

Adventure Games for Learning and Storytelling

**A Futurelab prototype context paper:
Adventure Author**

by Teresa Dillon

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1. INTRODUCTION

The aim of the review is to provide a general introduction for those who are interested in the design and use of computer games for adventures and storytelling. This review stems from an exploratory phase of research and concept development between Futurelab and Dr Judy Robertson, University of Glasgow and Dr Judith Good, University of Sussex on their project Adventure Author.

Adventure Author is a game-authoring prototype designed to support interactive storytelling skills through the use of game technologies. Originally conceived and developed by Dr Judy Robertson and Dr Judy Good with support from Futurelab and graphic artist, Mick Lockwood, the game draws on traditional role-playing techniques, by moving away from first-person-shooter game formats by emphasising character, plot and dialogue. For further details on how the game was developed refer to the Futurelab showcase at www.futurelab.org.uk/showcase/show.htm.

2. AIM OF THE REVIEW

As the focus for first phase of the Adventure Author project was interactivity, character, plot and dialogue the current review provides:

- glossary of key terms
- definition of adventure games
- history of adventure games
- current theoretical debates
- embedding fictional structures within game design
- research on creating believable characters and plots within games
- review of current research on games for learning.

3. WHAT ARE ADVENTURE GAMES?

Generally speaking an adventure game is a software program which presents an artificial environment with which the user must interact in order to solve the problems presented in the game world (Cavallari, Hedberg and Harper 1992). The game world is usually like a story, in which the user plays a character. The player moves through the story solving problems and interacting with other non-player characters (NCPs) and objects in the game world.

Adventure games are often considered as a form of interactive fiction. Interactive fiction (IF), is a broad term, that generally refers to a medium through which you can influence the outcome of a story (eg 'Choose Your Own Adventure' books with their branching stories).

Key characteristics of adventure games:

- Game play is primarily driven by a narrative through which the player moves as the game progresses.
- Other narrative-based art forms are heavily drawn on, such as film, novels and comic books.
- The player generally controls the main character.
- Games are often based around quests or puzzles, which are solved through interaction with the game world and its objects – this is often integral to the game experience.
- Emphasis is on exploration, thought and problem-solving abilities over the fast reflexes of more action-styled games.
- Fundamental elements include:

- **Game rules** – defined by the author, the rules govern the operation and the functioning of objects and characters in the game world. Players may be made aware of the rules prior to the game or have to discover rules through play.
- **Game world** - island, cave system, magic world and their relevant populations.
- **Plot** – usually contains information about what happened prior to the player entering the game world and details of what they should expect in order to archive the goal and complete the game. Typically the plot is full of dangers and can often be non-linear in that there may be several ways to successfully complete the game.
- **Theme** – the underlying moral theme of the game. For example often in adventure games the player's quest involves restoring balance or harmony to the world.
- **Characters** – both player and non-player characters (NCP's) tend to possess certain traits or attributes (magic powers; special features, such as facial scars etc; unique knowledge or history).
- **Objects/items** – have an important role and are usually collected and used by the player to solve problems. Often the player has to have a particular skill or knowledge in order to use them.
- **Text, graphics and sound** – contemporary adventures involve a combination of text, graphics and sound, although this was not always the case.
- **Animation** – adventure games often contain pre-programmed animation sequences which are embedded within the game world (especially characters' movements; properties of objects). They serve to enhance the game play and immerse the player in the story.
- **User interface** – the observable on-screen features which allow the user to communicate in a meaningful way with the computer via the selection of text, graphics, sound and animation.

Depending on the style of gameplay, adventure games can be broadly categorised into text based, graphic and action adventure. The following section discusses each type.

4. HISTORY AND CLASSIFICATION OF ADVENTURE GAMES

An overview of adventures games provides a greater understanding of this particular game genre and the early history of gaming. The following table provides an account of the major advancements in gaming.

Table 1: Chronological overview of adventure games

Period	1976-1984	1984-1987	1987-1993	1993-1997	1997-
Graphics	None	2D	2D	Digitised film	3D
Interaction	Textual	Textual	Menu based	Menu based	Menu based

Note: Table reproduced from web article: Adventure, www.game-research.com/adventure.asp (retrieved 17 January 2004)

4.1 Text-based adventures

The idea of interactive storytelling within games can be traced back to early developments in text adventures such as Adventure (Crowther and Don 1977) and Infocom's Zork trilogy (1981; 1981b; 1982). Both games were decisive in shaping game history, with the Zork series becoming a seminal game hit and the first adventure game where the NCPs had 'personality' traits.

