



SERIOUS GAMES AND INCLUSION

**SPECIAL EDUCATIONAL NEEDS NETWORK
ANNUAL REPORT ON INNOVATION NO. 2**

NOVEMBER 2013



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ABSTRACT

The Annual Report on innovation is an output of the Special Educational Needs network (SENnet). This 2013 report presents innovative approaches using serious games in the three areas of activity in the network: the integration of learners with special needs into mainstream schools, innovative learning environments and raising teacher awareness.

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INTRODUCTION

The activities of the Special Educational Needs Network (SENnet) include the production of an Annual Report on innovation in the three focus areas of the network: the integration of learners with special needs into mainstream schools, learning environments and teacher professional development.

This second report focuses on digital games, drawing on research and activities in 2013. It includes contributions from partners in Austria, Belgium, Denmark, Estonia, Italy, Portugal, Turkey and the United Kingdom, as well as from the European Agency for Development in Special Needs Education. Particularly thanks are due to contributors to a seminar held in June 2013 on serious games for inclusion: Terry Waller for providing a background paper, developers, members of the European Schoolnet Special Education Needs Working Group and to SENnet partners.

This document references recent research reports, practitioner consultant and commercial recommended software and highlights some of the issues that might be addressed in terms of the use of games in education and the benefits they offer students with special educational needs (SEN).

The first annual report can be downloaded from <http://tinyurl.com/og42yyk>. Further information about SENnet can be found at <http://sennet.eun.org>.

1: THE CASE FOR SERIOUS GAMES IN EDUCATION

SERIOUS GAMES AND LEARNING

Games and learning are uneasy partners. The Horizon K-12 reports¹ show that, between 2009 and 2013, while other trends in technology have been correctly predicted, serious games did not take off in schools as fast as predicted by the experts, and many teachers (as well as parents and politicians) worry about the image, nature and effects of video games and are resistant to the idea that learning is not 'work' and can be playful.

Yet there is a growing body of evidence for the value of game playing in learning relating to personal empowerment, creativity, improved learning outcomes and socialisation. As a recent study (Biagi & Loi, 2012) points out:

“Gaming is the only activity for which a positive coefficient between PISA test scores and intensity of use is consistently found.”

Plass et al (2012) provide the following reasons showing that games can be effective tools for pedagogy:

- Games provide highly contextualized problem-solving spaces
- Games support highly engaging, individualized learning
- Games bridge in-school and out-of-school learning
- Games by design have a high emotional impact
- Games create communities of practice
- Games allow for embedded assessment

Another review (McClarty et al, 2012) of the literature also comes to the view that in general research supports that digital games can facilitate learning, but it is difficult to draw stronger conclusions about the educational impact of digital games as relatively few games have been tested against other teaching and learning approaches. They recommend that future research should focus on **how** games can best be used for learning highlighting that the key differences between games makes it difficult to generalise from one to all games. This conclusion is echoed by Professor Sharon Ainsworth of Nottingham University who suggests we are asking the wrong question – not whether games are a tool for learning, but “which games played in what ways, supported (when relevant) by which classroom practice create valuable opportunities for learning?”

A report by Dupl aa and Shirmohammadi (2010) highlights the benefits of gaming derive from opportunities for pleasure, interactivity, problem solving and creativity, leading to increased engagement in learning, but also recognise that the research is yet to evidence impact on

¹ <http://www.nmc.org/pdf/2013-horizon-report-k12.pdf>

learning outcomes. They suggest classroom-based activities that support literacy and numeracy using free online games: “Activities involving video games will increase student motivation and help them develop their literacy and numeracy skills in imaginary interactive contexts that are more appealing than a book for many students.”

Employers frequently complain that children leave school without the 21st century skills of problem-solving, social communication skills, the ability to work collaboratively and creative thinking. Games can help develop such skills.

The Gates Foundation has funded research² about to be published based on a meta-analysis of 60,000 studies touching on serious games, 700 with test research and 77 using randomised control groups. Early indications are positive in relation to cognitive ability in the area of recall.

