What do computer games have to do with Libraries and learning? How to engage and connect learners of different age groups and with different interests using computer games as the vehicle for learning.

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Two teachers have undertaken a project in which year five and six students design computer games and year ten to twelve students build them. The younger students are taught basic flow diagram techniques and thus patterns of logic. They then select a topic of personal interest for their game design. The game is in the form of a quest for the player and must contain material that has been researched using Library resources. The complete, fully documented game designs are passed to the senior Information Technology students who produce them. All students are fully and formally accredited for their work.

Introduction

Games have been played for as long as human kind has existed and have been used in educational settings for many years as a means of engaging students with learning. In the latter half of the 20th century computer games began to appear in the public arena at a time when advances in technology saw the advent of the microchip, and the subsequent emergence of the personal computer onto the world market. Since then computer programmers have progressed from being generic programmers to working in specialized areas of programming, one of which is gaming.

"Since the invention of computers, computer games have been a popular form of entertainment. Children and adults have enjoyed playing computer games and do so now on a massive scale" (Denny). Players have continued to develop skills at playing games in line with the increasing complexity and sophistication of each new generation of games. There are now programs, both commercially produced and open source, available that help people to make their own games without the need to learn programming languages

The notion that children can create their own computer games has been the driving force behind the project described in this paper, however commercial or freely available games development software is not a factor in the project.

The Origins of the Computer Games Project

In March 2006 the author and a colleague, an Information Technology teacher, were delegates at the annual Education.au Conference in Adelaide, South Australia. The

Conference topic was *Delivering 21ˢᵗ Century Tools, Learning and Skills*. Marc Prensky, an advocate for greater and more innovative use of technology in education as a means of engaging students, delivered the keynote address. On a number of occasions throughout his speech and in subsequent addresses from other speakers the idea of students being involved in the design of games for learning was advocated.

On return to school the following week work began on an experimental, co-operative project between year five and six students during their Library lesson time and the year eleven and twelve students studying a range of Information Technology subjects. There was very little structure to the project as it was felt that the teachers would first need to determine firstly, whether such a project would raise enthusiasm amongst the students and secondly, whether it would have a chance of succeeding. The younger students were given the freedom to design in whatever way they chose and the older students were left to interpret those designs.

During their Library class time year five and six students were working on a range of self-paced online Information Literacy projects. The theme for the game was based on one of these projects, this being about the dangers of smoking at a young age. Once completed, the ideas and designs for the games were passed on to the year eleven and twelve students. Formal assessment for these students, all of whom were studying for the Victorian Certificate of Education (VCE), allows for the development of computer games using a variety of programming languages. Three games were completed and these are now available for anybody within the College community to play.

The students involved in the project were pleased with the outcome of this pilot program so it was decided that in 2007 the entire process would be formalised.

The second version of the Games Project incorporates opportunity for deep and meaningful learning which occurs when younger students work through the various stages of the design process, and when the older students interpret and develop the game designs in accordance with the original concepts of the younger students.

At the time of writing this paper, version two of the Computer Games Project is still a work in progress but favourable outcomes are predicted on the basis of the results obtained from version one.

The following paper unwraps all the theories, philosophies, externally imposed constraints and the practice of the Computer Games Project.

The Psychology of Games and Games for Learning

Why People Like to Play Games

From early childhood we begin playing simple games with our parents then move on to explore on our own through play. Later we join with others in the schoolyard, and so it continues. Psychologists have worked on unmasking our innate urge to do this and have arrived at a set of reasons as to why game playing is important to the overall development and well being of the individual as well as to the group.

Anders Hejdenberg is a world-renowned video-games producer with titles such as Clans, Battlefield and Futurama to his credit. He has written a paper entitled The psychology

of games in which he draws upon the works of theorists and researchers such as Maslow, Csikszentmihályi, Caillois and others to explain why games are so appealing. In summary of his paper, games give us pleasure and feeling pleasure is the physical response to a natural release of dopamine into the brain. It is a reward mechanism for engaging in pleasurable behaviours. Our brains like the response to this chemical stimulus and look for ways to get more. This response is thought to have "come about in evolution because it helped promote survival and reproduction." (Gray, 1997, p.204). For most of us today the need for pleasure in order to survive is unimportant for our existence but the brain continues to work the way evolution designed it and so we continue to seek pleasure.

