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# The development of an interactive multimedia based professional development

James New
*Edith Cowan University*

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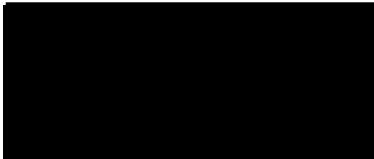
# The Development of an Interactive Multimedia Based Professional Development

Dissertation submitted for the degree of
BSc (Internet Computing) Honours

Supervisor: Dr Shirley Bode

At the Faculty of Business and Public Management

Mr. James New

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# ABSTRACT

The role of the teacher has changed over time such that teachers are asked to augment their own specialist knowledge with skills from other domains, for example information technology.

This study has examined the perceptions and experiences of teachers and speech pathologists involved in the production of an instructive Interactive Multimedia (IMM) product to deliver Professional Development (PD). The individuals involved in this project were teachers from the High Valley Language School (HVLS) - a specialised primary school.

The study used a social action research methodology, which allowed the researcher to build theories from emergent data. The data collection process consisted of observations, journals, meeting minutes, and interviews. The data was analysed primarily using a qualitative perspective. Qualitative research methods allow phenomena to be studied in greater depth.

The study outlined the need to understand what factors determined the feasibility of such IMM projects, and what attributes form the baseline of skills needed to achieve success. This study also outlined existing research and development methodologies that can assist in unfamiliar project domains.

The results of the study show that while the team members were not trained in information technology development, they were relatively well equipped to adapt to large tasks and the creation of Educational Interactive Multimedia. The team members displayed how the use of existing skills and problem solving techniques

from their domain can be used to solve problems that crossover into the information technology domain.

# Acknowledgments

I want to extend my grateful thanks to the following important people:

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# 1 INTRODUCTION

This chapter will examine how the role of the teacher is **in some cases** changing. It is suggested that one cause of this change is the different world we face, in which computer-based media is increasingly being used to deliver information. Such media include CDROM, DVD, the Internet, and mobile communication. This chapter will explain the background and motivation for the HVLS decision to develop computer-based resources.

## 1.1 The Background of the Study

### 1.1.1 The Role of Teachers in the HVLS

The teacher is, by necessity, an adaptive creature forced to change with the times and to change roles depending on the need of the school. Schools also attempt to fully utilise their staff to address changes. A real world example of this adaptation exists in the teachers at HVLS, who are qualified primary teachers, and receive additional training from Speech Pathologists in the area of language development. The teachers at HVLS must also fill roles including professional development producers and IT support.

### 1.1.2 IT for Teachers

The Education Department of Western Australia (EDWA) has recently initiated a scheme that enables primary teachers to lease a laptop / notebook computer (for $A350 per yr) (Education Department of Western Australia, 2002a).

The laptops are preloaded with Microsoft Windows XP, Intel Pentium 4 Processors and CDROM devices (Education Department of Western Australia, 2002b). This gives teachers access to online and computer based resources. Based on this and the popularity of IMM as an educational tool, it can be suggested that IMM will be one of the major platforms employed for resource and training delivery. One might also expect an increase in the amount of IMM Professional Development and classroom material that is available for teachers.

### 1.1.3 High Valley Language School- "PD on CD" Project

The High Valley Language School[1] employs teachers, teacher aides and speech pathologists, and aims to address language disorders in lower primary aged children. Children attend the school for between one and four years, depending on their needs. They then return to their local, mainstream primary school. As there are limited intake places available each year, students not accepted for this program attend mainstream schools. Teachers of these students frequently seek out information from HVLS on language disorders and classroom teaching strategies.

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[1] A pseudonym has been used to protect the identity of the school and its' staff.

To keep the relevant parties up to date with theory and further develop teaching methods, the HVLS runs PD events throughout the semester. These events target new and current staff, mainstream teachers, and parents. The PD events are delivered face to face in a seminar format and participants are provided with activities, helpful hints and printouts of the seminar slides. These printouts are offered to aid reflection on theory and activities presented in the PD.

Professional development content must be appropriate for a range of levels of understanding. The levels of understanding include: the parent, who may have a minimal understanding but is concerned about their child's language skills; new staff and mainstream teachers who have had exposure to the theories involved but have not yet had experience with real world examples; and teachers at HVLS that have knowledge of the theories and can see real world examples in the children they are teaching.

Additionally, the HVLS Principal has raised concerns about the level of training provided to teachers in non-metropolitan areas and local schools that may not have an ex-HVLS student. To address this concern the HVLS, with support from EDWA, propose to deliver a portable version of training to schools that request information about language disorders.

There are several language areas identified by the professionals at HVLS, for which over time the school aims to develop training (See Table 1-1 List of target language areas).

Currently HVLS has decided to focus on the creation of an IMM based PD addressing the language area of oral narrative. The HVLS has called the project "PD on CD"- Professional Development on a Compact Disk.

It is believed that a well-constructed product will prove itself as portable and informative. Another benefit cited by HVLS will be the ability of the learner to revisit not just an abstract of a lesson, but the entire lesson or practice.

| | |
|---|---|
| Comprehension | Language Development |
| Literacy | Phonological Awareness/ Metalinguistics |
| Pragmatics | Psycholinguistics |
| Narrative | Semantics |
| Social Skills | Syntax |

**Table 1-1 List of target language areas**

### 1.1.4 Narrative

Narrative Language is also known as Oral Text or Oral Narrative. A narrative is an account of an experience or events that are temporally sequenced and convey some meaning (University of South Alabama, N.D). Narratives are used to present past experiences, memories or instructions. The narrative is essentially a framework within which one puts together the appropriate setting information, plans, actions and consequences into the context of why an event would or did occur.

## 1.2    The Significance of the Study

This study will investigate a change in the way professional development is developed and delivered. The significance of the study is that it will determine whether this approach of creating an IMM for PD purposes in the school setting is effective. The development serves as a pilot program as there are plans to convert more of the HVLS's professional development to the more portable CD based resource (See Table 1-1).

# 2    THE PURPOSE OF THE STUDY

## 2.1    Main Objective

To examine the development of an interactive multimedia based PD addressing the narrative language area.

## 2.2    Specific Objectives

- To determine the ability for a school based team to create an IMM product.

- To determine the impact upon the team.

- To determine how extraneous variables impact on the project.

- To determine the difficulties in the adaptation process and what path the project took.

# 3   RESEARCH QUESTIONS

- **Is it effective for the HVLS to develop their own IMM based professional development?**

In order to try and gain a deeper insight into the effectiveness of the team to develop such a product and thus answer the above question, several sub questions were used to guide the data collection.

- o **How does the team cope?**

  What motivated the team and what was the state of their motivation? How did obstacles impact on their motivation and hence their ability to cope?

- o **What tangible and intangible costs are involved?**

- o **What path does the project execution take?**

  Does the project use a recognised development model?  What EIMM design considerations are important for this product? Does the end product meet the needs of EIMM?

- o **Was the project a success?**

# 4  REVIEW OF THE LITERATURE

The review of the literature discusses literature related to the creation of Interactive Multimedia and its efficacy as an instructional and educational resource. Attention was also given to research and development methodologies that enable a team of educators to implement PD via Interactive Multimedia. The review has also been used to examine the likely difficulties such teams can face.

## 4.1  IMM as a Quality Learning Media

This section identifies the important components and reviews relevant literature on IMM and its educational applications.

Terms such as Courseware, Computer Based Training, Instructional Multimedia and Computer Based Instruction are often used in the description of Educational Interactive Multimedia. On the surface these terms have similar meanings (Phillips, 1997; Soulier, 1988; Stoney, 1998), however, there are some important differences in the application of these terms. Given the context of this project, 'PD on CD', the terms specific to this research are defined as follows:

- The 'PD on CD' project – is an attempt to provide high-level training or Professional Development to teachers via a multimedia CDROM.

- It will be a Computer Based Training resource that utilises the educational advantages of Interactive Multimedia.

Computer Based Training (CBT) may, or may not, be interactive. It may be interactive, such as a first person strategy game, or it may be non-interactive, for example a linear multimedia, such as an online reference or text. Multimedia is the bringing together of sound, animation, images and text (England & Finney, 1999) and can be used to enhance CBT (Barker, 1994).

### 4.1.1 Training and Interactive Multimedia

The aim of educational Interactive Multimedia (EIMM) is to provide a rich environment in which the user becomes less aware of the Interactive Multimedia (IMM), and more aware of the concepts central to the training (Stoney, 1998). Stoney (1998, p. 56) referred to this effect as immersion. Research into the learning outcomes and motivational effects of IMM identify two attributes, motivation and engagement, that are central to effective learning from multimedia resources (Stoney, 1998). Interactive Multimedia makes it possible to also include attributes such as immersion; reflection; flow; collaboration (discussion); learner control; curiosity; fantasy; and challenge into a portable learning resource (Phillips, 1997; Stoney, 1998). These attributes are also key components of the Constructivist Learning Modality (Coleman, Perry, & M.Schwen, 1997) which is also refereed to as *"social constructivism"* by Stoney (1998, p. 23).

Stoney's study (1998) *Using Multimedia Microworlds to Motivate and Engage Adult Learners,* examined how the motivation and engagement factor can be used to positively impact the learners computer based training (CBT) experience. Stoney found that the ability to immerse a learner in the educational environment could help to keep the learner studying for longer periods of time. It was assumed

that an engrossed or fully immersed learner would be less distracted by outside influences and study for longer (Stoney, 1998). The inclusion of authentic tasks was used as an example of how CBT resources can motivate and engage learners. Similar views were found in research by Herrington, Herrington, Oliver, Stoney, & Willis, (2001) and Stoney, (1998).

Learning follows a continuous pattern of action and reflection (Johnson & Bragar, 1997). Action is of course the doing or participation in some practical example of a situation or problem – such as an experiment or roleplay (Johnson & Bragar, 1997). Reflection is the act of analysing critically the outcome of an action or experience and making sense of it. As Johnson and Bragar (1997, p. 346) stated *"reflection ties new experiences to existing frames of reference and prepares the learner to interpret future experiences."* Authors such as Stoney (1998) and Sharan & Shaulov (1990) have also discussed the important part collaboration plays in the pattern of learning and why collaboration should be included in EIMM.

Students in cooperative learning groups have an enhanced motivation to learn, that is directly attributed to cooperative instructional methods. Sharan provided data that suggested cooperative instruction is more motivating than whole class methods. Sharan's study also showed that cooperative groups out performed whole class instruction based students academically. Notably Sharan explained that group students were more likely, when given a choice of activities, to continue on the group task. In contrast, competition in the classroom environment, low self esteem, and low motivation to learn, contribute to low academic achievement (Lazarowitz & Karsenty, 1990; Slavin, 1990; Sharan & Shaulov, 1990).

Lazarowitz and Karsenty (1990) found that in a class using a traditional classroom instructional setting, a competitive learning climate dominated and

students worked as individuals, while a cooperative classroom created a positive learning climate. Group students took an active interest in their own learning and also their peers - high achievers helping low-achievement students (Lazarowitz & Karsenty, 1990). In this way students also increased their potential for reflection as they benefit from the experience and insight of multiple learners.

