session time and task completion time) and others (e.g. biomechanical load) could be better assessed using an electronic device. In addition, the evaluation was extremely time-consuming. Further work is required to further generalise the ordinal attainment levels and to determine which subset(s) of the suggested measures could be used to provide an accurate and efficient usability analysis of an assistive device.

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Goal	Principle	Description
Operability	Obviousness	The intended use of an appropriately designed input device for a task primitive is either obvious or easily discovered
	Predictability	The use of an input device is predictable when it is designed to operate and respond according to the expectations of the intended user population
	Consistency	The use of an input device is consistent when it operates and responds in the same manner when used in similar situations
	Compatibility	An input device is user compatible when its design accommodates anthropometrical characteristics and biomechanical capabilities of the intended users
	Efficiency	An input device is most efficient when it functions with the least amount of time and effort
	Effectiveness	A device is effective when its design takes into consideration factors that lead to enhanced or optimised user performance by means of accuracy and completeness
	Satisfaction	An input device design is satisfactory when its design incorporates factors that lead to freedom from discomfort and enhance positive attitudes of users towards its use
Controllability	Non-interference	An appropriately designed input device does not interfere with its own use
	Grip surface	Control of an input device is adequate when its grip and contact surface prevents unintended slipping during its intended use
	Device access	Access of an input device is adequate when it can be grasped, positioned and manipulated quickly and easily without adversely affecting performance
Biomechanical load	Posture	An appropriately designed input device can be operated by the user without undue deviation from a neutral posture

Table 1. Ergonomic Principles for assistive input devices

Factor	Ergonomic Principles	Measure	Pre-conditions/ Additional Information
1	Obviousness	Ability to use with no prior instruction	Initial Test - No prior use
2	Obviousness	Discovery time	Initial Test - No prior use
3	Predictability	Expected response	Perform an action
4	Consistency	Frequency of operation defects	Perform an action
5	Compatibility	Anthropometric difficulties	During use
6	Compatibility	Biomechanical load	During use
7	Efficiency	Session time	Best time counts
8	Efficiency	Task time	Best time counts
9	Efficiency	User comments from questionnaire	After use
10	Effectiveness	Frequency of unproductive actions using device	Perform an action
11	Effectiveness	Frequency of disorientation	During use
12	Effectiveness	Frequency and type of rectification	After disorientation
13	Effectiveness	Frequency of verbal support	During use
14	Effectiveness	Frequency of physical support	During use
15	Effectiveness	Number of completed tasks	Once session completed
16	Satisfaction	User comments from questionnaire	After use
17	Non-Interference	Frequency of interference with own use	During use
18	Grip Surface	Frequency of slipping during use	During use
19	Device Access	Amount the position, grasp and manipulation affect performance	During use
20	Posture	Amount of deviation from natural posture	During use

Table 2. Usability Factors derived from Ergonomic Principles

Factor	Attainment Levels
1	Obviousness: user experiments with device before instruction provided. Measure: able to use without prior instruction. 1. User demonstrates a high level of understanding of the obviousness of the device. Lower level requirements must be satisfied as well as operating at least half of the navigation functions and every aspect of the interaction, with no prior instruction. 2. User demonstrates a reasonable level of understanding of the obviousness of the device. Lower level requirements must be satisfied as well as operating a few functions of the navigation and every aspect of the interaction, with no prior instruction. 3. User demonstrates a low comprehension with the obviousness of the device. Lower level requirements must be satisfied as well as show an understanding of distinguishing between navigation and interaction, with no prior instruction. 4. User demonstrates little understanding, indicating poor obviousness of device. Ability ranges from no understanding of both the navigation and interaction to a little understanding of the interaction, with no prior instruction.
2	Obviousness: time taken to demonstrate competent understanding of movements. Measure: discovery time. 1. Throughout the session time user demonstrates a competent understanding of the device conveyed by thorough use of both navigation and interaction where at least half of the navigation functions are exercised with confidence. 2. Throughout the session time user demonstrates a reasonable understanding of the device conveyed by a show of competence with the interaction where a few of the navigation functions are exercised with confidence. 3. Throughout the session time user demonstrates a moderate level of understanding of the device. User may become momentarily confused differentiating between interaction and navigation functions, however with time and verbal assistance is able to distinguish between the two. 4. Throughout the session time user demonstrates a low level of understanding of the device. User encounters difficulties distinguishing between navigation and interaction and continually uses the wrong one, requiring high physical assistance.