A report published by European Schoolnet, *Digital Games for Learning* (Blamire 2010), showed that educational games in learning can develop mathematical and linguistic skills and knowledge and can support the development of key competences, including digital competence, creativity and innovation, citizenship, and lifelong learning. They can also develop ‘soft’ skills including strategic thinking, planning, negotiating skills, group decision-making as well as eye-hand coordination. They tend to be most effective when educational content is embedded and they are used with certain curricula and pedagogies.

A recent national project in Scotland, which focused on the educational value of console games, concurs, and highlight the fact that that game-based learning approaches build on children’s existing interests, skills and knowledge, can narrow the gap between children’s home and school cultures and can increase communication between parents and teachers and school leaders and enhance parental engagement in children’s learning.

A recent literature review (Perrotta et al, 2013) of games for learning using a range of sources, including empirical, practice-based evidence and more speculative literature, published from 2006 onward, found that:

- “The literature was split on the extent to which video games can impact upon overall academic performance.
- The studies consistently found that video games can impact positively on problem solving skills, motivation and engagement. However, it was unclear whether this impact could be sustained over time.
- Despite some promising results, the current literature does not evidence adequately the presumed link between motivation, attitude to learning and learning outcomes. Overall, the strength of the evidence was often affected by the research design or lack of information about the research design.”

Finally, Royle and Colfer (2010) explore the challenges to the adoption of games into mainstream education in England, finds that there are significant barriers and calls for collaboration and focused research.

² <http://www.learninggamesnetwork.org>

A 2013 report argues that games can make a real impact on inclusion. *The Potential of Digital Games for empowerment and social inclusion of groups at risk of social and economic exclusion: evidence and opportunity for policy*, published by the Institute for Prospective Technological Studies, Joint Research Centre, provides a useful summary of research findings, some dating back at least 10 years, but much is new, since 2010. Although there are proven benefits, there are barriers as well, including the low quality of many special-purpose games, lack of formal evidence of impact and the scarcity of high-profile demonstrations.

The EU report highlights seven areas of potential for understanding digital games based learning for inclusion:

- Engagement – intrinsically motivating – for most people especially young 11-14, 14+
- Experiential learning – by doing
- Social learning – naturally through interaction with mentors and peers (sometimes the same)
- Situated – or context related, providing authentic ‘real’ learning taking account of prior knowledge etc.
- Personalised – interactive between game and play and play-player – adaptive (for progress and success)
- Safe participation – experiment and learn by failure (caveat around e-safety).

SENnet was represented at the November 2013 Interactive and Games Conference in Nottingham UK and the research work presented included the following relevant to school age players:

- The SoundScapes concept, a motion-sensitive environment (Dr. Anthony L Brooks)
- An accessible haptic gaming system for children with cerebral palsy (David Hobbs et al, Flinders University, Australia), enjoyed by children: “I had the best two weeks of my life playing the games” said one
- Motorway Jive: immersive environments using only audio or visual input (Dimitrios Darzentas)
- Pervasive gaming as a way of directing players to geographical locations (Patrick Armstrong, Flinders University, Australia): using gameplay to encourage interaction with the real world
- Natural user interfaces (Peter Mitchell et al)
- Conducttr, a pervasive entertainment platform to ‘create your own street game in a box’

- Preferences and appropriateness of communication in a virtual world for young people with autism (N. Newbutt, Bath Spa University, UK): highlighting the need for care in text chat, identifying with avatars, the importance of the teacher in facilitating and prompting, and the usefulness of virtual environments for users with autism ‘to make mistakes without real-world consequences’ (e.g. road safety, but also social situations such as catching a bus, buying a coffee, choosing a seat in a café).
- Participatory design (Prof. David Wood, Nottingham Trent University, UK): the importance of roles and responsibilities, the value of deconstructing games, using simple tools, co-operative enquiry, being issues / education-led not games-led, gender-specific sub-groups and reporting / recording using visual means (video and photos) rather than text.
- The ViPi project (www.vipi-project.eu, Andy Burton, Nottingham Trent University, UK): a set of learning objects and games for teaching basic ICT skills (for students with intellectual disabilities), some adapted, some new and some for mobile devices, e.g. labelling the parts of a laptop, Stay Safe (role play on e-safety), and matching pairs.
- Serious Games for Social and Creativity Competence (<http://www.games4competence.eu>), an EC funded project involving older learners (Manfred Pretis, Austria)
- Responsive robots (Prof. David Brown, Nottingham Trent University, UK): lifelike programmable robots that have been used successfully to coax responses and interaction from autistic and withdrawn young people.