### 4.1.2 Advantages of Interactive Multimedia

Rath and Gaudet (1998) discussed that IMM and other new instructional techniques could offer benefits such as the ability to match various learning styles by bringing together all the aspects of IMM. This included the positive aspects of simulation, the microworld, and the ability to store relationally organised learning resources in one place (Rath & Gaudet, 1998).

By including simulation type learning activities, IMM provides a cheaper form of learner experience. "[W]*hen employees learn by doing, they learn faster and retain more* [..]"(Cauldron, 1996, p. 34) and as a result save companies substantial amounts from training budgets and payroll costs (Rath & Gaudet, 1998). Rath & Gaudet (1998) and Li (1996) provided estimates that due to the simulation aspects of IMM, learning occurs 38-70% faster than with classroom instruction, and course content could be mastered 60% faster. IMM can be used to simulate *"expensive, dangerous, and complex processes"* and to present *"material which has a broad*

*context"* (Phillips, 1997, p. 27). One of the advantages of IMM is that when it is designed properly it can create or simulate an environment that is not dependent on the user's prior exposure to IMM or computers. The logical environment to create is one that simulates the real world, and uses familiar scenarios and images. A metaphor is a useful way to implement such a scenario (Stoney, 1998).

In IMM design, a metaphor is a conceptual aide, such as a sound or internationally recognised symbol (Soulier, 1988). The use of metaphors extends beyond the use of graphically suggestive icons to a holistic representation of the familiar or intuitive graphical user interface. The consistent use of the environmental metaphor throughout the design of the IMM is referred to as a Microworld (Heylighen, Joslyn, & Turchin, 2000; Stoney, 1998).

The result of using the Microworld is that IMM can be used to cheaply deliver a simulation of the actual experience. Popular computer games use the microworld to engage and immerse users, but the extent of simulation must be balanced with the progressive nature of the game (Jones, 1997). Users get bored if there is no real objective, and if the game does not provide a continual challenge.

The aspects of computer games that make them popular can be implemented in the instructional microworld, however not everybody is motivated to play computer games (Jones, 1997). The choice of metaphor or microworld must be reflective of the target user's interest as well as to enhance the learning experience. It holds then that the choice of microworld is also important in IMM especially if it is used for learning.

### 4.1.3   Disadvantages of Interactive Multimedia

### 4.1.3.1   Infrastructure Limitations

Both (online and cdrom) methods of multimedia delivery are subject to cross platform compatibility problems (Phillips, 2001). Cross platform compatibility issues include the architectural differences between Macintosh and x86 based machines and the different companies providing internet and media viewer programs and plug-ins. Examples of these are Microsoft's Internet Explorer/ Netscape's Mozilla, Apple's QuickTime/ Microsoft's Media Player/ Real Networks' Real Player (Hashmi & Guvenli, 2001). Then there are the open source application providers all delivering similar products.

The trouble with having a multitude of similar products, is that one can't be sure that every user will be able to run the resource because they all support their own standards (Phillips, 2001). When a browser or media product is selected it can't be relied on to perform the same on the different operating system platforms (Hashmi & Guvenli, 2001). This generally results in the creation of two products one for each of the two major commercial architectures, or two products one text based with no multimedia and another rich multimedia. Supplying dual text based and rich media based versions is also used as a work around for problems of bandwidth and online multimedia.

Hashmi and Guvenli (2001) discussed how the variability of bandwidth negatively impacts high-end multimedia and video net-casters. The article explored the nature of the drawbacks and gave examples of how organisations modify or compress their high-end content to make it online friendly. The process is undesirable as it generally lessens the quality.  Hashmi and Guvenli also explain

further obstacles such as the general shortage of internet bandwidth, and the use of 56K modems.

However; the use of CDROM is also limiting as the process of updating content and redistributing CDs becomes expensive. Literature by Philips (2001) and Hashmi et al. (2001) both suggested that by combining a web application with a CD product (Web/ CD Hybrid) an organisation could, and have, overcome the problems associated with bandwidth and redistributing CDs. However this technology has a reliance on a higher technical skill set and therefore increased set-up cost (Phillips, 2001).

In any case the individual learner has to be motivated to use a computer as a tool in their learning. There is still such a resistance to the use of computers. These resistant people have been called Neo luddites (Webster, 2002) - people who object to the increasing computer intrusion on their life or who are just afraid of technology. In the context of the pre-computer generation (Bouchier, 2002, p. 14) gives a commentary on their fears *"Computers will give them problems that they never dreamed of -- heart-stopping messages like "Fatal Error," carpal tunnel syndrome, eye strain and the relentless pressure to upgrade their systems."*

### 4.1.3.2 Pedagogical Limitations

There are a number of pedagogical limitations that are discussed in the literature. These include the reliance on the learner's motivation, the style of learning attributed to CBT and the ability to include all social constructivism attributes.

*"You actually have to make yourself do the assignments,"* the student said, *"instead of having a teacher tell you when it is due."*(Guernsey, 2001, p. 8) Indeed

the two notable limitations are the motivational aspects and the in-ability to cater for all learning styles. The learner has to be motivated to learn in any situation but how the learner is motivated by CBT, regardless of its form, has been found to be contentious (Okan, 2003).

Okan (2003, p. 260) asks *"Are students motivated to learn, or just to play with the computer?"* and *"Does the medium used in teaching shape the content and the users?"* In the article Okan found that efforts to create spectacular, motivating and engaging environments should be balanced with efforts to create an intellectual stimulation. Okan (2003) argues that there are still no studies that fully evaluate the effects of **edutainment** on learners, and that the current stream of studies focuses more on the engagement and motivation aspects. However; it must be noted that Stoney (1998) and Herrington et al. (2001) found that authentic tasks could also be used to engage and motivate the learner (see section 4.1.1). In his study Okan also argues that due to the non-linear structure of CBT, the learner will come to see knowledge as a non –linear hypermedia like structure.

**Lack of Authentic Collaboration**

In an article in the newspaper USA TODAY McLean (1999) cites market research based on what *"adults see as the main advantages/disadvantages of* [online learning]" the article found that 51 % of respondents saw *"the lack of interaction with teachers* [and other] *students"* as a disadvantage.

All major studies and resources reviewed for this study that related to learning theory and CBT identified collaboration as an aspect of importance. There is a tendency however, to discuss how face-to-face or real-time collaboration was used in an effort to bolster the learning outcomes of CBT. Few studies mention including collaboration in the CBT – virtual collaboration. Stoney (1998) identified two

collaboration flow models - *vertical* and *horizontal*. Stoney explained the vertical model as being the student-teacher or student-program collaboration and horizontal as student-student collaboration. Stoney incorporated only student-student and student-program collaboration and found that students used whatever collaboration was available to them. On the student-student model Stoney (1997 p. 239 - 240) found that *"couples constantly questioned each others reasoning, they provided summaries or clarifications of their decisions, they questioned and tested each others knowledge [ ...] they planned and developed* [strategies], *and they discussed, at length, formulae and calculations; all of which were clear indicators of collaborative process [...]."* These are strong and bold examples of collaboration compared to Stoney's analysis of student-program collaboration "[..] *they did not have the advantage of a second view or a process of discussion.* [students use of built in help mechanisms] *provided evidence of the ability of the program to generate and support this attribute* [collaboration] *in the learning environment*" (Stoney, 1997, p. 240). The treatment of collaboration in CBT literature shows that the only clear way for the learner to gain full advantage is still at this point via face-to-face or real-time collaboration and not with a program.

## 4.2 Interactive Multimedia Development Process

The production of IMM and especially EIMM is a complex time consuming process. Phillips (1997, p. 15) stated that for each hour of usable EIMM product, it takes between 300 to 500 hours of development. Thus there is a need to manage the different roles and tasks to create an orderly and timely product. The following sections go into the detail of how large products can be managed toward timely delivery and quality. These sections also review the available related research and development methodologies.

### 4.2.1 Project Management

With the acknowledgement of the very special considerations needed to produce rich Educational Interactive Multimedia (EIMM), a framework has to be developed for their creation. Maylor (1999) linked conventional software design to a software lifecycle model, such as the waterfall model, and with a project management approach, governs the projects path through the life cycle. Such management should take place in EIMM as it is software, and needs to fill a set of requirements. England et al. (1999) states, "*Project management principles unite the disparate ways of working in interactive media development*"(p.31). It is the responsibility of the Project Manager to determine an appropriate development model and scope for the project, together with assignment of roles.

Project management is about creating a goal based environment and can be used to manage a series of goals to achieve some organisational benefit. Many organisations use project management techniques to achieve side projects or non core business activities. The result of project management is usually some new service or improved organisational product (Cleland & Ireland, 2002). The task of a project

manager is to create a framework or plan that can allow a team to accomplish a specific objective within a planned expenditure and time-frame, and to a predefined level of quality (England & Finney, 1999). Due to the nature of projects it is imperative that they are run efficiently and productively as failed projects detract from the organisations overall success.

### 4.2.1.1 Setting Achievable Goals and Time management

*"One of the most common causes of stress among project managers is that they have apparent responsibility for an area, but not the authority to make the necessary changes in order to meet the requirements placed on them"* (Maylor, 1999, p.24)

It is important to set tasks in a way that they supply the employee with motivation to continue at a high level of effort (Cleland & Ireland, 2002; Locke & Latham, 2002). Cleland and Ireland (2002) stated that motivation of project members can be heightened by setting challenging tasks. However setting tasks that are well below or above the ability of the team or the individual team member can have a negative effect on motivation (Cleland & Ireland, 2002). The project manager must also be careful not to select projects that are beyond the team's ability.

Time constraints can also have a significant impact on the management of tasks. The management and allocation of time is also crucial to the delivery of timely products. The project manager must decide how much time tasks take and budget appropriately for the time needed. Two examples of how a project manager might structure project processes are *the concurrent development model* or *sequential models* (Maylor, 1999). These are chosen to fit the project budget and desired project deadline, as one is resource hungry while the latter is more time consuming (Maylor,

1999). These models may therefore be used to accommodate projects based on their budget and time requirements.

### 4.2.1.2   Selection of Appropriate Project Managers from Existing Staff

The selection of the project manager should be based on the relationship of a candidate's attitude and characteristics, to the project (Maylor, 1999). The skills of the project manager should be managerial in nature rather than technical, however the project manager should *"... comprehend the work that is being carried out, and '[speak] the language' of the people involved"* (Maylor, 1999, p.24). While management skills are at the top of the list, there may be occasions where having a project manager that serves in the team, as a functioning team member is acceptable. However, an examination of the project manager's responsibilities and required skills would seem to preclude involvement in the team especially in large projects. One of the primary roles of the project manager is the delegating of responsibilities to candidates with the required skills and who are best placed to focus on the related task (Gido & Clements, 2003; Maylor, 1999). Thus a project manager should not select himself to be involved in a technical project on a technical level. It would therefore also be a mistake for teams to select, from existing human resources, the most proficient technician or programmer as the team leader, instead of selecting a goal oriented or management oriented member.

### 4.2.1.3   Defining Quality

Project management assesses the successful outcome of a project in terms of customer satisfaction – whether the product was delivered on time, within budget and

whether it met the requirements (Maylor, 1999; Smith, 2001). Educational IMM need to meet specific requirements in terms of functional quality and instructional design (New & Bode, 2003). Such a quality guideline exists in *An ECU framework for assessing quality of on-line learning materials* (Oliver, Herrington, Herrington, Stoney, & Willis, 2001). This guideline can be used to ensure that products have more specifically defined quality in terms of useability, delivery strategies, content and pedagogy.