3	Predictability: whether aspects of the device respond as user expects Measure: expected response occurs 1. The device demonstrates a high level of predictability to the user conveyed by the user manipulating the correct function for the task to be completed for the majority of the time. 2. The device demonstrates a reasonable level of predictability to the user conveyed by the user manipulating the correct function for the task for a reasonable percentage of the time, however the wrong movements are also performed a number of times. 3. The device demonstrates a moderate to low level of predictability to the user. The majority of the time the reactions from the device do not comply with user expectations. 4. The device demonstrates little predictability to the user. The lack of predictability is conveyed as the user continually manipulates the wrong function for the task and the reactions from the device do not comply with user expectations.
5	Compatibility: device size. Measure: anthropometric difficulties. 1. There is high compatibility between the size of the device and the users' body size, where both seem to be proportional to one another. 2. There is reasonable compatibility between the size of the device and the users' body size, where the two seem approximately proportional to one another. 3. There is little compatibility between the size of the device and the users' body size, where the two are disproportional to one another. 4. There is no compatibility between the size of the device and the users' body size, where the user struggles to use the device.
6	Compatibility: muscular activity. Measure: biomechanical load. 1. Muscular activity appears to be spread evenly during operation of the device, causing no weighting of pressure on one particular area of the user. 2. Muscular activity appears to be spread relatively evenly during operation of the device, however there may be slight indication the weighting of pressure may be increased on one particular area of the user. 3. Muscular activity appears to be spread unevenly during operation of the device. There is definite indication the weighting of pressure is increased on one particular area, where the user is showing signs of discomfort. 4. Muscular activity is hugely uneven. The pain is so immense the user

	ceases to use the device.
9	Efficiency: effort exerted when using device. Measure: user's self-report 1. The user reported exerting little effort. 2. The user reported exerting a moderate amount of effort. 3. The user reported exerting a fair amount of effort, using phrases such as 'quite tiring' or 'tiring'. 4. The user reported exerting a large amount of effort, using phrases such as 'very tiring'.
10	Effectiveness: excess force used/overcompensation? Measure: frequency of unproductive actions using device. 1. The user shows a high level of control over the device. The user rarely uses either excess force to control the device or overcompensates with regard to either interaction and navigation movements. Very few mistakes occur. 2. The user shows a reasonable level of control over the device. The user may have used excess force to control the device or overcompensated with their movements a number of times, but not disproportionately to the number of correct movements. Few mistakes occur. 3. The user shows a low level of control over the device. The user uses excess force to control the device and overcompensates with their movements a considerable amount of the time, with regard to both the interaction and navigation movements. A large proportion of mistakes occur. 4. The user shows little control over the device. Excess force to control the device and overcompensation with movements occurs the majority of the time, with regard to both interaction and navigation movements. Occurrence of mistakes happens the majority of the time.
11	Effectiveness: disorientation. Measure: frequency of disorientation. 1. The user demonstrates a high degree of control of the device. The user rarely appears disorientated. 2. The user demonstrates a reasonable level of control of the device. The user may lose control of the device, resulting in disorientation on occasion. 3. The user demonstrates a low level of control of the device. The user becomes disorientated a considerable number of times. 4. The user demonstrates little control of the device. The user is disorientated most of the time.