I'm listening to you: BBC TV featured programmable robots at ITAG in the evening news

Further information about ITAG can be found at http://www.ntu.ac.uk/apps/events/9/home.aspx/event/139932/default/itag_conference_2013.

GAMES AND SPECIAL NEEDS

In the area of games to support learners with special educational needs and disabilities research evidence is relatively thin. There is, however, evidence of increased motivation, engagement and progression in a range of skills and abilities. This is particularly true for those at the early stages of learning and communication – for work, play and creativity alongside peers (examples include eye gaze technologies) – with increased independence, autonomy and resultant self-esteem.

A research review (Franceschini, 2013) confirms that research has shown that action video games could improve visual attention this study investigated whether an improvement in visual attention led to improvements in reading. They found it did but as the article points out the sample was of only 20 students.

Professor David J. Brown, Interactive Systems Research Group, School of Science & Technology, Nottingham Trent University, United Kingdom, spoke at SENnet's workshop on serious games and inclusion in June 2013. His field is learners with intellectual disabilities and much of his work relates to the use of games. He considers that games are interesting for SEN pupils because they:

- Engage learners in sufficient repetition to ensure that learning takes place (*Pivec*)
- Provide life experience, engagement with knowledge and people (*Blamire*)
- Allow them to work on their own pace, make mistakes without irritating others (Salem-Darrow)
- Help to learn to monitor more objects in visual field and faster, and increase spatial resolution as visual processing (*Green & Bavelier*)
- Improve choice reaction time and independent decision making (*Standen & Brown*)
- SEN students have very specific needs: games must be age and ability appropriate and should not contain any violence or gambling themes (*not allowed at school*).

As most commercial off the shelf (COTS) games do not meet these criteria, the team at Nottingham creates games.

Professor Brown recognised that there are opposing views, for example:

- Computer games can have negative effects, as they play an important role but real relationships with people and nature, real hands-on activities etc. are more important (*Alliance for childhood*³)
- Video games promote overly rational modes of thought and remove people from the interaction they need with the real world (*Monke*)
- One the most fundamental, and most dangerous, errors of the video-game-as-educator argument is that what takes place on the screen is a fair and adequate model of what takes place in real life (*Monke*)

Brown said that there are many definitions/ ways of classifying educational games, serious

³ www.allianceforchildhood.org

games, and their relationship to virtual worlds and simulations. '**Serious games**' is the accepted term for games with an educational intent. They need to be engaging, although not necessarily fun, while the learning can be implicit or explicit.

A major problem, according to Professor Brown, is that there is not a strong tradition in education for efficacy studies, as for example in health. He pointed out that a closer cooperation between research on gaming and robotics could be very fruitful. As many SEN students suffer from damages to their central nervous system, it is necessary to think about very advanced interaction systems. An evaluation study on mathematical skills is an example. It posed the research question: can participating in serious games improve the understanding of SEN students of fractions, percentages and decimals in students? The study design involved matched pairs; eight students using intervention software to improve mathematical skills, 8 students using battery of control games for five weeks (20 minute weekly sessions). It was difficult to match pairs, as disabled people are a very heterogeneous group. Analysis of the results showed that those who played the intervention software performed better than control group and that games like "cheese factory" (see below) can improve mathematical abilities

USEFUL RESOURCES

FOR TEACHERS

Digital games in schools: A handbook for teachers

This handbook for teachers (Felicia, 2009) provides a valuable overview of games types and outlines what researchers have noted as the uses and benefits of digital games.