### 4.2.2 Action Research the Teachers Research Tool

*"Teachers Action Research (TAR) is an evaluation method designed to engage educational practitioners in the assessment and improvement of their own practice. It can be an individual tool, helping classroom teachers to reconsider their teaching methods or to adapt in order to solve a problem."* (Gorski, 2003, par. 1)

TAR is the tool that has emerged over the past 20 years empowering teachers to conduct research and improve teaching and school resources (Delong, 1996). Delong (1996) gives the example of Ontario which, *"is on the move toward an action research model for school improvement"*. Great Britain, The United States, Australia and Continental Europe, are countries involved in similar movements (Delong, 1996).

Action research follows a cycle comprising action and critical reflection phases (Dick, 2002). The particular cycle visible in TAR follows the generic steps *design, develop, test/try*. Abdal-Haqq (1995, par. 5) borrows this explanation of TAR from McKay (1992) "[TAR is] *a six-step cyclical process:*

*(1) identifying an issue or problem to study;*

*(2) gathering and reviewing related information;*

*(3) developing a plan of action;*

*(4) implementing the plan;*

*(5) evaluating results; and*

*(6) repeating the cycle with a revised problem or strategy derived from what was learned in the first cycle, until the question is answered."*

Similar iterative and incrementally progressive models also exist for software development. Phillips (1997, p.38) introduces an IMM development model that consists of a cycle through the steps *"**design**, **develop**, **evaluate** until the product is finished and **implemented** or installed."* The next section focuses on iterative and incremental development.

### 4.2.3   Iterative and Incremental Development

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*"Not everything that can be counted counts, and not everything that counts can be counted." - Albert Einstein (1879-1955)*

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When used in reference to software development the above quote from Albert Einstein could be translated to *you can't plan for everything and not everything can be planned.* In the current world of software and application development, methodologies that cater for changing and unknown requirements are gaining in popularity (Ambler, 2002).

Since the early 90's certain pockets of the software development industry have been developing and implementing lightweight development methodologies

(Ambler, 2002; Botman, 2002). These include rapid application development (RAD) and it's spin off, adaptive software development (ASD) (Highsmith, 2002). The reasoning is firstly that customers want applications to be developed in less time (Highsmith, 2002). The second reason is enhanced customer/user inclusion, lightweight development methodologies can deliver tangible progress in small increments which the customer can view and criticise; therefore projects are likely to stay on track (Highsmith, 2002; Weaver, 2003). Another benefit of iterative styles of development is that they provide teams with a strategy to attempt projects using unfamiliar technologies (Sliwa, 2002).

### 4.2.3.1 Agile Processes

In cases where the user has a detailed knowledge of the products requirements it may be useful to include them in the development team. Iterative/ lightweight development processes do just that. These include rapid application development (RAD), adaptive software development (ASD) and agile processes (Highsmith, 2002).

Agile methodologies in particular, have emerged from industrial practice (Botman, 2002) and more closely adhere to the nature of software engineering in industry (Rubinstein, 2002).

Reifer (2002, p. 16) enumerates, "*a laundry list of practices as agile*" it includes "*collective ownership, ... customer collaboration,... full stakeholder participation, ... pair programming, rapid application development, refactoring, retrospectives, stories for requirements, team programming, and test-driven development*".

The practices such as pair programming and XP that are a part of agile, can be used to incorporate training of staff in new technologies in parallel with the

development of a project. Training can then be viewed more correctly as a part of the project. If this is the case, more technologically diverse projects can be undertaken. Ideally the path will also be opened for less experienced people to take part in IT projects, especially where the project impacts upon them. In Derby (2002), Denise Tinsley, an IT Trainer, discusses upper managements reluctance to make training/ professional development a part of a project time line (Derby, 2002). Derby's article offered the opinion that when faced with a steep learning curve, such as a change in programming language or paradigm, *"expert feedback will increase the rate of learning and provide a base level of quality"*. Derby infers that in this way, a project can be used as practice for the learning goals, whilst still completing the project with a minimum of stress. Using agile development processes, and positioning experts as mentors and or reviewers, can increase the flow of the expert feedback the team needs (Derby, 2002).

## 4.3   Specific Studies Similar to the Current Study

In the article, *A Case Study of the Development and Project Management of a Web/CD Hybrid Application*, Phillips (2001) discussed the complexities of producing a high-quality interactive multimedia application. The study also elaborated the extra difficulties involved in creating interactive learning environments.

In his own words study examined

- *the conversion of the initial educational design into a technical specification of the requirements of the software, and establishing the feasibility of the specification;*
- *a range of project management issues, including:*
- *the establishment of effective dialogue between all project team members,*
- *the crucial role of documentation and quality assurance processes, and*
- *measuring the performance of the development team;*
- *the role of formative evaluation in the project development cycle; and*
- *the improvement of future performance through reflection on individual and team performance.*

**Table 4-1 listing of study points from Phillips (2001, p.1)**

The study drew the conclusion that for development teams to be effective they need to have an appropriate balance of educational design, programming, and project management skills.

Studying a group specifically converting existing curriculum to multimedia Rath & Gaudet (1998) examined the level of multimedia software development and procedures developers are using in the context of a university curriculum. They developed the opinion that *"training in business computer skills needs to be expanded from a focus on functions of common computer applications to design and development skills such as how to convert curriculum from paper to multimedia formats"* (p. 7). The further implications of the study are that there is no commonly used framework for the changing of existing curriculum to multimedia.

## 4.4    Conclusion

This chapter has identified that IMM can accommodate different learning styles. In particular IMM can give a learner a realistic experience of an exercise, valued in the constructivist learning modality. It is this aspect of IMM and the move toward making technology affordable and available to teachers that will ensure the place of multimedia projects in education.

The way projects are managed has a significant impact on the motivation of the projects participants, and therefore on the project. It is important for the project manager to control the project and to lead the team members in a way that supports the goals of the particular project.

The chapter has also been used to highlight the emerging development processes such as agile, which include the user in the development process. The processes of agile software development and action research have both strong iterative and incremental features. They are both used to include people that are not normally associated with the given organisation. With agile practises, learning new programming languages and development skills can be attempted in parallel with the development of a product, and ensure quality. Action research is identified as a process where researchers can make a product and use the experience to learn. The user can with his/her extensive knowledge of the desired product, be involved more productively in the development team. While agile creates a place for the lay person in the project team action research paradoxically, provides a place for the expert/consultant in the development team.

# 5 THEORETICAL FRAMEWORK

## 5.1 Identification of Variables Impacting on the Research Questions and Their Inter-Relationships

A main goal of the project is for teachers to produce an in-house interactive multimedia (IMM) resource for professional development. Study participants may have little experience with computers and IMM, especially in the development domain. This lack of skill is hopefully made up for by the teams understanding of instructional design techniques. It is hoped that the study can observe the adaptation of team members to new tasks and the acquisition of any necessary skills.

The amount of time the participants could allow for work on the project may have been impacted on by what skills they had to acquire and the time took to acquire them. The time spent on the project was also impacted on by the other roles they had to fulfil in the school. Motivation to take on extra unfamiliar roles in the organisation may impact the team's progress either positively or negatively.

Low motivation was expected to slow the projects progress thus increasing the time it takes to complete. It was also anticipated that increased time to complete the product may impact the total cost of the project and therefore its feasibility.

## 5.2 Identification of Theoretical and Philosophical Assumptions Underpinning the Study

Reviewed literature has shown a framework for development of educational IMM. The literature has established this framework citing contributors to the

educational environment. The assumption of this study is that teachers can relate the concepts of instructional design using the framework to create an educational IMM product. A further assumption is that teachers are equipped with a set of useful research tools used to develop classroom strategies and resources. These research tools equip teachers partially to investigate and develop technically sophisticated learning media such as CBT resources.

# 6 METHOD

The methodology chosen for this study is qualitative in nature and is based on an Action Research paradigm. Patton (1991) pointed out that qualitative research, including ethnomethodology, grounded theory and action research, allows the researcher to study phenomena to a greater depth than is possible with quantitative methods. Guba (1981) suggested that in selecting a methodology the researcher should chose a model appropriate to the "phenomenon being investigated' (p.76).

Action research is generally used to solve specific problems within organisations. The main argument for this type of research is for the participants and the researcher to be actively involved in the research process. An outcome of this type of research is for the researcher to provide results that may be implemented in the organisation that is being studied (Eden & Huxham, 1996).

The benefits of this particular method is the possibility of solving problems within the organisation and the intent of the researcher to effect some change on the organisation as a result of the research. It is the intention of this research to effect change within the organisation being studied, therefore Action Research is the most appropriate method for this study.

The objectives of this study, as outlined in chapter two, were to trial and evaluate a change in the way a case school develops and conducts its Professional Development. The change was from presenting a topic or module as either a lecture or seminar, to supplying it as an IMM resource. In this particular case, the researcher played a role in directing the development of the IMM resource within the school.

Action Research sets out to "explicitly study something in order to change and improve it" (Wadsworth, 1998, p. 3). This involvement within the study could be seen to cause a conundrum, by being a consultant and observer the researcher steers the development of the IMM implementation and could potentially invalidate the study. Yet, Eden & Huxham (1996), suggested that unlike conventional research paradigms action research makes it possible to be both researcher and participant.

## 6.1    Reliability and Validity

As with all qualitative research, it was vital that this study displayed both reliable and valid measures of its procedures. Both Lincoln & Guba (1985), and Miles & Huberman (1994) discussed methods to ensure reliability and validity in qualitative analysis. Although it was not possible to include all suggested methods,

multiple forms of reliability and validity checks were necessary to ensure that this study was valid.

Reliability in qualitative research depends "...largely on the skills of the researcher" (Miles & Huberman, 1994, p. 38). Miles & Huberman (1994) identified several characteristics to look for to improve reliability including:

- Some familiarity with the phenomenon and the setting under project;

- Strong conceptual interests;

- A multidisciplinary approach, as opposed to a narrow grounding or focus in a single discipline;

- Good "investigative" skills, including doggedness, the ability to draw people out, and the ability to ward off premature closure. [Miles & Huberman, 1994, p. 38].

Reliability was further increased by the researcher maintaining an audit trail of the research as suggested by (MacMillan, 1999; and Northey, 1997).

This study also used triangulation of sources to increase both the validity and the reliability of the findings. Triangulation is a method of increasing validity and reliability by using a combination of sources and/or methods for collecting data. Relying on one source of data may incur bias and triangulation of data seeks to minimise this problem (Burgess, 1984). Triangulation of data sources for this

research project included interviews, analysing secondary data sources and field notes.

## 6.2   Target Population

The target group for the study was the project group, including the Principal (referred to as **P**), Speech Pathologist (**SP**), four teachers (**T01- T04**), and the Researcher. The study sample was selected using a non-probability sampling method.   There are several forms of non-probability sampling including *quota sampling, snowball sampling* and *theoretical or convenience sampling* (Minichiello, 1995).   The basic premise of theoretical or convenience sampling implies that participants are chosen deliberately to suit the parameters of the research (Minichiello, 1995). The sampling method for this study was therefore based on convenience related to each participant's involvement in the project. The target sample for this study consisted of all project members, subject to their informed consent and relevant involvement.