12	Effectiveness: rectification. Measure: frequency and type of assistance required for rectification. 1. Rectification is rarely required as the user demonstrates a high level of competence with the device. When rectification is required the user does not require assistance. 2. Rectification is required a number of times, mainly performed by the user with the occasional need for verbal assistance. 3. Rectification is required a number of times, mainly consisting of verbal assistance as well as rectification from the user and the occasional need for physical assistance. 4. Rectification is required a number of times, mainly consisting of physical assistance as well as rectification from the user and verbal assistance.
16	Satisfaction: freedom from discomfort and positive attitudes of users. Measures: user's self-report 1. The user claimed to gain satisfaction from the device by selecting the category 'very comfortable' in the questionnaire. 2. The user claimed to be reasonably comfortable using the device by selecting either of the categories 'comfortable' or 'quite comfortable' in the questionnaire. 3. The user claimed some discomfort with the device out of using the device by selecting either of the categories 'ok' or quite uncomfortable' in the questionnaire. 4. The user claimed significant discomfort by selecting 'uncomfortable' or 'very uncomfortable' in the questionnaire.
19	Device Access: handling of device does not adversely affect performance. Measure: the amount the grasp, position and manipulation of the device affects the users' performance. 1. The device appears to be easily accessed by user who demonstrates it can be grasped, positioned and manipulated quickly and easily, causing no adverse effect on performance. 2. The device appears to cause problems to the user, who demonstrates minor problems with grasping, positioning and manipulating the device. These problems inflict have a slight adverse effect on performance. 3. The device appears to cause a moderate number of problems to the user with grasping, positioning and manipulating the device. These problems are causing an adverse effect on performance. 4. The device appears to cause problems to the user, where they demonstrate difficulties with grasping, positioning and manipulating the device. The problems are quite severe and significantly limit performance.

	N.B. The positioning of the device encompasses its design, the design and adjustment of the workstation and the position of the user.
20	Posture: operable by user without undue deviation from neutral posture. Measure: amount of deviation from neutral posture. 1. Device operable by user with almost no undue deviation, extension or flexion of the hands from the neutral posture. 2. Some deviation, extension or flexion of the hands from the neutral posture was required in order to operate device. 3. A substantial amount of deviation, extension or flexion of the hands from the neutral posture was required in order to operate device. 4. Device almost inoperable by user due to high deviation, extension or flexion of the hands from neutral posture.

Table 3. Ordinal Attainment levels

Pupil	Sex	Age	Age Equivalent	Score Range
1	Male	7:03	2:08 – 3:06	Extremely low (higher end)
2	Female	8:04	3:10 – 5:01	Extremely low to moderately low
3	Male	8:04	2:08 – 3:06	Extremely low (middle)
4	Female	11:07	3:03 – 4:05	Extremely low (lower end)
5	Female	12:10	5:02 – 5:05	Extremely low
6	Female	14:10	2:10 – 3:10	Extremely low (lower end)
7	Male	15:00	4:10 – 6:01	Extremely low (lower end)
8	Male	15:02	5:02 – 6:05	Extremely low (lower end)
9	Male	15:03	4:02 – 5:04	Extremely low (lower end)
10	Female	15:07	7:02 – 8:04	Extremely low
11	Male	16:04	5:07 – 6:10	Extremely low (lower end)
12	Male	16:11	8:10 – 10:09	Extremely low (higher end)
13	Female	17:04	6:01 – 7:04	Extremely low (lower end)

Table 4 – BPVS-II – age equivalent and score range

Pupil	Sex	Age	Age Equivalent	Stanine Score	Stanine Description
1	Male	7:05	6:04 – 7:04	5	Average
2	Female	8:06	5:11 – 7:02	3	Academic problems are possible
3	Male	8:06	<5:00 – 5:11	2	At risk of academic failure
4	Female	11:09	<5:00 – 6:04	1	At high risk of academic failure
5	Female	13:01	6:08 – 7:06	1	At high risk of academic failure
6	Female	15:01	<5:00 - <5:00	1	At high risk of academic failure
7	Male	15:02	7:02 – 8:03	1	At high risk of academic failure
8	Male	15:05	6:04 – 7:04	1	At high risk of academic failure
9	Male	15:05	5:06 – 6:11	1	At high risk of academic failure
10	Female	15:09	5:06 – 6:11	1	At high risk of academic failure
11	Male	16:06	6:04 – 7:04	1	At high risk of academic failure
12	Male	17:01	6:08 – 7:06	1	At high risk of academic failure
13	Female	17:06	5:11 – 7:02	1	At high risk of academic failure