The premise of most games is the need to learn, memorise, collaborate, explore or obtain additional information to progress. Serious games can also have a focus on developing understanding – to learn (skills and knowledge), to improve (skills and knowledge), and to develop or deepen understanding through a mixture of experiences.

iPads for communication, access, literacy and learning: an introduction

As the title suggests this publication (Mill, 2012) looks at the use of apps for children with communication difficulties.

Games in Education

A games in education wiki set up by Adrian Camm, an Australian who is highly active in the area of ICT in education in the state of Victoria. His blog has some useful links <http://gamesined.wikispaces.com/>. See also <http://adriancamm.com/about>.

FOR GAMES DESIGNERS AND DEVELOPERS

International game developers game accessibility special interest group

This is a special interest group within the international game developer's association with a passion for game accessibility – making video games playable for everyone and take special considerations for gamers with disabilities of any sort. There are useful links in different countries. <http://igda-gasig.org/>

Games accessibility guidelines

These guidelines are the result of a collaborative effort between a group of studios, specialists and academics, to produce a straightforward developer friendly reference for ways to avoid unnecessarily excluding players, and ensure that games are just as fun for as wide a range of people as possible. <http://gameaccessibilityguidelines.com/>

Includification: a practical guide to game accessibility

This recent publication from AbleGamers Foundation (a US charity) provides developers with an overview of the design issues that should be considered when producing an accessible game, including those running on mobile devices. <http://www.includification.com/>.

OTHER USEFUL SOURCES OF INFORMATION

Interactive Technologies and Games Conference. <http://itag.gamecity.org/>

Serious Games Institute: <http://seriousgamesinstitute.co.uk/Default.aspx>

DESQ: <http://desq.co.uk/>

OneSwitch: <http://www.oneswitch.org.uk/index.htm>

EXAMPLES OF GAMES FOR INCLUSION

SERIOUS GAMES AND INCLUSION: WORKSHOP

At a SENnet workshop in June 2013, developers from across Europe were invited to demonstrate their work and products.

GAME ON, GOAL, GOET⁴

Game ON provides engaging and motivating games-based learning materials created to encourage development of basic, personal and work sustainability skills in prisoners, those at risk of offending and ex-offenders, including those with disabilities

GOAL and GOET: to improve work based learning and develop vocational skills like to support people with severe disabilities in finding and keeping a job



Example Games: Cheese Factory, My Appearance, Virtual Supermarket (<http://goet-project.eu/downloads/games/>)

All games are Open Source games, available in 5 languages
Games have embedded accessibility models (extra graphical texts, alternative texts, additional interaction possibilities, etc.).

LIFETOOL

The non-profit Austrian organization Lifetool⁵ aims to develop hardware and software for children with disabilities.

- Each game has to pass test to be on the list of content
- A lot of attention is paid to virtual and acoustic design (*special effects can be switched off/ tasks also visual for people with hearing impairments*)
- Settings/ options are crucial: wide range of levels, profile for each student (*with results*)
- Motor requirements: Big cursor, big objects, all inputs accessible by just one click
- All games available in several languages

Play with me

- Animation games like catching eggs, birds
- 2 people can play together (to collaborate/as opponents)
- PC software, 70 Euro



⁴ <http://isrg.org.uk/projects/>, <http://goet-project.eu>

⁵ Stefan Schürz <http://www.lifetool.at/startseite.html>

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Wheel Sim

- Game to learn to use a wheelchair/ improve road safety
- Game simulates functionality of an electronic wheelchair
- Game was produced with university and end users
- Used as decision making tool, to show to insurance company if person is able to use a wheel chair



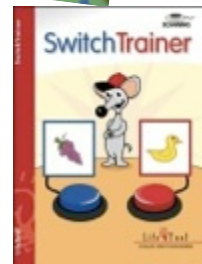
Puzzle World

- Collection of well know puzzle games, primarily designed for children who are not able to use normal puzzles
- 4 different puzzles designs, a lot of possibilities to adapt level of difficulty