## 6.3   Design

This case study examined the characteristics of an adaptive project team and the process of instructional IMM development. The research is predominately qualitative as it asked questions that rely on hermeneutic evaluation rather than acute statistical analysis. The research was a part of a pilot program that asked "Is it

possible?" "Should we continue?" and "In light of our current situation, how should we continue?"

The Researcher worked as part of the project team, which also consists of the Principal, a Speech Pathologist and Educators.

Observations were made during or after significant milestones of the design and development. These observations were carried out using contextual surveys (see 6.4.2 & Appendix 2: Survey Questions). An interview session (see Appendix 1: Interview Schedule) was also used to sharpen the meaning of previously collected data. The interviews also gave participants an opportunity to vent their feelings about the project to an impartial observer, thus creating extra depth to the data collection process and the significance of the study.

## 6.4    Instruments

The emergent nature of the research limits the researcher's ability to construct a finite list of questions needed for conventional social research. It is anticipated that questions would emerge from the process of the research.

Initially the instruments included: Letters Requesting Participation and Informed Consent forms; Survey Questions; Interview Questions; and Framework and Guidelines.

### 6.4.1    Letters Requesting Participation and Informed Consent Forms

The letters requesting the participation of team members briefly outlined the nature of the study and discussed the method of data collection. An information

session was held at which participants were presented with informed consent forms. The subjects were allowed to complete and respond to the informed consent in their own time also knowing that they may change their mind at any time of the project without fear or prejudice.

### 6.4.2   Survey Questions

As the project and study evolved, questions were raised that were deemed worth answering. Such questions may not have been apparent at the start of the study so questions were formulated as the need arose.  These questions were either added to a brief survey given to the group at the end of a meeting for their private and confidential consideration, or discussed in the meeting and recorded in the minutes. Appendix 2 shows a survey, which identified the concerns of the participants at team formation and throughout the project. Many of the questions in the survey instrument were germane to later periods of the study.

### 6.4.3   Interview Questions

As with the survey questions the emergent nature of the research allowed more contextually sensitive questions to be formulated. The factors involved in the formulation of questions were time-based, issue based and relevant to the phase of the project at which they were formulated. The entire schedule of interview questions (see Appendix 1: Interview Schedule) was centred on the three research questions and the impact on them of emergent issues. The interviews were held two months after the final set of survey data had been collected.

An example of where it was useful to reformulate interview questions was to address a time management issue. This issue had begun to impact on the team's motivation and palatability of the project to the participants. The questions that were

seeded by this issue identified responsibility, personal impact and the general perception of the entire project.

### 6.4.4 Framework and Guidelines

Where possible this project was developed under existing and proven methods. To this end the project used and adapted a suitable formal development framework.

An evaluation framework was adapted from *"An ECU framework for assessing quality of on-line learning materials"* (Oliver et al., 2001) see Appendix 3 which identifies key points from section 4.1 as contentious evaluation criteria.

## 6.5   The Setting

The High Valley Language School is a multi campus educational environment for children with receptive and/or expressive language difficulties. The HVLS's goal is to improve the language skills of these children and reintegrate them into the mainstream school system. Children are referred to the HVLS provided they have average or above performance IQ, as reported by a psychologist, and that they have a significant primary language disorder, as reported by a Speech Pathologist. The children are educated following the curriculum defined by the Education Department of Western Australia (EDWA).

As well as providing specially trained teachers, the HVLS employs the services of speech pathologists and teachers aides. The HVLS also aims to spread

awareness of language development issues to teachers in mainstream city and rural schools.

## 6.6 Procedure

The research proceeded in the following way:

1. An application to the Ethics Committee was made detailing the nature of the study and its requirement for human participants.

2. Members of the target population were asked to participate in the study after being informed of the nature of the study and its requirements.

3. Meetings were held to plan what action was to be taken for the project, and to set a time for the next meeting.

4. The meetings also reflected on the action resulting from the previous meeting.

5. The meeting minutes were then taken as a main component of the data collection.

6. Comments and other incidental observations were collected as anecdotal evidence.

7. Questions were asked and answered in a private journal regarding previous issues.

8. Steps 3-7 were repeated until a significant portion of the project had been developed.

9. This dissertation and conclusion were constructed from the theories and data that emerged from the study.

## 6.7 Data Analysis

It is important as a researcher to document every aspect of the research so that it may be reproduced, given a similar scenario, by another researcher. This documentation allows others to fully scrutinise every aspect of the research so that it may be bettered and so that the validity of the initial research may be witnessed. An important part of this documentation is the description of how the data collected was analysed and interpreted to form the findings of the research.

The study examined longitudinally the data derived from critical reflection and planning for future action. Action research as Eden & Huxham (1996) explains, is *not simply being "grounded in data" but being "grounded in action"* (p. 527). Thus it is important that the data analysis be focused on data that emerges from an action.

Following this logic it the researcher to performed the data analysis in the following fashion:

- Anecdotal evidence was analysed in the context of what action had taken place and any difficulties encountered. This identified how team members coped and how they interpreted the progress.

- The Researcher made interpretations from the journal data, and the longitudinal survey.

- The researcher also made independent observations throughout the study.

- Triangulation of these results was performed to eliminate the subjective nature of the interpretations. Such comparisons involved cross-referencing data from the longitudinal survey against the data collected in the interview sessions.

- Further validity was incorporated by also cross-referencing the findings from the data against relevant literature.

The data was coded so that the identity of both the participants and the organisation, which they represent, may be protected. The participants have been given a coded identity and this is further explained in section 7.1.

The coding and transcribing of survey results from the simple 5 part Likert scale was done such that a Strongly Agree was transcribed to a numerical value of 2, Agree to 1, Neutral to 0, Disagree to −1 and Strongly Disagree to −2. The identities of the respondents were coded according to the convention already mentioned. Further reflection of this part of the data analysis will be discussed as the need arises.

Longitudinal commentary that accompanied the surveys was also subject to the above coding.

# 7 RESULTS AND DISCUSSION

## 7.1 Description of the participants

The participants of the study were the project team members, including the Principal (referred to as **P**), Speech Pathologist (**SP**), four teachers (**T01- T04**), and the Researcher.

**P** is a female in her late 40's and is the school principal. **P** is the project's main stakeholder and the PD on CD ideas conceiver. **P** has been the school's principle for 5+ years.

**SP** is a female in her late thirties and is a Speech Pathologist. She has worked with the school for 4 years.

**T01** is a female in her middle thirties and is a teacher. She has worked with the school for 6 years.

**T02** is a male in his late thirties and apart from being a teacher, he is also the IT support officer, and a deputy principal. **T02** has duties to fulfil on other campuses of the school, and while most of these are scheduled he is often called out to a campus at less than a days notice. He has worked with the school for 10+ years.

**T03** is a female in her middle fifties and is a teacher and a deputy principal. She has worked with the school for 10+ years.

**T04** is a female in her early forties and is a teacher. She has worked with the school for 3 years. **T04** came into the project near the end.

As the study progressed the research focused on the involvement of two teachers (**T01** & **T02**) and the speech pathologist (**SP**). The two teachers and the speech pathologist were in-fact the main participants in the development of the project. One teacher **T01** and **SP** collated and researched the largest proportion of content. During the content research process teacher **T02** was researching and developing skills enabling the online delivery of the content. The two teachers worked together in the final stage of the study to complete the bulk of the content integration.

## 7.2 Coping

During the project the team's levels of motivation and progress moved up and down. The motivation of a team may rise or fall dependent upon the relative ease or difficulty of tasks or obstacles (Cleland & Ireland, 2002). This is to be expected during the different stages in most projects (Maylor, 1999) however; the special case that has been examined is not a normal project, that said, no project is ever "normal" they are all unique in some way (Gido & Clements, 2003).

This project has differed because it is centred on the functional understanding of the concepts that need to be delivered – that being the narrative language area. In a similar product, the entire workload would be outsourced to contractors. In the outsourced project, contractors would poll the client for the content resource material as a part of the ongoing analysis (England & Finney, 1999). In both cases the teachers and speech pathologists would be the best placed to research and compile suitable content resources for use in the project – since they are the content specialists. It has therefore been the assumption of the main stakeholder (P) that using the team to produce the finished multimedia product only adds one step. The researcher found that the team, including the researcher and the stakeholder, had seriously underestimated the size of the task. This underestimate was the catalyst for a complicated web of obstacles including confusion about the goals and importance of the project, an increase in stress, and ultimately a lack of motivation.

The following discussion section highlights how the team coped with this task and the obstacles associated with it. In the cost section there is discussion on the

advantages and disadvantages of outsourcing to a professional educational multimedia developer.

### 7.2.1 Scope of the PD on CD project

Initially there was a meeting of all interested and otherwise involved members of the team. The purpose of this meeting was to explain: the target audience; budget; desired outcomes; what information to research; and the overall scope of the information.

### 7.2.1.1 Understanding the goals of the PD on CD project

The principle **P** obviously had a good concept in mind when discussing the project as was witnessed by her enthusiasm; however there seemed to be some problem with the dissemination of the information. Both interviewees **T01** and **T02** referred to this during the life of the project. Interviewee **SP** who speaks English as a second language found **P**'s style of communication "stressful".

It became apparent that there were some details missing from P's description and from the groups understanding. Concerned team members needed to repeatedly ask questions as **P's** responses often veered off topic. This is a reflection on **P**'s ability to prepare concepts in a manner easily digestible to other team members, evidence for this was a lack of documents presented at the meeting on the part of **P**. All interviewees indicated their initial understanding of the project would have been improved if they had have been presented with a tangible list of requirements, **T02** stated *"P could have documented her ideas* [had them down on paper rather than explaining from and refactoring the idea in her head] *so I and others could have something tangible on which to construct our understanding."* The team as a whole had obviously placed an importance on the knowledge of the project goals.

There was possibly some confusion about who was meant to know what and what the important information was for each individual. There appeared to be a case here for a consolidation meeting for the team. Such a meeting provides an opportunity for team members to explain their individual understanding and to form a list of questions. The resultant list of questions would elicit more direct responses from the stakeholder in later meetings (Maylor, 1999). As the researcher observed, there was a growing case for such a meeting. There was some evidence of confusion over the project goals in the survey responses of the participants.

**Results from the first application of the survey instrument**

**T01** responded neutrally to **Q1**: *I know exactly what has to be done* (see Figure 7-1), **SP** responded negatively and **T02**, responded positively. The mixed results implied that the team as a whole was uncertain of the goals of the project. In **Q3**: *The team knows exactly what has to be done* (see Figure 7-2) **T02** responded positively and **SP** responded negatively showing that there was no solid understanding of the goals within the group.

**Summary of Q1 and Q3 results**

A basic interpretation of the responses to Questions 1 and 3 can be summarised as such:

T01- I'm not sure of the goals but I am pretty sure someone knows what is going on.

T02- I have some idea of what is expected of us but I don't think the rest of the team does.