Characteristics of text-based adventures (later called interactive fiction):

- Computer and player interaction driven by language, ie movement and interaction initiated solely by text.
- Early versions (eg Crowther and Don's Adventure) typically used a verb-noun parser to interact with the user. For example, 'release bird' or 'down steps'.
- Later versions (eg Infocom's Zork trilogy 1981; 1981b; 1982) used text parsers, which provided players with richer textual experiences because it understood full sentences and not just simple verb-noun relationships and added humour to the gaming experience. For example, the player might type in "Hit mailbox". To this the game might respond "I've known strange people, but fighting a small mailbox?"
- Plot and character development and the player becoming part of the story central to the experience.

Due to the narrative logic of text adventures they became affiliated to the novel, with Adventure and Zork serving as tools for literary theorists to discuss the relationship between author, text and reader and post-modern interests in reader autonomy. The relationship between literacy and games will be discussed in more detail later.

Other examples of text adventures:

- The Hitchhiker's Guide to the Galaxy, Infocom (Adams and Meretzky 1984)

4.2 Graphic adventures

During the 1980s interactive fiction became more visual. Ron Gilbert a graphic designer working for Lucasfilm Games (now known as LucasArts) made a significant development, by creating a script-writing system SCUMM (Script Creation Utility for Maniac Mansion) and the point-and-click interface. Instead of having to type a command to the syntax analyser, as in the previous text adventure, this system was controlled by means of icons and menu bars. Key to the success of SCUMM was the arrival of the mouse, which further led to textual interaction been replaced by graphical interfaces. With the introduction of SCUMM the days of text adventure games were numbered. LucasArts dominated many of the advances during this period of development and menu-bar systems, which they introduced, still remain an essential part of gameplay. Unfortunately, for a variety of reasons, Infocom, the company who were pivotal to kick-starting game culture, have since closed down.

Characteristics of graphic based adventures:

- Text-based parser replaced with graphical point-and-click interface.
- Computer and player interaction visually triggered via icons representing an object in their inventory, or on a part of the image. This system was used for the first time in the game Maniac Mansion (LucasArts 1987).
- The computer mouse key to navigating the experience.
- Less emphasis on plot development, with smaller scenarios when compared to text adventures. Players' immersion in the game driven by the graphics, when they were first released some fans of text adventures thought the graphics limited their imagination.

Other examples of early graphic games:

- The Monkey Island Series, 1990-2000, LucasArts (Gilbert, Schafer, Grossman and Card)
- The Gabriel Knight Series, 1993-1999, Sierra (Jensen)

4.3 Revival in adventure games

In the early 1990s, interactive fiction made something of a comeback with games such as *Myst*, Cyan (Miller and Miller 1991) in which the players explored a world and solved a variety of puzzles. *Myst* was built using HyperCard with each card consisting of a three-dimensionally rendered scene.

Characteristics of *Myst* and similar games:

- Abandoned cartoon like graphics in favour of detailed graphics and a ultra-real look, which provided users with new levels of immersion.
- Gameplay consisted of a first-person journey through an interactive world.
- Purposefully move away from using graphic accounts of violence and death, with a return to using puzzles to create games that were based on plot and characterisation. For example within *Myst* the player had no enemies and there was no threat of 'dying'.
- Nonlinearity where players take different paths to completing the game is a common part of the playing experience.
- Literary references are used liberally, with the introduction to the game explaining how the player arrived in the world via a 'book' called *Myst*, with the image of the player entering the 'story'.
- Drew heavily on science fiction and the work of authors such as Arthur C. Clarke and Ray Bradbury.

Other examples of games similar to *Myst*:

- *The Labyrinth of Time*, Terra Nova Development (1993), released by The Wyrmskeep Entertainment Co (2004).

4.4 Action-based adventures

Action-adventure games are video games that combine elements of the adventure game genre with various action elements from other game genres.

Characteristics of action-based adventures:

- Marries general qualities of adventure games such as, puzzle-solving, exploration and gathering items with combat or reflex based game play and computer role-playing games.
- Nonlinear game play is common.
- Games are usually played on video game consoles.