Switch Trainer

- Programme to learn how to use 2 switches in computer operation
- Designed for physically impaired children with or without learning disability
- For example, first game teaches: if you switch, there will be an animation



WAINOT⁶

WaiNot is a safe online environment in Flemish accessible via a free login, providing the following activities. All text is spoken aloud (in Flemish) so there is no need to be able to read:

- Emailing using pictograms (*will be translated to words and back*) or using voice recording (*up to 1 minute*)
- Reading news (*adapted: in easy language, with pictograms/voice recordings*)
- Games section (*games train cognitive/motor skills*)
- Activities section: Tips on events fully accessible to disabled people
- Website gives possibility to monitor activities of the users



⁶ Tanja Maes <http://www.wai-not.be>



Simeon (Downes' Syndrome) demonstrating WaiNot

MONKEY TALES⁷

A fun 3D game from Belgium which allows children to acquire maths skills and learn at their own pace. The aim is to save monkeys, to master a series of rooms with obstacles. There are mini games on math allow for repetition of what has already been learned at school (age 7-12).



- Adaptive exercise: the level of the next exercise is adjusted based on the results of the previous one.
- Suitable for both slow and very advanced learners.
- Game follows national curricula (*adapted to each country*).
- Cost: 15 Euros for PC; a demo is available on website

GAMES FOR HEALTH: HEELSEAKER AND HYPERACTIVITY⁸

The game “Heelseaker” (Planet Commander) for ADHD patients developed by team of content specialists, commercial specialists costs 37 Euros. It is a web-based game in Dutch, English and German, for students 8-12 years old, takes 22 hours to play in full – visiting all planets and completing the activities. You can play against the computer or against another person live online (importance of fixing a rendezvous time and keeping to it – role of parents to reinforce and support is important)

Starting point: ADHD has side effects in behavior: people have difficulties with time

⁷Vicky Vermeulen, die Keure Educatief <http://www.educatief.diekeure.be/educatief/index.php>

⁸ Johnson and Johnson, Belgium (www.izovator-healthgames.nl/heelseaker.htm; video clip www.youtube.com/watch?v=sjK0PE_ZFY)

management, planning, and social skills, all of which are a burden for hyperactive young people. The idea is a gamification of those skills (*possibly also interesting for other students*)

Goal of the game: find minerals, adventure game with team activities (*possibility to meet other players online*), planning dimension. Implicit learning (*students do not have the impression they are learning*)

Crucial issues:

- Could validation process for games be lighter than for medicine?
- So far proof of concept in a randomized controlled trial with 45 ADHD patients
- Difficult to use in school because of timetable constraints - time needed to complete the game.

NICOLAS EYMERICH⁹

The Inquisitor audio game is an adaptation of the Nicolas Eymerich adventure game and is playable in English, Latin and Italian, by tapping an iPad with one or two fingers by blind people; it is compliant with Italian guidelines for dyslexic people:

- Target group: 12 years and above
- Version for blind is the same 3D scenario with additional audio instructions (*as the blind testing the game preferred a game with the same level of complexity instead of a simplified version*)
- Positive feedback on the fact that mainstream content was adopted (*instead of producing specific “politically correct” content*)
- The app costs 13 Euro, and there have been almost 1000 downloads so far with no promotion (*70% in the US*). Even so it is difficult to market such a product globally – Ivan writes on blogs and other social media channels.
- Useful links:
 - To find easy and quick info about the game functions: <http://www.eymerich.it/index.php?center=audiogame&lang=eng>
 - Forum topic on Audiogames.net talking about the Inquisitor Audiogame: <http://forum.audiogames.net/viewtopic.php?id=10073>
 - Impressions that blind users had: link to the iOS version on iTunes: www.appstore.com/theInquisitorAudiogameAdventure
 - International trailer: <http://www.youtube.com/watch?v=as1J7bXxDAk>.