**SP**- I don't really know what's expected of me, but definitely someone in the team does.

These results are given further validity when we examine **T01** and **T02**'s comments from the application of the interview instrument. In response to the question **"What has changed over the life of the project that affected your understanding of the goals of the project?"** **T02** stated *"I had to corner **P** a couple of times to find out what exactly she was looking for and what she wanted to see happen. I think the goals at the start were very broad and that could have been because **P** didn't really understand them. To be honest I don't think **P** had a clear idea of what she wanted"*. **T01** seemed a little more uncertain of the goals of the project *"we are making a CD for teachers.. I remember that goal and the rest of the goals, they haven't been explained to me so I guess it's none of my business."*
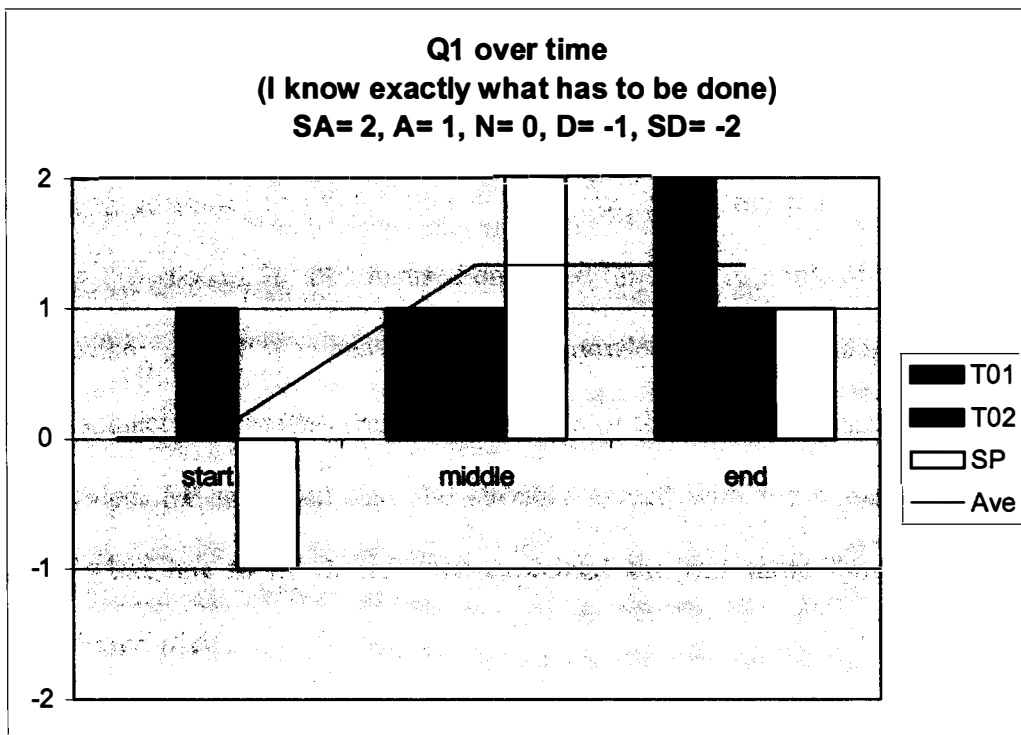


**Figure 7-1 respondents over time Q1**
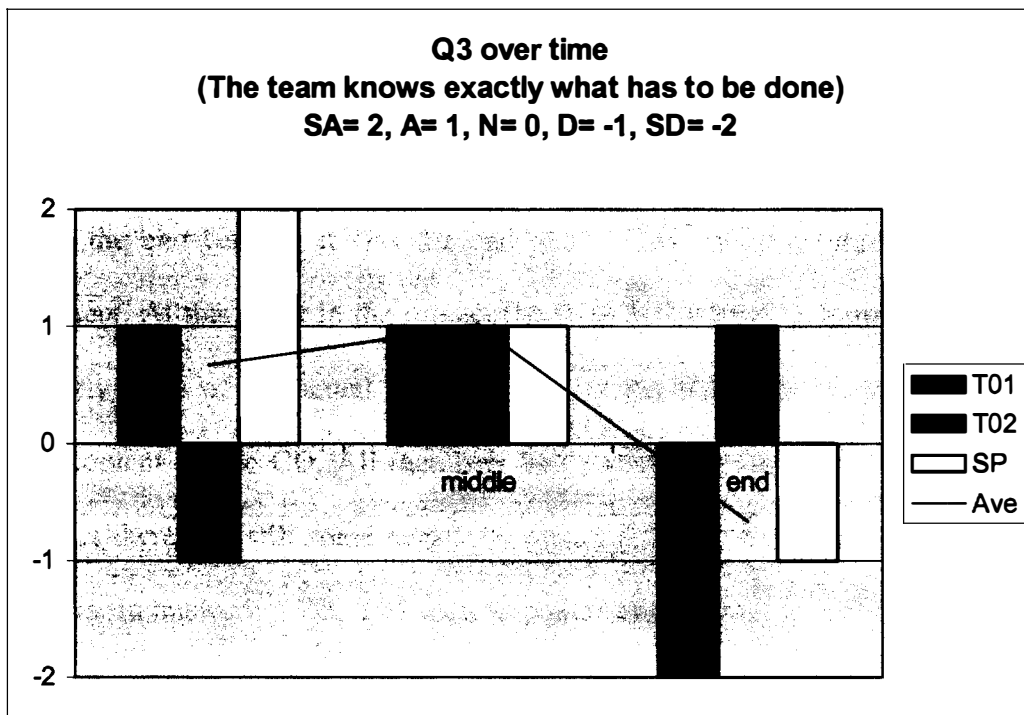
**Figure 7-2 respondents over time Q3**

### Results from the second application of the survey instrument

Repetition of Q1 during the *middle* of the data collection period indicated that there was a positive change in the evolution of the team members understanding. **T01, T02 & SP**'s answers to Q1 show that over time there was an improvement, all respondents attributed this to the allocation of time, better information flow and team members expertise in the area focused on at that time. An example of the latter is the speech pathologist **SP** who had a specialised knowledge of the areas important to the content subject - *narrative*. During the middle of the project when this aspect was most needed, **SP** indicated that she strongly agreed with the statement "**I know exactly what has to be done.**" **SP** explained she was more familiar with "*the content based stuff*".

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**Results from the third application of the survey instrument**

The theme of task familiarity is continued through to the end of the data collection. Although the project was not yet finished the last set of data collected was termed the *end* because it was the end of the data collection through the survey instrument. At this point in the project the team had started to form the CD. In this still early stage of the actual CD development the team was inserting the theory-based content on the CD. All members had a sound idea of what their tasks were. However there was still some negativity associated with the teams understanding of the tasks. In answering Q3, **T01** indicated she believed that many of the other team members were not familiar with the process **T02** had employed to implement the CD and simply had no further part to play. **T01** indicated next to her response *"remaining team members would know* [exactly what has to be done]". **SP** responded negatively at this stage to Q3 and stated that *"No one wanted to put closure on the project"* indicating that there may still have been some uncertainty amongst the team as to what the finished product should constitute.

### 7.2.1.2 Summary

Authors such as Hoffer, George & Valacich (1998) and Maylor (1999) place great importance on the initial stages of a project, where the scope and requirements of the project are collected. The analysis and documenting of these fundamental goals help to set the boundaries of a project and determine how the product should function and what attributes it should contain. Not getting these goals correct at the start of the project usually leads to some form of project failure, whether that means complete cessation, a budget blow-out or going back to the drawing board. This is generally the case for traditional software development methodologies such as the waterfall model (Hoffer, George, & Valacich, 1998; Maylor, 1999). There are

however strategies available for the development of products where the entire set of requirements or goals are not known. These methodologies use an iterative and incremental progression to focus on one goal of the product at a time and are discussed in section 4.2.3. The team was not cognisant of these methodologies, nor were they aware of the traditional analysis and design models used to produce software. The development model employed by the team is discussed below in section 7.3.

## 7.2.2 Time management

There were many issues stemming from time management that impacted the progress and quality of the project. These issues can be seen in two lights

1. **The failure to recognize the importance of time allocation and its impact on structured progress.**

2. **The failure to recognize the importance of time allocation and its impact on the perceived importance of the project.**

With the team consisting mainly of teachers and other school employees, one issue that was considered was - How the team made time for the project.

At the start the team made no agreement on time allocation for the project. There was none allocated by the project manager **T02** or the stakeholder **P**. The speech pathologist **SP** was, after a short time, allocated dedicated project time.

### 7.2.2.1 Time allocation for the speech pathologist

The speech pathologist had decided that to pursue the project would be unethical. **SP** worked part time for a company that held a service contract with the

school. **SP** after discussing the ethical implications with the researcher, **P** and the team, then consulted her employer. The agreed solution was for the school to purchase additional time for **SP** through the company. As a result **SP** had been granted specific project time.

**SP** was allocated half a day each week for the project. This caused some confusion and eventually each team member was allocated time specifically for the project.

### 7.2.2.2 Time allocation for the teachers

Some time before the middle of the data collection the team members **T01**, & **T02** compressed their regular and additional school tasks. This was done so that they would have half a day a week each to work on the project, but it was apparent that other tasks often took priority. **T01** stated that the project took a low priority to common teaching tasks. *"It was a balancing act. If I had other stuff to do then I would miss narrative, but then I would have to make it up later. I put my teaching first! That's only because I wasn't allocated time for it. It hadn't been given enough value because there wasn't time allocated to it"*. Team members indicated that putting off the project was a common occurrence and it appeared goals were not being met. **T02** stated *"I guess we organised meetings when we could and when we had no time nothing got done. So initially our method of coping was (to avoid it) put it aside until we had time, which was a poor way of coping really. It was a bad start because every one was negative about the project."*

*"Eventually we got to the point where we* [content team and project manager **T02**] *held a meeting where we decided we are not getting anything done, we have to go and see P! So we formulated the need for time and further direction."*

### 7.2.2.3 Possible reasons for the lack of time

If blame for the lack of time had to be apportioned to any one in the project team, it would be to the principal and the project manager. It was firstly **P**'s responsibility for not stating or realising that time would need to be dedicated to the project. It had been explained to all members that typically projects of this nature require up to 300 hours of design and development to deliver one hour of rich content. Despite this advice the team members were not allocated adequate time.

In addition to the above, it was the project manager's (**T02**) responsibility for not putting a stronger case for time allocations to be made.

The on site project team and the researcher believed that the project was of little importance as the requirement of project time had been ignored by **P**. **T01** and **T02** both made statements to the effect that *we have been given this project and P has not given us the time to work on it* [2]. **P** later stated that she sets up these projects because *"they service a genuine need in the school"* and *"I like to give the staff the freedom to make their own decisions... you get better returns that way"*. **P** believed that she gave the team *"ownership"* of the project and that *"if they needed anything they could ask"*. The team saw this tactic as **P**'s disinterest *"P removed herself from the team"* (**T02** stated).

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[2] A composite of reflections made by respondents T01 and T02

The team (excluding **SP**) saw the start of the year induction processes as more important. This led the researcher to believe that the project would be seriously if not terminally delayed. **T01** stated that in February *"it was suggested to can the project [...] but we extended our deadlines."* **T01** observed that *"enough enthusiasm still existed in the majority of the team"*. The suggestion to abandon or *"can"* the project at that time was more evidence of the projects waning importance. The low priority of the project did indeed delay any real advance for at least one whole term (10 weeks) and the restart was sluggish.