Example of action based adventures:

- *The Legend of Zelda* series, 1985-1987, Nintendo (Miyamoto 1985)

Despite the revival in adventure games that *Myst* brought about, advances in graphic design led to the increasing popularity of first person games, where special effects, blood, guts and gore became the flavour of the day. This had an impact on the adventure game genre, leading to action-adventure games, which are the most popular subgenre of adventure games. Their success has also led to further subgenres called survival horror.

Survival horror games are:

- A video game subgenre of action-adventure games or first-person shooters.
- The goal is generally to escape through shooting and puzzle solving in an enclosed, isolated location (eg house or town) that is inhabited by various monsters and zombies.

- Players are typically armed, but not to the same extent as in a shooter game.
- Enclosure and isolation is one of the most recurrent themes within this genre.
- Horror is the defining characteristic of the game and horror film references are used liberally throughout the game.
- Can be difficult to classify as they also marry other styles of game plays such as beat 'em ups; role playing games; first-person shooter and text adventure games.
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Other examples of action-based adventures:

- Alone in the Dark, Lion Gate, (Boll, 2003) www.alone-in-the-dark.com
- The Resident Evil (Biohazard) Series, 1996-current, Capcom (Mikami) www.residentevilfan.com

5. ADVENTURE GAMES TODAY

Despite the seminal contribution of adventure games to the development of game culture, today they are not as commercially successful as in their heyday of the 1980s and early 1990s when several adventure games were published a year. In contrast in the 2000s this has been reduced to one or two a year, with major players in the sector such as Sierra and LucasArt looking to other markets.

The reasons for this decline are difficult to ascertain although advances in computer graphics and 3D modelling, changes in gamers' tastes, motivations and attitudes have all contributed to transformations in game culture. In addition many famous graphic adventure games cannot be run on modern computers because they were built for older models such as the C64 and Amiga. To address this emulators such as the open source project ScummVM¹ have been developed and provide a free engine for some of the LucasArts graphic adventure games to run on modern computers. On the other hand both because text adventure games use simpler formats they can run on most computers and are also suitable for running on hand-held, personal digital assistants (PDAs).

Consequently although traditional adventure games are rare today, action-adventure games, role-playing games (eg The Final Fantasy series, Sakaguchi, www.ffonline.com) and MMORPGs that focus on character and plot, continue their legacy by combining elements of adventure games with other game styles.

In addition since publishing companies have ceased producing as many adventure games, a new form of development has emerged - 'fan adventures'. Fan adventurers are gamers who programme from scratch or use authoring tools². They are keeping the genre alive and reflect the continually evolving nature of game culture.

6. GAMES AS A FORM OF LITERACY

One of the first commentators to theorise game play as a form of literacy was Aarseth (1997). Aarseth analysed games and other software as 'texts' by linking games and interactive fiction to the literary tradition of labyrinthine or ergodic texts. Ergodic texts refer to stories, such as mystery books, that do not have a linear structure, and in which you choose what the character does next. Aarseth specifically drew comparisons between computer games and ancient ergodic texts, such as the I Ching, where meaning is determined by how the reader responds or acts on the interpretations provided in the text. Although Aarseth drew comparisons between games and other literary traditions he was cautious in advocating a

¹ www.scummvm.org

² For examples of game authoring environments refer to: Adventure Game Studio www.adventuregamestudio.co.uk/ Visionaire www.visionaire2d.net/index.php?newlang=english

theory of games that was defined through other narrative traditions and disciplines. Despite his caution, Aarseth's early validation of games as an area of serious academic study paved the way for the theorising of games both as a form of narrative and ludology.

6.1 The nature of narrative

As Lindely (2002) has discussed, although much has been made of the tensions between narrative and gameplay in computer games. The relationship is not straightforward, particularly as the nature of narrative is complex and the term is used in many different ways depending on the context and nature of the research. Broadly speaking narrative theory focuses on how stories are 1) narrated – that is how they are told and the linguistic and representational process that are involved and 2) the narrated events - that is the activity and dimensions of the narrated situation which give rise to the story process. Distinguishing between how the story is told and the events or circumstances which give rise to it enables us to understand certain effects of storytelling, such as temporality, speed and pace. For example, dense description in the narration may equate to slow place of events in the story world. While shallow description may relate to fast events. From this perspective computer games have been described as 'slow' and 'fast' narratives. For example, Cyan's *Myst* (Miller and Miller 1991) is considered a 'slow' narrative because of its descriptive detail. While idSoftwares' *Doom* (www.doom3.com) is considered a 'fast' narrative in that it uses blocky polygonal graphics, attack strategies and fast reflexes.