Maslow's Theory of Human Motivation, which includes his hypothesis on the hierarchy of human needs, ranks these needs from basic to complex. Our basic needs are physiological needs such as food, shelter and comfort whilst our highest order needs are those associated with personal fulfilment such as self-esteem and self-actualisation. Pleasure and excitement are higher order needs and "the ultimate goal for all our activities is to get pleasure and/or avoid pain." (Hejdenberg, 2005). Maslow hypothesises that once our lower level physical and social need are met our minds and bodies are free to seek out the higher-order, intellectual needs. The means of finding gratification vary between individuals but given that humans are social animals, game playing with other individuals, either real or imagined, is a means of satisfying higher order needs that elicit a pleasurable response. You only live twice, (ABC, 2007)1. a report about the online game/world Second Life, which was broadcast on Australian television in March 2007, exposed the extent to which people will go to seek pleasure and the amount of money they will spend to acquire it, even if that pleasure is only imaginary.

In 1958 Roger Caillois discussed, in Les Juex et les Homes (Man. Play and Games), his observations of game playing and the kinds of experiences that occurred through play. Competition, chance, vertigo (an altered state of mind) and make-believe can all be pleasurable experiences, or indeed, the expectation of these experiences can result in pleasure.

A contemporary psychologist, Mihaly Csíkszentmihályi, currently Director of Quality of Life Research Center, Drucker School, Claremont Graduate University, California "noted for his work in the study of happiness, creativity, subjective well-being, and fun, but…best known as the architect of the notion of flow" (Wikipedia, 2007) or the state of complete involvement in an activity to the exclusion of all else, has identified eight reasons why well-designed (computer) games are so engaging for players. They provide challenges that require skill, they require high levels of concentration free from distractions, they provide deep involvement that removes players from their normal plane of existence, the need to be self absorbed by everyday events is set aside, perception of time is altered, there are clear goals to attain, a degree of control can be applied to a given situation and players receive continuous feedback about their performance.

Why Games are an Effective Teaching Tool

Deep and meaningful learning takes place when students are engaged in a task and games that are well designed can meaningfully engage. Csíkszentmihályi's work substantiates this statement, as do childrens' attitudes and responses to computer games. It is often difficult to extract a young player from the grip of an exciting game, even for seemingly necessary comfort breaks such as food and toilet breaks.

In the past computer games tended to be isolating as they could be played by only one person at a time but access to fast internet services has altered the landscape of computer game-playing dramatically. Games are now shared, social, interactive experiences, albeit in virtual worlds, where avatars replace real-life players and reality can be suspended.

Our young people are experienced participants in these environments. They know the rules and social mores of "the game", they are adept at navigation and they are completely aware that they can be held in thrall for extended periods of real time by these virtual worlds. They are also well aware of the differences between their real world and the games world. Because they are already receptive to the notion that games are almost always pleasurable, positive experiences, young people readily accept that games can play a legitimate role in their learning, provided that the learning games are "fun".

If we look further into Maslow's Hierarchy of Needs we discover that all but the most basic of needs can be addressed through game play. Games are usually social, cooperative experiences that can mirror real-life situations in a safe and non-threatening way because they have clearly defined rules. These things satisfy the middle order needs of comfort, safety and social interaction. Learning involves the higher order needs of self-esteem and fulfilment and well-designed games can satisfy those needs.

Engagement is an active word and learning happens through active participation. The games that young people choose to play away from school allow them to encounter, explore, challenge, master, build, perform, research, lead, amass and cooperate. A natural consequence then is that there is an expectation by young people that learning will also give them these pleasurable experiences. If the school environment does not provide them, students will simply switch off and not learn the things they need for survival and success in the 21st century.

Marc Prensky, an international consultant, futurist and games designer for education and learning, is an advocate for educational computer games as a means of engaging students for deep and effective learning. He has identified a range of techniques that video game designers use that relate to learning.

- Designers encourage players to try new things, persevere, take risks and practice.
- Designers build games that automatically adjust to a player's skill, keeping them at the leading edge of their capabilities, and providing rewards at appropriate times.
- Designers build games that allow psychological interplay between the real self and the self as player. This can affect real-life self-esteem.
- Some games can be used to try things, form new belief systems, test hypotheses and revise results. These are the techniques used by scientists in their everyday work.
- Well-designed games allow players to be active learners without realizing that they are learning. (Prensky, 2003, p.8)

When players play video games Prensky (2002, p.2) suggests that five different types of learning occur:

- How – is the acquisition of knowledge and skills needed to deal with any given situation.