### 7.2.2.4 The impact the lack of formal project time had on the project

The failure to recognize and allocate dedicated project time meant that the teachers had to shuffle their schedule to accommodate meetings.

It made a hard task harder and as discussed in Locke & Lathem (2002) decreased the levels of motivation in the team. As **T02** stated *"It was a bad start because everyone was negative about the project."*

The project manager could not realistically define the timeline of the project because there was no project time allocated in that school term.

The failure to recognize and allocate dedicated project time also meant that the teachers perceived that the importance of the project was low. This caused the teachers to plan more familiar tasks such as student contact time, curriculum and class activities.

### 7.2.2.5 Summary

With the teachers doubting the importance of their involvement in the project, the importance of the project, and the lack of any structured timeline the teachers and the project manager were reluctant to ask for dedicated project time. The teachers

especially regretted being involved in the project and some even wanted to see the idea abandoned. The lack of time also impacted the understanding of the goals. The team believed that with more time allocated, they would have reached the conclusion that the goals were not clear earlier.

## 7.3 Path

Philips (1997) discussed an iterative process for the production of IMM. The cycle of iteration went through phases similar to that discussed in teachers' action research (TAR. see 4.2.2). The methods of development used by the team in this study were iterative and also collaborative. Iterative processes that are emerging in the IT industry come under the umbrella of agile processes. The methodological similarities are discussed in the following section.

### 7.3.1 Was the path of the project describable by any existing methodology?

The researcher observed the collection and development strategies employed by the team and formed a general flow diagram. The resultant flow diagram for the content collection was then shown to the team members during the interview sessions. Both the research flow diagram (see Appendix 4) and the production flow diagram (see Appendix 5) were recognised by the participants as the practice employed by the team. Both diagrams illustrate task specific iterative cycles similar to the *IMM development model* discussed in Phillips (1997) and agile processes (see 4.2.3 & 4.2.3.1).

### 7.3.2 Decomposition

It was originally suggested that the project be based on an area with less content (see 11.2 Appendix 6 A), alternatively the project could be based initially on one smaller aspect of the narrative language area. By working towards the smaller section the team could quickly learn whether the project was achievable. At this point **P** (main stakeholder and project champion) stated reasons for using the narrative language area and addressing the entire area. These reasons justified the decision at the time to continue development on the entire narrative area. The team also chose to tackle the entire area as a result of the amount of people that were available to research and collect content (see 11.2 Appendix 6 B). It was the team's opinion that by collecting all the content the team would be better placed to design the flow of the CD.

It was suggested at the same meeting, the team break down the narrative area into related areas and to use this as a type of project decomposition (see 11.2 Appendix 6 C). Each content member was set with a topic for research toward the content. The method of decomposition was the concurrent model discussed by Maylor (1999). The one difference being that there were more content areas than members in the content team. The team worked through the content areas iteratively and incrementally. The iterative process used by the content team is captured in the diagram 0 (*Appendix 4: Phase 3, Research* Flow Diagram*)*. During this process some members worked independently whilst two worked collaboratively.

### 7.3.3 Using Collaborative Methods

The importance of collaboration and instant feedback through a co pilot in learning and problem solving situations has been identified in current research (Derby, 2002; Dusseault, 2003; Williams & Kessler, 2000). The use of collaboration is important not just for the learning in parallel to the task (Derby, 2002) but in the enjoyment and motivation during programming and problem solving (Williams & Kessler, 2000).

The benefits of collaboration are not limited to the development of software. Indeed there are many times when teamwork is essential, for example *the buddy system* in scuba diving. Writing an important email or making important decisions, are also good examples (Dusseault, 2003). The team have used collaborative methods to *design/research, develop, test/try* the collection of content germane to the product. It was also noted that collaboration had been a keystone to the success of the later stage of content development. **SP** stated that one of the greatest achievements of the project was the working relationship she had created with **T01**. Part of this relationship had also helped **SP** to see things in a more teacher oriented fashion and helped her to then generate content specifically for the digestion of teachers. Later **T01** indicated that working with **SP** was one of the benefits she experienced from the project. **T01** added that the nature of the working relationship was rewarding because **SP** was as reliant on **T01**'s feedback as **T01** was on **SP**'s feedback.

Another example of collaboration during the project was found in the CD production. A design and development environment rich with instant feedback was created through the use of Hypertext Mark-up Language (HTML) and a What You See Is What You Get (WYSIWYG) HTML editor Macromedia Dreamweaver MX.

The immediately reviewable results of the HTML scripting language and the Dreamweaver design tool allowed **T02** to see for himself the results of changes to the product. The nature of the design tool also made it easy for the co pilot **T01** to make constructive criticism of the design and placement of the content without the need for advanced IT knowledge such as HTML script. The design tool was found to enhance the collaboration. The use of such a tool was also found to be important because it enabled people trained in the focus of the content to deliver coherent products with professional design. The focus was placed on the knowledge and content, not the skill of implementation.

### 7.3.4   Summary

Pockets of the IT industry have used iterative processes in the achievement of unfamiliar tasks and to implement on the job learning. This project was to a large extent a learning task with unfamiliar goals. By decomposing the content area and production tasks, and working collaboratively, the team could ensure content and production quality. The team have also demonstrated the adaptation of a methodological framework, which by convergence is similar to those used in similar situations in industry.

## 7.4   Cost

The cost to the organisation can be discussed in terms of monetary cost and the impact on the team/ organisation. The focus of this study was neither on how

much money the project would cost nor how much a third party would charge to develop the product. The evaluation of cost effectiveness could be considered for future research. However, during the interview **T02** discussed the monetary cost of the project: **T02 stated** *"the cost in terms of time is* [the] *main concern, the cost in terms of teacher wages is fine. It's estimated to be $8500, that's going to continue, so well above $10000."* $ 8500 is based on 480 hrs so far expended on the project.

The attitude to the time cost of the project was that as long as the product is used properly it has been worthwhile. **T01** stated that *"if it took five years to make and it was still useful then it would be worthwhile. If the product is really ridgy didge but not accessed then it will not be worth while."* The type of study the researcher has presented thus far is social in nature. It is appropriate, given the social focus of the study, to discuss the impact of the project on the team.

The cost to the organisation is that PD on CD is diverting the teacher's attention from other roles and tasks. There is evidence to suggest the project caused extra stress on the project members.

### 7.4.1 The impact of the project on the normal roles and responsibilities of the team

It is understandable that if an employer changes the nature of a staff member's role the staff member could experience some level of stress. This stress can be attributed directly to the instituted change (Maylor, 1999). Stress can also be attributed to the difficulty of a task or change. An overload of stress in the working environment can also impact negatively on the employee's motivation and ability to work. Change management theory attempts in part to use this form of stress in a constructive manner (Maylor, 1999). Thus the impact of stress on an employee can be both positive and negative.

The project could be seen as a source of stress for the participants of this study because of the change it brought to their normal roles. **T01** related her frustration of the impact on her normal role, she stated that the project made her "*stress and worry that* [she] *wasn't doing a good enough job* [in the classroom]." **SP** was also worried that working in the team would not only impact on her time and duties at the school but the ethical issues may impact her career or continued employment. **SP** also stated that the understanding she obtained from the teachers, about the way they saw *narrative* and the types of strategies they needed, was quite valuable.

One issue that seemed to have been lost in the whole project was the fact that teachers enjoy teaching - the student contact component of their work. That is why they are teachers. **T02** found that the project had a negative impact on one part of work. "*It has pulled me out of the class, I'm not in the classroom at the moment and that's affected me because I'm a teacher and I like being in the class. In order to be part of the project I've had my class contact cut.*"

### 7.4.2 The impact the normal roles and responsibilities had on the project

**T01** had a positive attitude to the impact her normal role had on the project. **T01** stated "[my teaching experience had] *a good impact actually, if I didn't have the training and the background and the role that I have then I wouldn't have been able to continue like I had.*" However **T01** prioritised her normal teaching role over that of the project "*It was a balancing act. If I had other stuff to do then I would miss narrative, but then I would have to make it up later. I put my teaching first!*" **T01** attributed this to the lack of dedicated project time "*.. that's only because I wasn't allocated time for it. It hadn't been given enough value because there wasn't time*

*allocated to it. "* **T02** stated similarly that the normal roles had a large impact on the project *".. because there have been times when I've had to say 'can't do narrative CD today'"*

### 7.4.3 Summary

Whatever the final outcome of this project, there has been a significant cost to the employees. There is evidence to suggest the project caused extra stress on the project members. The project also impacted on the enjoyment of their teaching role. The cost to the organisation is that the teacher's attention has been diverted from their normal responsibilities. The cost to the students has not been investigated and would warrant further investigation.

## 7.5    Determining the success of the project

One of the limitations of this research was that the potential for observation lasted longer than the life of a typical Honours research. The project itself was initiated in August 2002 and at that time it was to be completed in July 2003. As explained in the discussion, the project's size was seriously underestimated. The project manager **T02,** now has set a tentative completion deadline for July 2004. Given the incomplete nature of the project it was impractical to draw tangible conclusions on the projects success - at least the final product. As an exercise in interest, the researcher scheduled questions regarding the success of the project. These questions were simply *Did you feel the project was a success?* followed by *What do you feel helped the team succeed?* and *What do you feel hampered success?*

The information that was obtained by asking these questions proved useful. It helped determine if the participant felt the project would truly be useful, if it had quality information, and ultimately if they thought the project had been a success up to that point. Some positive and negative points were given light.

The project was also assessed in terms of future feasibility, given the structure of the team and the progress to this point. This was done by examining the skills the team members demonstrated in their roles and objectively discussing the quality of these skills. The discussion uses the findings of the study conducted by Phillips (2001) as its basis. The researcher discusses this as the potential for success.

### 7.5.1   Did you feel the project was a success?

Based on the CD being incomplete the respondents stated that it would be difficult to determine. **T01** believed that the project would have to be used and evaluated before success could be assessed. **T02** stated *"I think its success depends on what we finish up with at the end really. But I feel we have gone further than I expected"* **T04** said after reviewing the strategies section of the CD *"oh it's fantastic."* **T02** also stated *"I think if we present the strategies[3] well, that part will be used real well, I'm not convinced that the theory[4] part will be well read [or] well used. Success is based on use. However the fact that all the resources are in one place will benefit our future attempts to deliver PD."*

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[3] The CD presents strategies for teacher development, strategies for including narrative in the classroom and strategies for assessment.

[4] The CD has sections devoted to narrative theory, the relationship narrative has with other language areas and the relationship between narrative and components of school curriculum such as math.

The views of the team throughout the project were a little more negative. Figure 7-3 shows the respondents' attitudes to the success of the project. The source data was collected at three points throughout the study. The participants had to respond to the statement *I am confident the project will succeed*. The trend was for an increasingly negative opinion of the project's potential success over time. This seemed to be a paradox compared to the data that had been collected in the interviews. The data collected in the surveys may have been impacted by factors discussed in the previous section. The factors include increased stress, and unclear or unachievable project deadlines.

The interview data collected two months after the last survey instrument was administered indicated a more positive outlook on the expectations of success. This may be explained by the participants reflecting on what had been achieved and the obstacles that had been overcome. Indeed there had been reflection on the skills and techniques that have been used to overcome the difficulties.