KUNG FU KITCHEN AND THERAPLAY¹⁰

A collection of cognitive and physical challenges in Kinect-based motion-sensitive games used by physiotherapists with patients who have to repeat certain movements (*including management system to monitor players’ activities*). The games which can be downloaded

⁹Ivan Venturi, TiconBLU Srl, Italy
(<http://www.eymerich.it/index.php?lang=eng¢er=thegame>)

¹⁰ Vero Vanden Abeele, GroepT Institute for Higher Education

and used are proof of concept developed according to a user-centred design process, and 'need polishing'; there is no commercial partner as yet. All rewards are positive (unlike games on the Wii which have three lives).

- Kitchen Kungfu (*catching plates*), Dragon flying, Cooking Game (for the severely physically handicapped), Egg hunting
- To be controlled with movements of arms, legs or the head
- A lot of possibilities to adjust the level of difficulty, graphics
- The aim was to create games, which are appropriate both regarding the age of the users and the cognitive level.

OTHER GAMES

The following games for learners with special needs and resource directories have been recommended by member of SENnet.

GENERAL

The Secret Agent Society (SAS) Computer Game Pack¹¹

This is an interactive computer program that teaches 8 to 12 year-olds about emotions and social skills. The game was specifically designed for children with Autism Spectrum Disorders; however, feedback from families and professionals suggests that it is valuable for working with children who have a range of social and emotional difficulties. The four level computer program includes:

- Games that teach how to recognise simple and complex emotions in others from facial expressions, voice tone, body language and situational clues.
- Activities that increase the player's awareness of the body clues and thoughts that signal the intensity of their own feelings.
- Animated virtual reality missions that teach different ways of coping with unpleasant feelings and dealing with social challenges such as being bullied, making friends, trying new things, working as a team and making mistakes.
- Interactive quizzes to test understanding.
- A series of 'home missions' that help with applying skills from the program to real life.

Ian Bean¹²

A teacher, then commercial company employee and now freelance consultant, Ian Bean has developed free online games for young people with severe learning difficulties many years.

All abilities playground¹³

¹¹ <http://www.sst-institute.net/uk/professionals/computer-game-pack/>

¹² <http://www.ianbean.co.uk>

A development supported by the Queensland Government¹⁴.

PR:EPARe (Positive Relationships: Eliminating Coercion and Pressure in Adolescent Relationships)¹⁵

Currently under development this is serious game for Relationship and Sex Education (RSE). The PR:EPARe Game aims to support the delivery of the RSE programme, promoting communal discourse and debriefing within a formal classroom setting. The game is currently being deployed in the local schools in Coventry and Warwickshire, in the UK.

HelpKidzLearn¹⁶

This highly successful subscription service provided accessible games and activities designed specifically for young children and those with learning difficulties. These are available online and some are appearing as apps.

2 Simple - purple mash¹⁷

This company provides online games, apps and activities including play and make your own games.

Reactickles¹⁸

These interactive games, initially created for use on the Interactive Whiteboard are designed for learners on the autistic spectrum, and an app is now available.

TABLET BASED GAMES

The recent growth in the use of tablets both in homes and more recently in schools has made low cost interactive games in the form of apps available to a new and large audience.

Research is starting to emerge examining the value of these apps to learning generally and for some groups of learners with SEN, for example those who use AAC devices or who are

¹³ <http://allabilitiesplayground.net.au/>

¹⁴ <http://www.communities.qld.gov.au/disability/community-involvement/queensland-all-abilities-playground-project/all-abilities-eplayground>

¹⁵ <http://seriousgamesinstitute.co.uk/links.aspx?section=66&item=515&category=55>

¹⁶ <http://www.helpkidzlearn.com/>

¹⁷ <http://www2.2simple.com/purplemash>

¹⁸ <http://reactickles.org/>

on the autistic spectrum. Educators, advisers and suppliers, have produced listings, many aimed at interactive apps for students at the early stages of communication.

Teacher recommended apps for children with ASD¹⁹

This is a listing of iOS apps for children with ASD from the apps for ASD iPod Touch Project (Welsford, B., and Kingdon, A. 2010) with brief descriptions of how they can be used.

Flo Longhorn²⁰

A well respected practitioner and now independent consultant specialising in sensory support for children with complex and profound needs has developed training as well as guides to using iPad apps.