6.1.1 Different perspectives – Aristotle and the Victorian novel

Extending the idea of narrative within games, the American dramaturgist and computer theorist Brenda Laurel (1991; 1990) proposed a system for generating well-formed plots as defined by the ancient Greek philosopher Aristotle in his *Poetics*. In this system the computer program takes the role of the author. Consequently as the game progresses, any action by the player must be reflected in the system. In this respect the system begins to adapt to the player, increasing the possibility of making an interactive, fictitious world that is co-created by the computer and the player. The interactive drama/storytelling/narrative paradigm advocated by Laurel has been the leading the design of most videogames.

Taking a different starting point Murray (1997) built on Laurel's work by incorporating the qualities of the Victorian novel into gaming. Murray advocated that instead of creating simple story structures of forking paths (yes/no options etc) it is necessary to create more flexible systems, capable of adapting to the actions of the player and ensuring that there are a variety of choices with multiple rather than single or forked narrative paths.

6.2 Ludology - emphasising gameplay

In reaction to Laurel and Murray, Frasca (2000) called for a move away from such approaches to one of exploring video and cybertexts as games in and of themselves. Frasca's original aim was to complement narrative analyses of computer games by better understanding the specifically 'game like' features of games, in other words, understanding what distinguishes games *from* narrative. Frasca defines ludology as including videogame theory but going "beyond it to include all games and forms of play" and stresses that ludology is "the study of games". In sum the ludologist position attempts to move away from the position of Laurel, Murray and others who explore similarities and continuities between so called 'new' and 'old' media by examining games through existing media (theatre, film etc). Instead ludologists aim at examining the game-specific dynamics of games, such as the relationship between rules, strategy and game outcomes (Frasca 2001).

6.3 Contemporary debates

In sum contemporary game theory is in part driven by the debate between ludologist and narratologist. Ludology considers itself as the 'true' approach to game study as it attempts to address the medium on its own merits rather than borrowing extensively from other more established disciplines. On the other hand, narratologists consider video and computer games as part of an extended tradition of how humans use tools to express themselves and tell their stories. From both perspectives interesting work has and continues to emerge.

7. EMBEDDING ELEMENTS OF STORYTELLING WITHIN GAMES

One of our main challenges in working on the Adventure Author project was to explore how we could support young authors to create nonlinear stories with believable and intriguing plotlines and characters. Over the last decade much work has been carried out in this area, with heated debates between narrative and ludologists fuelled by the complexities and interpretations of terms such as narrative and interactivity (for further discussion refer to Aarseth 1994; Smith 2002). To focus our thoughts this review discusses some of the ongoing research in this area drawing on examples of how programmers have drawn on ludology, narrative and cognitive psychological theories to support their thinking and creation of believable plots and characters. Ludologists such as Frasca (2000; 2001) and Juul (2001b) have focused on the difficulties in programming computer generated stories. Juul notes that one of the most commonly used tactics is to code basic knowledge of the needs and interactions of characters and their goals into the program, which they act out in a fictitious world. According to Juul, to make a good story it is necessary for programmers to go beyond such basic character levels and to create situations where both the plot and characters develop and form relationships. Juul believes this can increase the possibilities for creating moments of tension, climax and so forth which are necessary for storytelling. However for a computer to generate such stories it needs to have a sufficient knowledge of the world and some preconceived notions about what kind of story it and the author want to tell. For those working within this area Juul's (2001a; 2001b) research is worth exploring (see links below). Juul also has a forthcoming book on game theory 'Half Real' coming out in the summer of 2005.

Also directly relevant to this area is an existing three year project (2003-06) running at the Institute for Education, Centre for the Study of Children, Youth and Media at the University of London called 'Making Game's (see below link). This project is partly funded by the Department for Trade and Industry (DTI) with the aim of developing a pre-competitive prototype software environment for the authoring of computer games by young people and to research its design, uses and benefits.