**Q6 over time
(I am confident the project will succeed)**
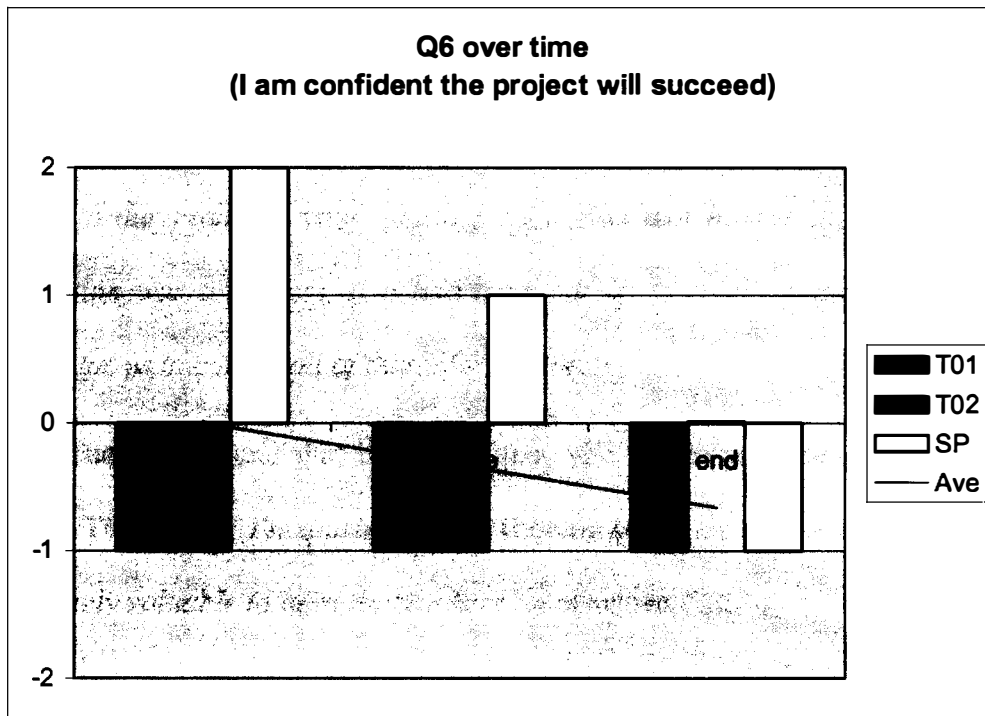
**Figure 7-3 respondents over time Q6**

### 7.5.1.1 What do you feel helped the team succeed?

The team members believed that there were two main areas that contributed to the success of the project. The first was the eventual allocation of time and the second was the skill set of the team.

When the teachers where asked what assisted in the success **T01** very quickly responded that time allocation was important to their success. **T01** stated that once time was allocated it *"relaxed the team and gave them time to collaborate"*. **T02** found that having time meant that they didn't have to scratch around for time and that meetings could be attended where before he couldn't. **SP** had no such problem because of the issues raised in section 7.2.2.1.

The second area the respondents recognised was the skillset. **SP & T01** had found that they were able to learn from the others point of view. They therefore

benefited from the others skills as an expert in their respective areas. **T01** gave an example of what **Sp** asked her during a collaborative session: *"SP asked me 'do you think this is what teachers want?', she was picking my brain".* **T02** stated *"having experts in our realm, having speech pathologists that helped collect and sort out information was a success, if it had been left up to teachers it would have been difficult for us to collate all of that information."*

The team found that being familiar with the subject matter also aided the process. **T02** stated *"Yes looking at who is going to use the resource – teachers. So it is definitely valuable to have the teachers' perspective."*

**T02** also reflected on the use of collaboration to "overcome the errors and obstacles." T02 indicated that *"we are currently on level three* [see 11.1 Appendix 5] *at the moment* [working with **SP**]. *this current problem was started on three weeks ago. The problem is a gap in the content."* **T02** added *"we work collaboratively to get a job done - a collaborative team approach."*

### 7.5.1.2  What do you feel hampered success?

The attributes and obstacles that hampered progress and in some way impacted on the success of the project have been covered extensively throughout the discussion. There was one factor that did emerge when interviewing **T02.** He believed that having the stakeholder **P** at more of the meetings would have been of benefit to the project. T02 stated: *"**P** not being a part of the team* [withdrawing too early from the project without giving adequate direction, hampered the project]. *If **P** had have stayed involved she would have been more of a driving factor. Because the main driver disappeared from the project it was hard to get going."*

### 7.5.2 The Potential for Success

In answering the question "is it effective for teams such as the team described in this study to develop EIMM?" one may look at Phillips (2001) assertion that with the correct balance of skills, there is potential for success. Reflecting on Phillips' study, section 4.3 lists educational design, programming, and project management skills. The teachers and speech pathologist have all recognised the potential for success. The following sections discuss the potential for success by asking: How did the team fair in terms of Phillips' assertion?

#### 7.5.2.1 Project Management

The literature discussed the importance of the project manager in managing the team and feeding the team descriptions of the goals. The project manager's role was to also make an environment that enabled the goals to be achieved. The project manager is also the team's interface to the stakeholder and vice versa. At some point the project manager failed in his communication with the stakeholder to obtain adequate description of the relevant goals. He also failed to secure the resources necessary to achieve the goals. However the ability of the team to communicate with the project manager meant that they were eventually able to overcome those difficulties.

The literature also discussed the selection of the project manager and relevant selection criteria. The project manager (**T02**) over time displayed a strong ability to manage the task and also came to understand the role and responsibilities of the project manager. The fact that these lessons where learned through trial and error does not impact the legitimacy of the lessons. It is a fact that the project manager was an unwilling participant chosen by the stakeholder, however as **T02** stated he tried not to let that get in the way. It is clearly important to have a team that is managed by

a positive project manager. This underlines the impact of motivational factors, the size of the task and the way that the stakeholder initiates tasks.

SP, T02 and the researcher observed that T01 played a good part in motivating and managing the content team. T01 fell into this role while T02 was busy with other tasks. T01 stated that she felt uncomfortable taking on the responsibility of managing the content team in T02's absence but it had to be done because the team was loosing direction. SP stated that T01 might have made a better project manager because she was more goal oriented, and wasn't faced with the same demands in her normal role.

T02 had definitely demonstrated a growing knowledge of what the role of project manager meant. Eventually he was able to relate it to the other roles he played at the school, as a teacher and a deputy principle. T02 explained that this knowledge may have existed in him before but he was initially unaware of how to apply it "*I had been involved in project management on a smaller scale in the classroom setting goals with support teachers etc*". But in terms of future projects he stated "*I know what to expect so I could do it better next time, if there is a next time, because the project has been so long, I have grown.*"

The choice of project manager may not have been the correct one for this project given the other duties of T02. From the observations presented in the previous discussion it would be easy to suggest that T01 may have made a better project manager. However, T01 may have had different problems or handled a similar problem in a more detrimental way. There may have been a case for selecting an external project manager or allowing the team to select the project manager based on an awareness of the roles importance and function. It is more likely that after this

extensive learning experience the current project manager would be better equipped in the future. Thus, senior/management level teachers would generally be well equipped for a project management role.

### 7.5.2.2 Educational Design

Studies such as Rath et al., (1998) and Li (1996) looked at converting existing curricula to multimedia or CBL. Rath's (1998) study found that there was no significant difference between the models of curriculum development and electronic curriculum development. Teachers and senior teachers that have educational design skills and experience using them in the educational environment would therefore be appropriate for electronic educational design. Rath (1998) observed that the difference between both design models was in the process of programming the multimedia.

The teams approach to when they would implement the educational design aspects was in contrast to Phillips' (2001) study. The team established the structural flow of the content and planned to use this structure to guide later decisions. Other issues could be edited later allowing the team to concentrate on the content development and inclusion. This was also a point **T01** made stating, *"The content team didn't need to consider the multimedia. Although we have been considering what would be best* [the most interesting strategies to be presented] *as a small video."*

### 7.5.2.3 Programming

The programming of the CD had been handled by the project manager **T02** and the teacher **T01**. The level of programming at that stage handled by **T01** and **T02**

was aimed at the order the information was presented on the CD, the layout of individual pages and the general appearance and design of the interface.

**T02** selected a product called Macromedia Dreamweaver MX as the design environment. This decision was made because **P** wanted the product to eventually reside on the internet as a web site. Paragraph 3 of section 7.3.3 discussed other benefits of using this product and associated technologies such as the HTML scripting language. The selection of this product meant that there was no real need to learn or employ any complex programming until the layout of the project had been completed. This would mean that once the video and sound had been collected a programmer could work in collaboration with **T02** to include it. The two could then work together to create the more interactive components of the CD. However the CD was still in the content inclusion stage at the last data collection point.

### 7.5.3 Summary

It is impossible to gauge tangibly if the project was a success. Based on interviews with team members, the project was a success in regards to collecting the content and developing teaching strategies. Key milestones in the development of the project have been met; one of these is a centralised narrative resource.

The fact that the project had run for such a long period of time without being completed, took away from its success. A point picked up in the background was that the product would be suitable for use for the induction of new staff. With induction taking place at the beginning of the year, the project was not completed for use in one of its main functions. Therefore it was not a success in relation to that function for the upcoming year; rather it would have to wait until the following year. Obviously the delay was partly caused by the teachers other roles. However, there is

still great potential for this and future projects to be a success. This is based on the demonstrated skills of the team members.

# 8 CONCLUSIONS

## 8.1 Conclusions and implications from the literature

It is suggested that CBT and EIMM should employ all the attributes of social constructivism to obtain authentic learner outcomes. The inclusion of these educational attributes does not guarantee entirely the success of any CBT. The literature indicated there are significant architectural and educational hurdles that are still to be overcome. Both CBT vendors and learners face these problems. Until these hurdles are removed CBT creators will not be able to provide a fair playing ground for all users.

## 8.2 The conclusion on the teams ability to cope with the task and its obstacles

The team members studied in this project demonstrated an array of coping strategies. The team were in most cases, able to identify issues that could harm the progress of the project and find a solution. The lack of clarity surrounding the goals of the project was found to significantly increase the team's negativity to the project and decrease motivation. However when the team encountered obstacles such as a difficult task or low motivation, they fell back into familiar strategies. The most significant of these coping strategies was the use of collaboration, which was identified in more detail in reference to the path of the project.

### 8.3 The conclusion on the path and it's validity

The literature that has been reviewed during this study has discussed methods for the management and development of CBT. The literature had discussed the iterative and incremental paths that aid in project completion and on the job learning. These emergent techniques are also being used in industry for projects with unclear or unfamiliar goals. There is also a similarity between these emergent techniques and the research and development techniques used by teachers. The major components of the emergent techniques such as collaboration, iteration and problem decomposition were found to also exist in the model of development employed by the team. However, one failing of the processes employed was the effect the uncertainty of project goals had on the team's motivation and the time the project had taken. Stronger project management experience was found to positively affect the progress of the project and the team's motivation. Regardless of which process is used by other organisations big or small, the best process to use is the one that works best for the organisation participating in the project.

### 8.4 The conclusions on the success of the project

Under the circumstances the project cannot yet be ruled a success. There have been many factors that impacted on the success of the project. The most significant of these was that the project had not been completed by the initial deadline. The other issues including time allocation and unclear goals were found to have negatively impacted the motivation of the team and contributed to the failure to meet the deadline.