Table 5 – MAT-SF – age equivalents and stanine interpretations

Pupil	Sex	Age	Score	Category
1	Male	7:05		~MD
2	Female	8:06	43	MD
3	Male	8:06	43	MD
4	Female	11:09	46	MD
5	Female	13:01	32	MD
6	Female	15:01	41	MD
7	Male	15:02	31	MD
8	Male	15:05	40	MD
9	Male	15:05	39	MD
10	Female	15:09	27	MD
11	Male	16:06	34	MD
12	Male	17:01	45	MD
13	Female	17:06	40	MD

Key:

Category	Meaning	Range
SD	Severe discrepancy from the normal range of function.	> 50
MD	Moderate discrepancy from the normal range of function	26 – 50
NR	Normal range of function	25 or less

Table 6 – QNST-II – score and category

Task No.	Task	Description
1	Enter Building	The user was required to manipulate the navigation unit forward and to the right to direct them through the outside doors.
2	Dress in protective clothing	The user was required to click on the cupboard with the cursor to open it. Once open, they had to select the right clothes by moving the cursor over the correct items and clicking on them.
3	Enter factory	The user was required to move the navigation unit and manoeuvre themselves through the doors.
4	Complete oil spill task	Just to the left of entering the factory there was an oil spill. The user needed to navigate towards it, select the factory manager with the cursor and then select the oil spill, again with the cursor.
5	Complete ladder rung task	Towards the right of the factory was a ladder with a missing rung. The user could complete this task by navigating towards it, selecting the factory manager and then the missing rung, both with the cursor.
6	Complete overload trolley task	The user was required to move towards the overloaded trolley with the navigation unit. The usual procedure of clicking on the factory manager and the danger with the cursor then needed to take place.
7	Complete obstruction of the first aid kit task	The first aid kit was obstructed by boxes, so it was necessary for the user to report the problem. They were required to move close to the danger using the navigation unit, then select the manager and the danger, both with the cursor.
8	Go upstairs	Towards the back of the factory were stairs leading to the next floor. The user could go up these by simply using the navigation unit.
9	Complete container task	On the second level there were a number of containers left out. The user had to navigate towards them, select the factory manager and them the correct container and corresponding cupboard, all with the cursor.
10	Exit factory	Once the user had either finished all the required tasks, or their session time had run out, they were required to leave the factory. This was completed by simply navigating their way to the original doors they can in using.

Table 7 – Set of tasks utilised in study

Factor	Ergonomic Principle	Measure	Test	Best Match
	Operability:			
5	Compatibility	Anthropometric difficulties	Wilcoxon	J+M
6	Compatibility	Biomechanical load	Insufficient sample size	
9	Efficiency	User comments from questionnaire	Weighted average	VR-1
14	Effectiveness	Frequency of physical support	Wilcoxon	J+M
	Controllability:			
17	Non-interference	Frequency of interference with own use	Insufficient sample size	
18	Grip surface	Frequency of slipping during use		VR-1
19	Device access	Amount the position, grasp and manipulation affect performance	Wilcoxon	J+M
	Biomechanical Load:			
20	Posture	Amount of deviation from natural posture	Insufficient sample size	

Table 8. Results of tests to determine the best physical match between user and device.