- What – is learning about the rules, environments and codes of a game or situation
- Why – is learning the strategies that evolve from the rules
- Where – is where players learn to place themselves in a context, where knowledge of the culture of a situation is required in order to modify strategies and behaviours to find reward.
- When / Whether – is the ability to make decisions and moral / value judgements.

Computer games which have become popular world-wide have done so because they carry behind them not only programming and multimedia expertise that gives us ever more life-like media, but also have the research skills of psychologists and social engineers who delve into the heart of the human psyche in order to exploit it for commercial gain. Whilst the same could be said for producers of educational games, the purpose is at least somewhat more altruistic.

Students Designing Games for Themselves

When students are presented with an opportunity to develop their own computer games they simply jump at the chance. Their minds begin to work overtime and they talk excitedly without drawing breath. The ideas leap from them, one after the other. Just knowing that their thoughts and ideas may eventually become a reality and that their peers will see the results engages them in the task immediately. There is a purpose for doing.

Once students are briefed as to how they are to proceed and guidelines for the task are set out the erratic ideas are quickly replaced by questions that need answers; and so begins the learning journey for the young games architect. "As students design and create their own games they build higher-order thinking skills, learn how to think logically, develop skills in breaking problems down, become more engaged in the learning process and develop a deeper understanding of the subject matter." (Denny)

Young people are highly imaginative and if imagination is given free reign then many things become possible. The freedom to respond creatively gives young people the permission they need to feel excited about learning and this becomes even more powerful if this permission is extended to exploring the things they can easily relate to. There is motivation for doing.

Learning is more effective when it is active. Building computer games requires interaction within a team whose members must discuss, debate, decide, plan, rethink, research, write, rewrite, draw, communicate and interpret. This interaction happens readily when there is engagement. Projects become personal missions and successfully completed work is viewed with pride. There is a sense of ownership.

Purpose, motivation and ownership are effective drivers for learning but all learning happens within a social context where there are rules, both written and unwritten. Most education occurs within a set of guidelines and in Victoria, Australia there are two sets of rules to follow.

Systemic Rules and Regulations

Victorian Curriculum and Assessment Authority

The VCAA (Australia) is the statutory authority responsible to the Victorian State Minister for Education and Training. It develops curriculum for all Victorian schools, government and non-government. The VCAA Board assesses student learning, monitors student achievement and conducts educational research.

Each school is responsible for developing its own curriculum within frameworks that have been established by the VCAA in order to meet the needs of its own community. The frameworks governing teaching and learning at years eleven and twelve are the VCE (Victorian Certificate of Education) and VCAL (Victorian Certificate of Applied Learning). For years Prep to ten, the VELS (Victorian Essential Learning Standards) and the CSF (Curriculum Standards Framework) combined form the basis of teaching and learning programs.

Victorian Essential Learning Standards

The VELS is a highly complex curriculum framework that incorporates a number of psychological and pedagogical theories into its corpus. It is the result of many years of educational research and aims to bring to students a sense of themselves as being adaptable, lifelong learners in a rapidly changing world.

The Victorian Essential Learning Standards identify three core and interrelated strands for the Prep to Year ten curriculum. Each strand has a number of domains which describe the essential knowledge, skills and behaviours students need to prepare for further education, work and life. The domains include the standards, organised by dimension, by which student achievement and progress is measured. (VELS in VCAA, 2007).

The breakdown of the VELS structure can be seen in Table 1.

Table 1. The VELS structure

Strand	Domain	Dimension
Physical, Personal and Social Learning	Health and Physical Education	• Movement and physical activity • Health knowledge and promotion
	Interpersonal Development	• Building social relationships • Working in teams
	Personal Learning	• The individual learner • Managing personal learning
	Civics and Citizenship	• Civics knowledge and understanding • Community engagement
Discipline-based Learning	The Arts	• Creating and making • Exploring and responding
	English	• Reading • Writing • Speaking and listening
	The Humanities	
	Economics	• Economics knowledge and understanding • Economics reasoning and interpretation
	Geography	• Geographical knowledge and understanding • Geospatial skills
	History	• Historical knowledge and understanding