Further research links:

- Japers Juul's website: www.jesperjuul.net
- The centre for Computer Games Research, IT University of Copenhagen: game.itu.dk
- Institute for Education, Centre for the Study of Children, Youth and Media at the University of London, 'Making Games' project www.ccsonline.org.uk/mediacentre/Research_Projects/main.html.

7.1 Creating believable characters and plots

To address the complexities of marrying good plot lines and character development within games, designers have most commonly used quests as a means of integrating storytelling elements into games, where the player becomes the protagonist. Over the last few years

Japanese 'communication games' such as Doko Demo Issyo and Nintendo's Animal Forest³, have adapted ideas from Pokemon and Gameboy to create games in which players build relationships with characters. In these games communicative interaction, narrative creation and character development are central to the experience. In such games the idea is to influence and contribute to the unfolding plot. The plot creates the circumstances in which a player must, via the characters, select between different possibilities. These games draw on the traditions within interactive fiction and the symbiotic relationship between plot and character by using different computer modelling approaches to create believable characters.

7.1.1 Narrative approaches

Drawing on the work of narrative theorists, Young (2004) discusses how the challenge for games designers is to operationalise concepts from narrative theory and translate abstract concepts into concrete, formal models capable of being used in the creation of an interactive virtual environment. Riedel and Young (2003) classify work by programmers in this area into three broad categories, those that create author-centric, story-centric and character-centric systems. Author-centred systems model the thought processes of authors. Story-centric systems model structural and grammatical properties of story texts. Character-centric systems model the goals, beliefs, and plans of characters in the story-world with the intention that the story emerges as characters pursue autonomous goals and interact with each other; this is also referred to as emergent narrative.

According to Riedel and Young (2003) one of the main challenges for designers in this area is how to reconcile the trade-offs between plot coherence and character believability.

Further research links:

- Mark Riedel: www.ict.usc.edu/~riedel
- The Liquid Narrative Group at the Department of Computer Science, North Carolina State University: liquidnarrative.csc.ncsu.edu/intro.php
- The Institute of Creative Technologies, University of Southern California: www.ict.usc.edu.

7.1.2 Psychological approaches

Laaksohit, Persson and Palo (2001) developed a character-centric system for their game Katus, which draws on work carried out within cognitive psychology on attribution theory, emotional appraisal and personality traits (refer to Bates, Loyall and Reilly 1992; Roseman, Antoniou and Jose 1996). The aim of Katus was to explore how in using such socio-emotional responsive characters one could push the character-player dyad into situations in which they had to act and react, which in turn they believed could draw the player more into the story. Their game used a set of scenes or situations in a hyper-linked structure, which were not static but depended on the emotional state of the players' co-characters (eg if the character is angry with you they may refuse the player certain actions). What was interesting about their approach is they use predefined sets of statements displayed in a dialogue window, through which the player could interact with the character. Once the player selected a statement, this was sent to an 'emotional reasoner', which was modelled on Roseman et al's work. The 'reasoner' assesses the emotional consequences of the situation, taking into account the character's goals, personality type, motive, consistency and inconsistency and so forth. In relation to this project Laaksohit and colleagues' work highlights how some researchers have attempted to create believable characters within game worlds using cognitive psychological models rather than narrative based theories.

³ www.planetnintendo.com/animalcrossing/games.shtml

8. GAMES FOR LEARNING

Alongside the issues around designing and modelling games from a cultural perspective, some researchers (eg Gee 2003) have discussed the kinds of practices that gaming creates. From this perspective the definition of game play as a new literacy and the use of games as a means of teaching and learning literacy skills have recently been the subject of significant attention by educators (Buckingham and Scanlon 2002; Gee 2003; Prensky 2001). Some commentators argue that games cannot be said to require a specific 'games literacy' (Buckingham 2004) and that the 'critical and creative' aspects of literacy are ignored in many discussions of literacy and games. This debate, however, is located within a wider re-evaluation of the nature and purpose of literacy in contemporary media-rich societies. Kress and Van Leeuwen (2001) for example, argue that being 'literate' means having the ability not only to create and interpret traditional forms of literacy such as reading and writing but also means engaging with multiple representations often at one time (eg websites and games which combine written visual, audio and gestural modes of communication).