Factor	Ergonomic Principle	Measure	Test	Best Device
	Operability:			
4	Consistency	Frequency of operation defects	Wilcoxon	J+M
8	Efficiency	Task time	Descriptive	J+M
10	Effectiveness	Unproductive actions using device	Wilcoxon	J+M
11	Effectiveness	Frequency of disorientation	Wilcoxon	No difference
12	Effectiveness	Frequency and type of rectification	Wilcoxon	VR-1
13	Effectiveness	Frequency of verbal support	Wilcoxon	J+M
14	Effectiveness	Frequency of physical support	Wilcoxon	J+M
15	Effectiveness	Number of completed tasks	Wilcoxon	J+M

Table 9. Results of tests comparing the effectiveness of VR-1 with joystick and mouse (J+M)

Factor	Ergonomic Principle	Measure	Test	Improved performance over time?
	Operability:			
2	Obviousness	Discovery time	McNemar	Yes
3	Predictability	Expected response	McNemar	Yes
4	Consistency	Frequency of operation defects	Simple count	Yes
13	Effectiveness	Frequency of verbal support	Simple count	Unclear
14	Effectiveness	Frequency of physical support	Simple count	Unclear
15	Effectiveness	Number of completed tasks	Simple count	Yes

Table 10. Results of tests to assess the learnability of VR-1.

Figure 1.VR-1

Figure 2. A scene from the Virtual Factory

Pat Wallis & David Jeckells Education: Using a wiki for collaborative investigations

Introduction

Reflecting on experience, is today seen as a valuable practice and promoted as tool to aid learning. Similarly social and collaborative learning is another aspect of the learning process. 'Inquiry into Learning'(IIL) modules are studied by all Nottingham Trent University, BA Childhood Studies students. Year 1 students study IIL1 and Year 2 students study IIL2. Each module consists of 3 seminar groups with approx 25 students in each group. Using an Inquiry Based Learning (IBL) approach these modules take a social constructivist approach to learning. Students undertake individual and collaborative inquiries which they then share with other students in their cohort. Dissemination of inquiries is difficult due to timetabling problems and cohort size. In order to help address these problems, few years ago we used the university's Virtual Learning Environment (VLE) as a platform for sharing work. However, this also had it's difficulties. Students did not have permissions to post to the VLE so they needed to email their work to a member of the administrative staff for posting. . Once on the VLE students were able to read each others work, but they could not edit their work or leave comments on each others work, so this continued to be done in the seminar groups.

In order to overcome this difficulty in 2007-2008, a different technological innovation was introduced in the form of a wikis (a web based collaborative workspaces). This tool allowed students to write up their inquiry, reflect and collaborate with peers, and when they felt it appropriate, edit their original work. This process of engaging with a wiki to share work with others to improve their own learning and performance engages students in a number of key skills as outlined by DfES.

This case study seeks to evaluate our experience of using wikis with these students for the first time. We will reflect and evaluate our practice, as well as discuss and evaluate feedback of the students experience from an online questionnaire.

Evaluating our practice

In the academic year 2007/8, approx 165 undergraduates were introduced to using a wiki as part of their Inquiry into Learning module. These year long compulsory, IBL modules require students to undertake a series of individual and collaborative investigations. Students then write up and share there findings with other students on the cohort. These inquiries then become a valuable resource for their final assessment - a 'patchwork text'.

A wiki (online-editable web sites) was chosen as it allows peers to review and comment on work, thus creating a stronger collaborative aspect to the task. With the support of our Learning and Teaching colleagues we feel we provided a well designed and user friendly wiki, which was set-up with a large degree of pre-defined and formatted pages, allowing students to concentrate on their own writing and reflection, rather than learning how to use the technology.

At the beginning of the module students were timetabled in a computer room where they were introduced to using the wiki. During this hands on session the cohort agreed 'rules' and etiquette when using the wiki e.g. only to edit or delete their own work, to be polite to each other, to provide constructive feedback on each others work etc. During this session a member of the schools Learning and Teaching Support Team joined the tutor to help students submit their first patches. By the end of this session all students had learnt to navigate their way around the wiki and had posted their first inquiry on the wiki for others to read and comment.