		• Historical reasoning and interpretation
	Languages Other Than English (LOTE)	• Communicating in a language other than English • Intercultural knowledge and language awareness
	Mathematics	• Number • Space • Measurement, chance and data • Structure • Working mathematically
	Science	• Science knowledge and understanding • Science at work
Interdisciplinary Learning	Communication	• Listening, viewing and responding • Presenting
	Design, Creativity and Technology	• Investigating and designing • Producing • Analysing and evaluating
	Information and Communications Technology (ICT)	• ICT for visualising thinking • ICT for creating • ICT for communicating
	Thinking Processes	• Reasoning, processing and inquiry • Creativity • Reflection, evaluation and metacognition

VELS recognise that students learn gradually and so have set benchmarks called Standards that students would ordinarily attain throughout their primary and lower secondary schooling. This paper deals with primary-aged students who are working at Standard Level 4 (years five and six) where children, who are on the verge of becoming young adolescents, are beginning to build breadth and depth in their learning. Some "key characteristics of students at this level include:

- assuming leadership responsibilities
- developing self-efficacy skills
- specialising and differentiating between domains
- managing new situations and solving problems
- learning deeply through extended projects to build flexible thinking and learning strategies
- exploring concepts that allow for several points of view
- demonstrating a preference for more specialised intelligences." (VELS in VCAA, 2007).

The Computer Games Project fits into the Interdisciplinary Learning Strand and utilizes all aspects of the Domains and Dimensions within that strand.

Assessment for the VELS follows a set of ten principles, which as summarised below.
1. The primary purpose of assessment is to improve student performance.
2. Assessment should be based on an understanding of how students learn.
3. Assessment should be an integral component of course design and not something to add afterwards.
4. Good assessment provides useful information to report credibly to parents on student achievement.
5. Good assessment requires clarity of purpose, goals, standards and criteria.

6. Good assessment requires a variety of measures.
7. Assessment methods used should be valid, reliable and consistent.
8. Assessment requires attention to outcomes and processes.
9. Assessment works best when it is ongoing rather than episodic.
10. Assessment for improved performance involves feedback and reflection. (VELS in VCAA, 2007)

Victorian Certificate of Education

The VCE is "the certificate that recognises the successful completion of…secondary education" (VCAA, 2007). There are four stages of completion for each VCE study, namely Units 1, 2, for year eleven and Units 3 and 4, for year twelve.

VCE VET (Vocational Education Training) is a VCE program that "combines general VCE studies with vocational training and experience in the workplace."(ibid). ELTHAM College of Education offers VCE studies in both of these streams of senior schooling.

Coursework for VCE and VCE VET is prescribed by the VCAA and teachers must adhere to the Study Design for each subject unit taught. A Study Design is the document to which teachers refer when planning their coursework. Within each Study Design there is extensive explanation of assessment procedures and detailed description for each learning outcome that students are expected to satisfy. This includes key knowledge and key skills that must be utilised by each student during the execution of his or her work. Study Designs allow for flexibility in the way teachers construct their coursework as conditions for teaching and student preparedness and ability vary widely throughout the State of Victoria and indeed, within each school.

Assessment for VCE and VCE VET is carried out through a series of school-based tasks, prescribed by VCAA and set locally by the classroom teacher and external examinations set by the VCAA Board's Assessment Branch.

VCE Information Technology. Two streams are offered in VCE VET Information Technology. These are IT Applications and Software Development. Within both of these streams there is scope for the inclusion of games development.
- Applications - IT Techniques: Computer games are specifically mentioned in the Study Design as one of the topics that could be pursued by a student for the successful completion of this task. Students must make a transformation from a design on paper to a finished electronic product.
- Applications - ICT Issues: Games and entertainment are stated in the Study Design as being possible areas of investigation whereby students must discuss social issues associated with the playing of computer games or other aspects of electronic entertainment

Assessment for IT Techniques and ICT Issues consists of a combination of four different tasks which include ICT use, written work (e.g. essay) and oral and visual reports. An exam is sat at the end of the unit.
- Software Development – Programming has an allowance for electronic games creation in its Study Design. The student must use at least two different programming tools in order to satisfy the subject requirements.

Assessment for Software Development – Programming includes proficient use of ICTs, written, oral and visual reports, a folio showing development of the final product, electronic journal entries (e.g. blog)used throughout the development of the product and an exam.

VCE VET Information Technology. Three streams are offered in VCE VET Information Technology, namely General, Software Applications and Network Administration. Assessment for all streams consists of three coursework tasks, worth sixty-six percent of the overall Study Score and an end of year examination, which is worth thirty-four percent of the overall study. There is latitude in the General and Software Applications streams for computer game design through units entailing product design.