Taking a multimodal socio-cultural perspective, Gee (2003) argues that children learn through informal computer games play to participate various 'semiotic domains'. Gee uses the term 'semiotic domain' to mean a set of artefacts that can take on meaning, eg words, gestures or pictures, in specific contexts and communities (for example, the specialist language that develops around DJ-ing and snowboarding). Williamson's (2003) review of Gee's book summarises Gee's key arguments:

"Gee begins by describing games as 'multimodal texts' (texts that mix words and pictures) belonging to distinct 'semiotic domains' that employ a range of strategies contributing to new forms of literacy in which images and words, sounds, music, movement and bodily sensations are factors, and their recognition and production evidence of the learning of these emerging literacies. For Gee, video games are a family of semiotic domains defined by the characteristics of specific genres such as first-person shooters, fantasy role-playing games, real-time strategy games and so on, although these generic domains overlap just as they might in certain branches of science. Such domains are also, Gee points out, far from static objects defined only by their content, but rather they are predicated on lived, historically changing sets of distinctive social practices in which content is continually renegotiated and transformed." (Williamson 2003)

Central to Gee's position is that semiotic domains are shared by groups of people, described as 'affinity groups', (similar to Lave and Wenger's (1991) concept of 'communities of practice') in which participants share knowledge, skills, tools and resources to form complex systems of interrelated parts. Within an affinity group, learners gain resources from fellow members that equip them to solve problems within, and perhaps outside of, the specific domain. For Gee, however the crucial aspect of this practice is 'critical learning': "The learner needs to learn not only how to understand and produce meanings in a particular semiotic domain that are recognisable to those affiliated with the domain, but, in addition, how to think about the domain at a 'meta' level... (and) how to produce meanings that, while recognisable, are seen as somehow novel or unpredictable." (Gee 2003, p23). From this perspective players must understand what they are doing and develop their comprehension of both a game's 'internal design grammar', and the ways in which its content is presented, and its "external design practices that determine the principles and patterns through which members of the domain recognise all the activities and practices which comprise it". According to Gee such systemic thinking allows players to think about and critique games as systems and designed spaces rather than simply moment-by-moment playable environments. However, as Williamson (2003) notes such critical thinking is not only absent in many schooling practices, but goes unnoticed in much appreciation of what games can offer in terms of learning.

Further research links:

- Professor James Gee: www.soemadison.wisc.edu/edpsych/facstaff/gee.htm
- Mark Prensky: www.marcprensky.com/default.asp

8.1 Skills and competencies

In attempting to ascertain the 'nuts and bolts' of what games can offer for learning two recent reviews (Kirriemuir and McFarlane 2004; Mitchell and Savill-Smith 2004) have attempted to summarise the work that has been conducted within the area over the last few years. Kirriemuir and McFarlane (2004) provide a digestible overview on the area noting that the majority of work has been mainly concerned with the development of related competences and literacies during game play, and the role of games in the formation of learning communities either while gaming or related to game play. While Mitchell and Savill-Smith (2004) go into more depth, focusing on eleven reviews that have examined the educational benefits of games. They noted that the inconsistency between studies in the area is due to the variation in researchers' theoretical orientation; methodological practices; sample sizes and age ranges; participants' prior experiences; subject and domain area; context; content and design. For example Randel, Morris, Wetzel and Whitehill (1992) were among the earliest to highlight the potential for computer games to support students who lack the motivation to learn. They also found that the success of games for learning depended on the subject areas where the games were used. From their overview of early studies (up to 1991) they noted that the best results were found to be in the areas of maths, physics and language arts (as opposed to social studies, biology and logic). Randel and colleagues concluded that the beneficial effects of gaming were most likely to be found when specific content was targeted and objectives precisely defined. Drawing on a different body of work Dempsey, Rasmussen and Lucassen (1994) in their review found games can potentially facilitate a range of different learning styles such as tutoring, practice and self-directed learning. Importantly they found that games can support these modes of learning in an entertaining way, which can lead the learner to change their attitude about a particular subject.