As the year progressed tutors repeatedly encouraged and tried to motivate students to post their inquiries on the wiki for other students to read and comment, but no additional training was given. However, in practice not all students posted their work. "Any experienced teacher knows that without the proper motivation for students to engage in a learning experience, the otherwise best designed experiences will be unsuccessful." Hodges, C. (2004). During the year tutors met regularly to discuss how the activity was going and reflected on why some students did not seem to be engaging in the process. We decided that, during the weekly seminar sessions, we would continue to try and motivate

students to post, read and comment on others work. There engagement did improve but there was still room for improvement.

To help us evaluate this activity, towards the end of the academic year all the students were asked to complete an on-line questionnaire. This indicated that most students contributed to the wiki, but some did not submit all of their work. We were pleased that some students found the experience positive: 'I found the wiki extremely helpful and enjoyed reading other's inquiries', one student commented, 'Others' work gave me inspiration when I was lacking it'. As a team we feel this type of collaborative forum is something we would wish to develop further. But we clearly need to develop our own practice in this area too.

Our own reflections and feedback from students indicate a number of areas we need to investigate further:

- We did not set deadlines for individual postings. Feedback showed that 40% of respondents commented that deadlines for their patches would have motivated them to post or post earlier. In our evaluation we need to consider whether deadlines for posting would be useful?
- Most, though not all students enjoyed using the wiki. 'I don't think the wiki is the best way to show your work, it's very impersonal'. However, most students reported that they enjoyed reading and sharing work with others.
- The cyclic process of learning (Kolb 1984) identifies the importance of planning, doing and reviewing our practice. With this in mind module tutors encouraged students to edit their inquiries as their learning and understanding changed, but in reality less than 17% of students actually did this.
- The inquiries themselves were not assessed, but were the foundation for students 'patchwork text' which was assessed. Would explicitly linking the task to assessment criteria influence student motivation?
- Although 66% of students said they never commented on other students work. 50% of respondents indicated that they were open to comments on their patches. But those that did read and comment stated that they "Valued others comment on my inquiries" as "I found it helped to deepen my understanding" Tutors noted this reluctance to comment on peers work

was also reflected in seminars, where students expressed reservations about what they viewed to be 'judging' or 'assessing' their peers inquiries.

- Being able to read others' patches was ranked as the most highly ranked motivation for students to post,- but in reality not all students posted their patches. A number of students complained about this and it is certainly something that we need to address with future cohorts.
- At the beginning of the module tutors agreed that in an effort to encourage student collaboration, they would read but not comment on inquiries, Tutors did however, provide verbal feedback in seminars or by email. Post module, student feedback suggests that they would have liked tutors to comment on their work. As tutors we need to reflect not only on how we interact with the wiki but also how we engage the students in this experience.
- Tutors had limited instruction on how to use the wiki and did not receive any guidance/support on e-facilitation or e-moderating.

All of these points and reflections on own practice, must be top of our evaluation agenda. How we present and interact with this shared online workspace needs to model how we wish the students to interact with it. We decided to start our evaluation by looking at Gilly Salmon's 5stage model for on line education and training.

Evaluating our experience with Gilly Salmon's 5 stage model:

With the help and support of our colleagues in the teaching and learning centre, we provided, what we thought to be a user friendly, straightforward area for students to use. Students were provided with hands on instruction to get them started, as well as reminders during seminars throughout the module. (Stage 1: Motivation & Access) The wiki was easy to access and simple to navigate. During seminars they were actively encouraged to share and collaborate with their inquiries. (Stage 3 : Information exchange) In the classroom we actively encouraged them to share their thoughts and ideas in small discussion groups as well as in whole seminar group 'conferences'. Working independently they were encouraged to upload and edit their own inquiries, read and comment on peers work. (Stage 4: Knowledge construction) They were also actively encouraged to

reflect on their work in this module in an effort to 'see' wider links throughout their learning experience. (Stage 5: Development)

On reflection it would seem that we did indeed addressed most of the 5 stages of Gilly Salmons model. Interestingly, the stages we did not address fully were stage 1 - motivation. and stage 2 'on line socialisation'. Could these be the area we now need to address? Could the fact that individuals had not established an on-line community have affected their participation? Or do many of the difficulties stem from motivational issues. How could we motivate students to interact with the wiki? What additional support and/or structures could we have provided to encourage their participation?