At the School Level

The Knowledge Era Organisation

Organisations and working life in the early 21st Century are changing from the familiar industrial models of the past two hundred years to a new paradigm known as the Knowledge Era in which "we have self-organizing teams that pattern themselves to both deliver on concrete opportunities and to also capture and reinvest their learning in the organizations future success…some hierarchy still exists, but it functions qualitatively differently." (KEE International, 2006). The key attributes of a Knowledge Era organisation and its workers can be summarised in Table 2. (Eunson, 2002).

Table 2. Knowledge Era attributes.

Organisation	Individual
The organisation is a learning and self-organising enterprise.	• Qualitative and quantitative research skills • Self-management -(time management, stress management. • Applied history - leadership, administration and organisations throughout history. • Leadership, management and organisation theory and skills
The organisation values emotional intelligence	• Interpersonal and team skills • Decision-making and problem-solving • Negotiation, influencing and conflict resolution
The organisation is innovative	• Applied philosophy -logic, ethics.
The organisation uses technology to advance its cause	• Software tools -Microsoft Office Users Certificate, certification in non-Microsoft Office packages, such as Corel, Lotus, Star and Open Offices; Microsoft Certified Systems Engineer, Apple, Linux operating system certificates; Cisco networking certification; Macromedia certification in website design and construction, online learning technologies • E-commerce skills
The organisation values the collective knowledge of its personnel	• Conventional qualifications • Project management. • Composition, writing and editing skills.
The organisation manages and creates knowledge to advance its cause	• Knowledge management

Modern education is about preparing young people for life. The school curriculum for the past one hundred and fifty years has been geared towards a working life based on the

Industrial model where much of the focus still remains. There is however a gradual shift towards a more flexible style of education that aims to prepare young people for their world of work; a world that is going to be very different from that of the preceding generations.

Knowledge Era Schooling

How we educate our young people for this new paradigm has been the subject of enquiry and research for many educators over the last decade or more. The VELS, Victoria's systemic response to the need for change has as its core values "social competence, the ability to work in a team, conflict resolution, understanding of other cultures, integrated thinking and the capacity to handle the uncertainty and paradoxes of the second modernity" (Beck cited in Caldwell, 2000). The VCE does not yet fully address many of those educational and social issues because it must comply with requirements directly imposed upon it by VTAC (Victorian Tertiary Admissions Centre) for entry to higher educational institutions such as Universities and TAFEs (Technical and Further Education).

ELTHAM College of Education is a non-selective co-educational, independent, K-12 school in suburban Melbourne, Australia. Its enrolment comprises local students as well as students from overseas. It is a leader in Knowledge Era education; having employed teaching and learning partnerships in the style of the VELS statement for some years before the document became enacted in Victoria.

Many parents who choose to send their children to ELTHAM do so because of the attention paid to the individual. In terms of a Knowledge Era future, the individual is seen as an important factor within an organisation's assets. Care for and nurture of the individual is enshrined in the school's mission statement, which states that teachers "…release and enhance the talents of the individual". This statement is underpinned by a number of values and sentiments to which the school subscribes and which are shared by any Knowledge Era organisation. A summary of ELTHAM's core values is given below. These compare favourably with the organisational attributes shown in *Table 2*.

- Individuals striving for academic, vocational, personal and emotional quality and excellence.
- Through sharing leadership and by working together, young and adult people negotiate, share knowledge and skills and make decisions to achieve common goals. Through negotiation young people and adults can also solve life's problems with confidence.
- Through teaching for self-directed learning young people can develop the disposition and skills to be multifaceted, life-long learners who have a sense of excitement in learning.
- Developing self-management skills so that individuals can manage life and work; living and working in different cultures of diversity and change.
- Learning to think creatively and developing the confidence to take on new ideas and experiences.
- Through collaboration and respect young and adult people can share each other's skills and knowledge to create new learning opportunities.
- With freedom comes responsibility but community partners need to build a trust of each other.
- Co-education creates equal opportunities for both genders. It recognises individual success.

- By promoting personal integrity and proactive behaviour for the protection of our social and physical environments we can learn to care for our world and create a sustainable future. This can be achieved effectively through social networking of community partners.

Constructivist Principles of Teaching and Learning are at the centre of Knowledge Era schooling and the VELS. The five principles which Constructivist teachers follow are: valuing the individual's point of view, challenging students' points of view, posing problems that are relevant to the learners, constructing learning around "big picture" concepts and assessing students in the context of daily learning. (Brooks & Brooks, 1999).