Many researchers have also noted the logical thinking, social and computer literate skills that game playing can support. For example Higgins (2000) found that games via their trial and-error approach to overcoming challenges or obstacles can support logical thinking. Much of this research has focused on 'strategy or adventure games', which encourage students in exploratory quest-like scenarios with a high degree of control over their progress (Malone and Lepper 1987; Russell 1990). While McFarlane, Sparrowhawk and Heald (2002) found that teachers and parents recognised that games play can support valuable skill development such as strategic thinking, planning, communication, application of number, negotiation skills, data-handling and group decision skills. Mackereth (1998) has discussed how playing computer games supports multi-media competences and confidence in using professional software packages. While the social skills that games facilitated has been discussed by Greenfield (1994); Fomme (2003) and Tobin (1998); these researchers have observed how game playing (e.g., within arcades and online) is embedded within complex social interactions.

Contrary to those who have found a positive relationship between games and learning, Emes (1997) and Harris (2001) found no clear causal relationship between academic performance and the use of computer games. However, as Mitchell and Savill-Smith (2004) note, it is difficult to compare Emes and Harris' study with for example Dempsey' and colleagues' work. Dempsey had included 94 studies in their review, while Emes only three and Harris only two, consequently due to the differences in samples sizes it is difficult to make any final conclusions. While recent studies at Futurelab (refer to Astroversity, www.futurelab.org.uk/showcase/show.htm) have raised some questions as to whether children are in fact able to move from intuitive problem solving in the game to an understanding of effective processes for identifying problems and generating hypotheses and solutions in other contexts.

More recently there have been major surveys carried out with UK teachers who had or would consider using games with their classrooms (Kirriemuir 2002; McFarlane et al 2002). The results from these studies highlight that the most frequently perceived or actual obstacles in using games within classrooms contexts were:

1. Lack of relevance of gaming playing to the curriculum and assessment.
2. Difficulty in persuading other school stakeholders (governing bodies; parents etc) as to the potential/actual educational benefits of computer game.
3. Lack of time available to teachers to familiarise themselves with the game and produce appropriate teaching methods.
4. Irrelevant content or functionality in a game, which could not be removed or ignored, thus wasting valuable lesson time.
5. Effort and time it takes to keep pupils on track when playing games.

This body of work suggests a growing consensus that games can provide motivating experiences through which particular cognitive and social skills can be supported. In attempting to ascertain why games are so compulsively motivating and fun environments many researchers (Malone 1981; Amory et al 1988; MacFarlane 2002) believe that their appeal lies in the merging of fantasy, challenge and curiosity. This balance is crucial to successful game experiences and amidst the work been carried out on learning it is important that these dimensions are not forgotten.

Further research links:

- eLearning Centre, Games research library: www.e-learningcentre.co.uk/eclipse/Resources/games.htm

9. SUMMARY AND MAIN CONCLUSIONS

Despite the amount of work that has been carried out on the use of games for learning, the current curriculum structure within the UK does not easily support their application within classroom contexts. In addition it is only relatively recently that concerted effort linking educational research with mainstream computer games technologies has emerged (notwithstanding earlier research into games designed specifically and from scratch for educational purposes). In this respect the area is still in its infancy and for these reasons the Adventure Author project provides the opportunity to explore relevant issues within this area. In addition much of the work carried out on the use of games within learning has focused on the decision making, reflex skills and communities of learners that they can support. Although there has been much theoretical debate about games as a form of literacy there remains a dearth of games that are specifically designed to support particular literacy and particular storytelling skills.

10. POINTS TO CONSIDER WHEN DESIGNING GAME AUTHORIZING TOOLS FOR THE DEVELOPMENT OF STORYTELLING

- **Position your work:**
 - What do you think are the important aspects of gaming? Would you consider yourself more a narrative than a ludologic theorist?Thinking about where you position your work will help you structure the experience you are trying to achieve.
- **Establish your storytelling goal:**
 - What kind of story do you want the game to support?
 - Do you want authors to work within a particular story genre?Your story domain and genre is important to plan prior to your build as it will help you make decisions about what kinds of affordances you will create within the programme.

- **Where is the story set (eg house, forest, sea)?**

Your genre and story setting will also dictate the graphic look and feel of the game. It is extremely important in gaming that the front end design complements the storyline.

- **Establish your target group:**

- What age ranges are you interested in supporting?
 - Are you aware of the needs of the age range and what they find difficult about storytelling?
 - Have you involved the target age group in the development process?