Summary of Findings

Most students agreed that they enjoyed posting and reading others work and that it helped with their own understanding. Perhaps not surprisingly they would be more motivated to contribute if the work was assessed. On reflection, perhaps we need to show direct links between their final assessment and their coursework e.g by the use of exemplars? A number of students indicated that they would welcome tutor comments on their postings. Could the lack of tutor input on the wiki have been construed as a lack of motivation on our part? 'The tendency for this resource to engage only already highly motivated and academically able students is worrying'. Hoskins, L & Hooff, J (2005). Tutors need access to training/guidance on how to be effective e-tutors. Inquiries need to have deadlines for posting. If students do not meet these, they need prompting.

Conclusions

Most students found using the wiki a valuable, enjoyable experience. However, for some it was a chore. They lacked motivation to post their work and/or to comment on others work. Gilly Salmon's 5 stage model for managing e-moderating provides us with some useful reflection points. There were at least 3 seminar groups (approx 25 students in each) posting to each of the wiki's (i.e. the whole cohort) so although social groups and individuals identities were established within the seminar room, they were not across the groups. On reflection would it have been useful to include an 'introduce yourself' section to

help with 'on-line socialisation' (Stage 2 of Salmon's model)? As tutors we wanted students to see this wiki as ***their*** learning space so we 'kept a distance' was this good practice? Should we have taken a more active role? Salmon talks about the use of a 'lifeguard' a person who could provide email for online help. Could this be a role for a tutor or a proficient student?

On reflection the wiki was presented in a purely text form. Should we have used different presentation styles e.g. icons, videos, pictures? Should we have checked to see who was logging on and when and prompted those who had not logged on? Reflecting on our experiences with other colleagues has helped us raise questions about our own practice and how we might develop this area for future cohorts.

1929 words

Indicative reading

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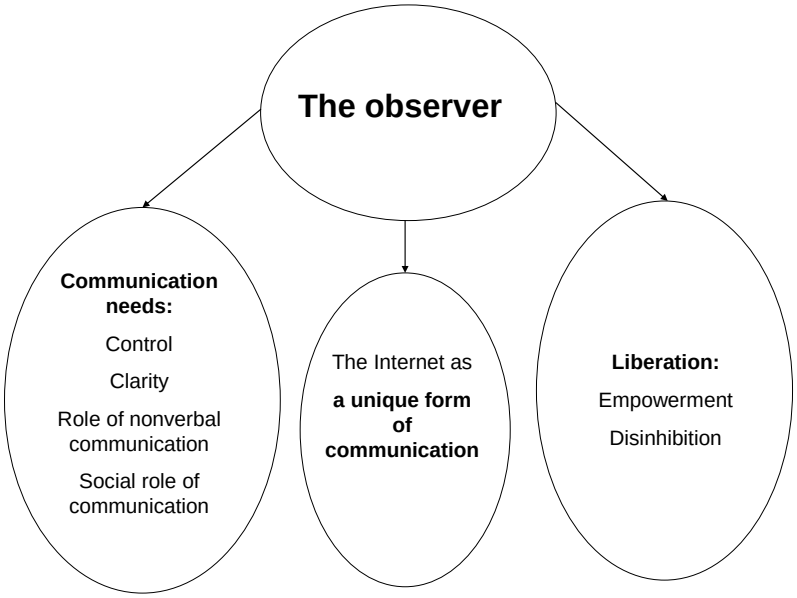

Figure 1. Overview of analysis