Following these principles and embracing the other values and characteristics of Knowledge Era teaching and learning requires teachers to be facilitators of learning rather than the fonts of knowledge that the Industrial model had created for the past. Not only should students "become engaged and interactive within a task where knowledge is created and applied" (Churchill, 2006), they demand to be challenged and excited. Students want learning to be "fun". In an era where the ego rules and where young people are accosted by sound and image throughout their daily lives and where skilled advertisers appeal to their senses and emotions in every conceivable way, finding a means of exciting and enthusing them for learning has become an art form for educators. The Computer Games project is an example of how a student-centred task can be motivating, engaging ("fun"), challenging, provide an opportunity for deep learning and the learning of new skills, allow for transfer of knowledge and skills to new situations, teach students to respect another point of view through working in partnership with others, and a give a sense of ownership for learning to the individual. (Kuhlthau & Todd, 2007).

The Library's Role in Teaching and Learning

"The ability to process and use information effectively…is… the basic survival skill for those who wish to be successful members of the 21st century" (Curriculum Corporation, 2001) is a key Knowledge Era statement but was written by librarians and teacher-librarians before Knowledge Era became a popular catchphrase. Librarians were and still are the original knowledge managers, "the ultimate search engine" (ASLA, 2006) and their work-skills have, by necessity, been ahead of the pack with respect to using, managing and transferring knowledge. A librarian is also a "classification specialist, a metadata specialist, an information navigator, a technical expert, Intellectual Property/digital rights adviser, e-services provider and information literacy expert" (Hill, Lucy, 2006). A teacher librarian has a somewhat greater role to play in the teaching and learning continuum. A teacher librarian has the combined skills, training and experience of a classroom practitioner and of a Librarian.

The VELS places a high level of importance on student enquiry also known as resource based learning. It demands that the student be the active party in seeking information for a purpose. Most young people are born with an innate sense of curiosity but need to develop habits of learning that aid the getting of true understanding. Teachers are skilled at guiding students through learning pathways and Librarians, the knowledge masters, are skilled at being able to pinpoint information pathways. A Teacher Librarian has the knowledge and skills to match a learning pathway with an information need and to intervene at just the right time so that students are able to transformation information into knowledge and thus achieve deep learning. Carol Kuhlthau has called this the "zone of Intervention" and

defines it as "that area in which a student can do with advice and assistance what he or she cannot do alone or can only do with great difficulty." (Kuhlthau & Todd, 2007).

Literacy

In order to understand information and turn it into knowledge, information "must be codified, that is, translated into symbols which other people can understand." (van Ewyk, 1998). This is at the heart of all human communication and in today's multimedia environment it is especially important that young people are taught to be critical of all the messages they receive, irrespective of the form in which these messages arrive. They need to learn to "resist manipulation and find alternatives to the explanations given by the media…(and be)… aware of biases imbedded in texts and imagery…(so they)…can sort out truths from half-truths, accuracies from inaccuracies, fact from fiction, and reality from myth." (Blaum, 2001). We are taught to believe that everything we see with our eyes is true but the digital age has changed this forever.

At a March 2007, SLAV (School Library Association of Victoria) conference in Melbourne entitled *Inquiring minds. Approaches to the VELS*, keynote speaker Dr Ross Todd made a bold pronouncement that the Big 6, is dead for Victorian teacher-librarians because specific teaching of the familiar Information Literacy models based on Big 6 principles was no longer necessary under the much broader, all encompassing VELS model. VELS recognises that in the "post-typographic, multimedia era" (Semali, 2001) where "most people spend much of their time looking at television screens, Web graphics, print illustrations, and other types of visual displays" (Messaris, 2001) there are multiple literacies, only one of which is Information Literacy. Semali describes these other emergent literacies as computer literacy, media literacy, television literacy and visual literacy. *In Table 1*. it can be seen that within the VELS Interdisciplinary Learning strand, multiple literacies are prescribed dimensions of learning but that they also have a place within the entire curriculum.

Teacher-librarians are well placed to assist learners in developing the skills required to interpret multiple literacies. They are able to
- acquire, organize, produce, and disseminate information
- provide leadership to students and faculty in the use of electronic resources and tools for information access and knowledge creation and sharing
- facilitate the instructional integration of information technologies so that students can use technology tools to discover and construct new ideas
- foster the development of information and technological competencies, including critical thinking and communication skills, which enable student to construct and present their deep understanding of curriculum topics. (Kuhlthau & Todd, 2007).