Busythings²¹

A UK based company has developed a range of primary and SEN focused games

The Spectronics' apps for Literacy Support²²

This Australian company has developed a range of literacy apps with a games approach

Koi Carp²³

Apps for special needs²⁴

Switch accessible Apps²⁵

Special iApps²⁶

Apps for special education²⁷

¹⁹http://assist-tech.ednet.ns.ca/Assistive_Technology_Centre/iPod_Touch_%26_iPAD_Resources.html

²⁰ http://www.netbuddy.org.uk/static/cms_page_media/111/flo%20longhornJanOpt.pdf and <http://www.multi-sensory-room.co.uk/ipad-ideas/>

²¹ <http://busythings.co.uk/apps.php>

²² <http://www.spectronicsinoz.com/apps-for-literacy-support>

²³ <http://www.148apps.com/reviews/koi-pond/>

²⁴ <http://a4cwsn.com/>

²⁵ <http://smartinclusion.wikispaces.com/IPOD%2C+IPAD+Resources>

²⁶ http://www.specialiapps.co.uk/en_gb/apps.html

²⁷ <http://www.scribd.com/doc/24470331/iPhone-iPad-and-iPod-touch-Apps-for-Special-Education>

iPads and ASD²⁸

Senware Software Limited²⁹

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<http://smartinclusion.wikispaces.com/file/view/iPads%20to%20Support%20Students%20with%20Autism%20Spectrum%20Disorders.pdf/388100026/iPads%20to%20Support%20Students%20with%20Autism%20Spectrum%20Disorders.pdf>

²⁹ <http://www.senware.org/about.php>

DISCUSSION POINTS

Issues that could be explored include:

- To what extent are games used with learners with special needs?
- What types of games are in use?
- What are the barriers to use?
- What are the inclusive opportunities provided by games in education – can these be quantified and measured and their benefits compared with other learning support strategies?
- Are there particular types of games that benefit groups of learners with SEN than others?
- Are there any ethical issues in using some types of games (for example immersive virtual reality environments) with learners with SEN?
- What are the specific e-safety issues for young people with SEN who use online games (both at school and at home)?
- Are there lessons to be learned from the way tablets are starting to be used in education?
- Do apps count as games – are they an opportunity or evidence of ‘dumbing down’?

The following table could be used to map the particular benefits games afford groups of learners with special needs and how they can support inclusive learning.

Benefits and uses of digital games	Benefits to specific learners?	Issues for specific learners and how they might be addressed?
Able to motivate, engage and immerse learners		
Provide auditory, visual, tactile and intellectual stimulation		
Develop cognitive, spatial, motor skills		
Improve ICT skills		
Teach facts (knowledge, recall, rote learning, and memorisation)		

Teach/learn principles – eg cause and effect		
(Complex) problem solving		
Increase/stimulate creativity		
Provide examples of concepts and rules that are difficult to illustrate in the real world eg simulations of experiments (examples of use in science, history and geography curriculum, but also reading, spelling, logical reasoning, etc)		
Provide genuine collaboration between players (in a in a Multiplayer environment, eg MMORPG – teams, sharing, learn from peers) – occurs naturally in these environments		
Can have an emotional impact, improve self-esteem, enable engagement in social activities (explore and manage emotions in a safe environment but with monitoring?)		
Range of emotions (can aid immersion in activity) and can aid memorisation especially if content match to emotions of learner		
Improve self-confidence by keeping success within reach		
Training, education, therapy (eg provide realistic immersive environments – therapeutic e.g. post-traumatic stress disorder,		

Wii-fit for health and wellbeing)		
Develop strategy skills		
Learning through creating the games (for example compare evidence on film making and multimedia creation)		

CONCLUSION

This brief overview of serious games for learners with special educational needs has highlighted evidence for its benefits both in mainstream and particularly in special needs education. Understandably, there is scepticism and resistance in some quarters to their use, but the range of games now available and students' response to them suggests that it is time to take a serious look at serious games.

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