Within games research and development there is still a lack of user-informed centred design, where the end users are engaged within the design process.

- **Establish your learning goals:**

- What particular aspects of storytelling do you want to support – do you want to focus on how to make good characters; develop plotlines; create nonlinear stories; develop good scenes?

Establishing clear learning goals prior to building your programme will help you decide which aspects of storytelling you want to focus on and support. This will help you make good programming decisions. For example draw on exiting approaches and research on supporting young people's reading and writing skills. Such research can provide insight in how to structure the learning experience and achieve your goals

- **Establish the game world interactions:**

- How do you want the players to be able to interact with the world? For example:
 - How big is the game world and will players have a map of the world?
 - How do players interact with each other, NCPs and objects?
 - Are interactions indicated by texts and graphics?
 - If you are using text based interaction how are you structuring such interactions?

Again draw on examples from other genres and domains to provide you with support in thinking through how players interact within their game world. It is essential that a map of the world is provided as this not only allows authors to easily locate their scenes and plot how characters navigate the world but also provides them with other sources of inspiration.

- **Create good plotlines:**

- Within the authoring tool it is necessary to think about how you are going to support authors to map multiple choice, storylines and how you are going to support them in creating 'dramatic' moments in the story.

One solution would be to create a basic interface which allows authors to link scenes together and which graphically represents moments of tension and conflict within the game.

- **Create believable characters:**

The following are a series of constructive hooks that are worth thinking about embedding with game authoring tools, as they provide ways for young authors to think more meaningfully about their characters:

- Emotional attributes – provide authors with the possibility to select their characters' emotional traits. Bear in mind you will also need to ensure that the graphics are of sufficiently high standard to reflection individual character emotional states.
- Appearance of the character - eg if the character is 'good' it has to look good; if it is 'evil' it has to look evil. Provide authors with appropriate tools to select their character profiles. Clothes, accessories, unusual facial or bodily scars are visual hooks, which can provide young authors with the tools to think more deeply about their characters.
- Relationships – the characters relationship to their environment and other is what drives a story, providing cues through which the authors can think about their characters relationships to their environs is important (eg embed particular questions about relationships within the authoring tool).

11. GLOSSARY OF KEY TERMS

Action games: Video games that combine elements of the adventure game genre with various action elements from other game genres.

Adventure games: Computer games where the user must interact in order to solve the problems presented in the game world.

Ergodic texts: Non-linear stories, where the reader chooses what to do next.

Graphic Adventures: Adventure games that use a graphical point-and-click interface.

Interactive fiction: Generally non-linear narratives where the player influences the outcome of the story. Adventure games are a specialised form of interactive fiction.

MMORPGs: Massively Multiplayer Online Role Playing Games.

Narrative: The structure of how stories are told and the linguistic and representational process involved.

NCPs: Non-character players in the game world.

Role-playing games (RPGs): Computer games where you assume the life of your character (avatar).

Survival horror: A video game subgenre of action-adventure games or first-person shooters that draws on horror films.

Text adventures: Computer games where the interaction is initiated solely by text.

12. EXTERNAL LINKS

Games research centres:

Centre for Computer Games Research IT University of Copenhagen, Denmark: game.itu.dk

Sony Computer Entertainment US Research and Development: research.scea.com

Games Lab, New Zealand: www.gameslab.co.nz

International Centre for Computer Games and Virtual Entertainment, Dundee, Scotland: www.iccave.com

Centre for Learning Games, Denmark: www.lld.dk/consortia/learninggames/en

General games research links:

Games Research: www.game-research.com

Digital Games Research Association (DIGRA): www.digra.org

Digiplay Initiative, Research into Games and the Industry they are part of: www.digiplay.org.uk/books.php

General games development resources:

Special Interest Group in Computer Graphics (SIGGRAPH): www.siggraph.org

Journal of Game Development: www.jogd.com

Games Developer Conference: www.gdconf.com

International Games Developers Association: www.igda.org

Industry Calendar of Events: www.gignews.com/gamecalendar.htm

Adventure gamer publishers/makers:

Colossal Cave Adventure: www.rickadams.org/adventure

Sierra's website: www.sierra.com

A site on Infocom: infodoc.plover.net

LucasArts site: www.lucasarts.com

Cyan's site: www.cyan.com

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