Let the Games Begin

The Computer Games Project was a direct response to complaints by some grade five and six students who found that the work they were doing during Library Lesson time; lessons centred around mini projects using online databases, was boring. They wanted to learn in a way that was interesting. This was a very challenging request but one that has resulted in an interesting journey with rather rewarding results and where learners have become co designers of the curriculum. In 2006, three student-designed, student-made games found their way onto the school's network. These were played by students of all ages, both

primary and secondary. The play created avenues of cross-communication between groups of students who would otherwise not talk to each other because of age differences.

Project Outline

Grade five and six students were briefed about the work they would be doing in class for about a half school year. They were to design a computer game around a theme of their own choosing. The game had to be in the form of a quest, which contained quizzes, objects, characters etc. that had to be researched using resources provided by the library. They were not to use Search Engines unless there was a very good reason for doing so, and then, only with the teacher's permission. Students were instructed that they would need to collate a work folios as evidence of their work. Students were given the choice of working alone or in small groups. Most students chose to work in groups. Students were given time to decide topics, form groups and discuss ideas for the project.

Before the creative work began, students were given a lesson on flowcharting techniques. This was done so that the teacher could identify those weaker students who may need assistance at later stages. It was an exercise for the students in learning how to express actions in written / graphic logic sequences. Students were given three standard flowcharting symbols to use in their flowcharts and their uses were explained.

- An - ellipse - represents the start or finish of a sequence
- A - rectangle - represents an action
- A - diamond - represents a decision

Students were then asked to represent the following two sequences scenarios in a flowchart.
Scenario 1: I am standing with socks on my feet and my shoes are next to me. I put on my shoes, tie up my laces and walk away.
Scenario 2: I am standing with socks on my feet and my shoes are next to me. I put on my shoes but have to decide whether to tie the laces or not. If I tie the laces, what will happen? If I don't tie the laces, what will happen?
Most students coped well with this activity but a couple struggled. In a few cases the simple act of handling and glueing the shapes was enough to make them understand the purpose of a flow diagram.

The next stage was the planning, research and design phase. All sources of information had to be recorded in an information grid and bibliographic details noted. Most students decided to combine all three aspects of this stage rather than work them as separate steps. At this age students do not yet have the knowledge and skills to separate the tasks. They have self-regulated their learning behaviour enough to acknowledge that they need to gradually build their understanding in order to create a sense of order about what they are creating. They develop characters and scenes as knowledge comes to hand. e.g., GI Joe from WW II wore a uniform but we don't know exactly what he looked like. What guns did he carry? What did his shirt and trousers look like? Did he wear a helmet? What do you eat when you are fighting a war? How do you take a bath? Where are they anyway? What scenery are we going to give our characters? What year is it? Students' plans evolve rather than result from the pre-mapped pathways that more experienced designers might begin with.

Flowcharting is the next phase of the project. At the time of writing this paper students had not yet begun to do this. Based on observations made during the initial flowcharting exercise, this will be a very testing time for students. The games they are designing are quite complex in nature so transferring ideas into patterns of mathematical

logic will be a challenge. It is anticipated that most students will use Inspiration, the mind-mapping program, as it is easier to manipulate and manage than paper.

The final phase of the game design will be a "write up". This will include a rationale for the game, details of plot and scenery, character analysis, results of research, a bibliography of all sources used in the game and presentation of the work folio.

As previously indicated, the work that the grade five and six students do towards this project fits in with the VELS structure (see *Table 1.)* by providing them with the opportunity to engage with a broad range of Interpersonal, Interdisciplinary and ICT skills. Through research they are also trespassing on the Discipline-based Learning strand.

Once the work has been assessed it will be passed to the year eleven and twelve IT students who will use a variety of programs and computer languages, in accordance with the VCE subject guidelines, to interpret the instructions.

In Conclusion

Many teachers believe that playing computer games is anti-social, harmful, mindless, a needless waste of time, but research and anecdotal evidence tell us otherwise. Games almost always entail a degree of learning and the power that games have over people can be harnessed to transform learning into a deep, meaningful and "fun" experience.

Notes

[1.] *You only live twice* (ABC, 2007). This program can be viewed in full through a broadband internet connection. It is archived on the ABC Four Corners website.

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