The impacts that such issues can have on a project have also been discussed in the literature. The majority of the obstacles faced by the team were in the domain of project management. As suggested by the discussion the project manager had improved over the life of the project, and eventually addressed the issues with the help of the team. The study has shown that by Phillips' (2001) assertions the team does have the required skills needed to succeed in such a project.

## 8.5   The effectiveness of the team

One of the goals mentioned by the stakeholder was her dream of having all the language areas (see Table 1-1) produced as CBT products. With the steepest part of the learning curve behind them there is the potential for the team to take on the other areas and therefore consolidate on their efforts. This conclusion is based on the premise that the team would now more easily identify and resolve emergent and familiar problems, assuming realistic time allocations are made to the team members. With this premise, issues related to the other tasks and responsibilities of the team would be reduced – also lessening the negative impact of the project on the team members other roles. Another premise for this conclusion is that the *narrative PD on CD* is evaluated to be pedagogically sound and useful to the target market.

# 9   LIMITATIONS AND FURTHER RESEARCH

## 9.1   Limitations of the study

The timeframe available for honours students to conduct their research was a limiting factor in the research. However, an important component of honours level

research is the ability to determine a research project that fits in the scheduled timeframe. The honours level researcher has to evaluate what are important issues relevant to his field and scope of the study and identify issues that can be better dealt with in future studies. Due to time restrictions the study was not able to asses the educational quality of the product and therefore its success. The researcher also recognised that the discussions of monetary cost and impact on the team members' students were studies that require in depth long-term analysis. The impact on the team members' current workload can only be accurately measured by conducting a long-term study. Such a case would require an independent and possibly worthwhile study. However, the researcher will collect anecdotal feedback from team members explaining their own observations on current workload impact

## 9.2 Further research identifying cost

Further research could be directed toward determining the cost of the project in comparison to similar projects and projects implemented by professional CBT authoring houses. Such a study would be decisive in comparing the monetary cost of in-house CBT projects. The cost to the students that are normally taught by the team members would also be a worthy study.

## 9.3 Further evaluation of project success

Further evaluation of the tangible success of the project would also pose a worthy study. Frameworks for evaluating the inclusion of important educational design attributes such as *An ECU framework for assessing quality of on-line learning materials* have been identified in the literature. Future evaluation of the PD on CD product could the follow these frameworks.

## 9.4  Further research on collaboration in CBT

The researcher found, as discussed in the literature review, that collaboration is an important attribute of the social constructivism model employed in education and CBT. However none of the literature discusses the inclusion of authentic models of collaboration in CBT. Stoney's (1998) study made a suggestion that a help system included in CBT could perform a collaborative function. Further research could be used to identify how dynamic or intelligent systems would aide collaboration in CBT.

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# 11 APENDICES

## Appendix 1: Interview Schedule

**Area 1: Is it effective for the HVLS to develop their own IMM based professional development?**

1   Did you feel the project was a success?

1.1 (If pos) What do you feel helped the team succeed?

1.2 (If neg)What do you feel hampered success?

2   What do you think were the obstacles projects such as ours face?

**Area 2: How does the team cope?**

3   What methods did you use to overcome the specific obstacles?

4   How did you detect errors?

5   How did you over come errors?

6   What methods do you think are useful to overcome the obstacles?

7   How did these obstacles change the shape of the project?

8   How did these obstacles change the cost of the project?

9   How did these obstacles impact on you?

10  Were there any Mistakes or bad decisions?

11  Did the change, from traditional instructional design to Instruction interactive multimedia design, increase the amount of obstacles or the size of obstacles?

12  What has changed over the life of the project that effected your answering of the question "The goals of the project have been made clear to me from the start?"

## Area 3: Time Management

13 How much time did you allow each week for the project?

14 How was this time spent?

15 How much time do you feel you needed?

16 Who do you feel is responsible for time management problems?

16.1     What part did L play\

16.2     What part did J play

16.3     What part did I/me play

16.4     What part did A play

16.5     What part did SB play

## Area 4: Path

17 Was there a particular planning process or project management tool/

methodology used?

18 What method did you use to govern the path of the project? (was it based on an

educational methodology or something else such as a software dev life cycle)

19 Does this image fit with your understanding of the researching phase? See

phase3.doc

Yes /if No then explain.

20 Does this image fit with your understanding of the process "placement of content

in the cd" ? See phase4.doc

Yes / if No then explain.

21 How much of your task would have changed if the project was to be developed

by an IMM company?

22 Would this have changed the quality? If yes, how?

23 Was being familiar with the subject matter and the target audience an advantage?

## Area 5: Cost

24 What impact did the project have on your normal roles/ responsibilities?

25 What impact did your normal roles/ responsibilities have on the project?

26 What was the team attitude to the cost of the project?

27 If it took less time would it have been worthwhile?

28 If it took more time would it have been worthwhile?

## Area 6: Benefit

29 How has your involvement in this project been of benefit to you?

30 Has the project increased your confidence in any way?

30.1    W.r.t. working in future projects?

W.r.t. working collaboratively with other team members?

# Appendix 2: Survey Questions

Please answer the following questions regarding the Professional Development (PD) on a CD project.

Where do I believe I fit into the team?
_____

Where do I believe others fit into the team?
_____

What special knowledge do I believe I can provide?
_____

About the next section (Questionnaire)
Some questions will require the ticking of a box, or request written responses while others will require you to circle a response such as [SA / A / N / D / SD] or [Yes / No] etc.
An instruction will be given at the start of each group of questions.

Please note the following abbreviations:
[SA / A / N / D / SD]  SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree.
Thank you again for your time and information.

| Please rate these statements | Please circle one |
|---|---|
| I know exactly what has to be done. | [SA / A / N / D / SD] |
| I would like to take on more responsibility | [SA / A / N / D / SD] |
| The team knows exactly what has to be done. | [SA / A / N / D / SD] |
| I feel I will gain some experience from the project. | [SA / A / N / D / SD] |
| I would like to take on less responsibility | [SA / A / N / D / SD] |
| I am confident that the project will succeed | [SA / A / N / D / SD] |
| This project will have a negative impact on my other tasks | [SA / A / N / D / SD] |
| The project team is of a satisfactory standard. | [SA / A / N / D / SD] |
| The goals of the project have been made clear to me from the start. | [SA / A / N / D / SD] |

What would you – in hind sight – change next time ?

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Please make any comments here. (Additional pages were attached for useful comments)

# Appendix 3: An ECU framework for assessing quality of on-line learning materials

**An ECU framework for assessing quality of on-line learning materials,** the following is an extract copied from the framework, which was sourced from:

Oliver, Ron, Herrington, Tony, Herrington, Jan, Stoney, Sue, & Willis, Jackie.(2001). *An ECU framework for assessing quality of on-line learning materials*. Retrieved 5 th February, 2003, from http://www.ecu.edu.au/lds/docs/quality_online_wg.doc

The framework described below has been developed at ECU to provide a means for consistent assessment and evaluation of on-line learning materials. It has been designed in the form of a checklist listing what are considered to be the critical elements of effective learning environments. The framework is intended to provide users with the capacity to investigate the potential effectiveness of on-line units through a determination of the scope and extent of these critical elements. A completed checklist will provide a detailed description to the user of the strengths and weaknesses of an on-line unit.

The checklist is based around the determination of critical elements within three main areas which describe the complete on-line setting:

- **pedagogies**, the learning activities which underpin the unit;

- **resources**, the content and information which are provided for the learners; and

- **delivery strategies**, issues associated with the ways in which the course is delivered to the learners.

The following section describes the critical elements within each of these sections and provides examples of how these elements can be manifested in on-line settings.

# 1. The pedagogies used in quality learning materials demonstrate:

|  | description | examples |
|---|---|---|
| **Authentic tasks** | The learning activities involve tasks that reflect the way in which the knowledge will be used in real life settings | • Problem-based learning activities using real-life contexts;<br>• Learning tasks based in workplace settings<br>• Tasks are complex and sustained |
| **Opportunities for collaboration** | Students collaborate to create products that could not be produced individually | • Tasks are set that require students to collaborate meaningfully<br>• Peer-evaluation, industry mentors<br>• Buddy systems employed to connect learners |
| **Learner-centred environments** | There is a focus on student learning rather than teaching | • Teacher's role is one of coach and facilitator<br>• Inquiry and problem-based learning tasks<br>• Activities support and develop students' metacognitive skills |
| **Engaging** | Learning environments and tasks challenge and motivate learners | • Interesting, complex problems and activities rather than decontextualised theory<br>• Activities arouse students' curiosity and interests<br>• Activities and assessments linked to learners' own experiences |
| **Meaningful assessments** | Authentic and integrated assessment is used to evaluate students' achievement | • Assessment is integrated with activities rather than separate from them<br>• Opportunity to present polished products rather than simple drafts<br>• Opportunities exist for students and their teachers to provide support on academic endeavour |

## 2. The resources in quality learning materials demonstrate:

| | description | examples |
|---|---|---|
| **Accessibility** | Resources are organised in ways that make them easily accessed and located. | • Resources are separate from learning tasks<br>• Intuitive and clear organisational strategies<br>• Resources are accessible in a non-linear format |
| **Currency** | The age of resources are appropriate to the subject matter | • Resources should where possible be current and based on regular literature reviews by lecturer<br>• Seminal works should not, however, be removed on the basis of age<br>• Use of primary resources is made wherever possible |
| **Richness** | Resources reflect a rich variety of perspectives | • Resources should represent a variety of views (including conflicting views) to allow students the opportunity to assess the merit of arguments<br>• Resources provide for a range of perspectives<br>• Media are used to enrich data sources |
| **Purposeful use of the media** | Media is suitable for the purpose intended | • A variety of media is used where appropriate<br>• Book on screen approach should be avoided<br>• Equally, elaborate multimedia should be avoided when a simple diagram would be suitable |
| **Inclusivity** | Materials demonstrate social, cultural, and gender inclusively | • Resources include a variety of cultural perspectives where possible<br>• Resources avoid gender and culturally exclusive terms<br>• Separation of local and generic content to facilitate customisation and adaptation |

# 3. The delivery strategies in quality learning materials demonstrate:

|  | description | examples |
|---|---|---|
| **Reliable and robust interface** | The materials are accurate and error free in their operation | • Site is accessed reliably<br>• navigation and orientation is seamless<br>• Many forms of on-line support for learners |
| **Clear goals, directions and learning plans** | Unit information and expectation of student roles are clear | • Students can find information on the website about the unit and its requirements<br>• Unit structure makes explicit relationships between learning outcomes, resources, activities and assessments<br>• Instructions clearly placed and always available |
| **Communication** | The unit provides opportunities and encourages dialogue between students and between teachers and students | • Information and communication channels are open and inviting for students<br>• Students are encouraged to communicate with the teacher and other class members |
| **Appropriate bandwidth demands** | The materials are accessible without lengthy delays | • Graphics and other elements checked for download times.<br>• Delivery formats employ strategies to optimise download times |
| **Equity and accessibility** | Unit materials and activities are accessible and available to all students | • Websites are accessible to disabled students<br>• Course requirements and resourcing made explicit to students ahead of the course<br>• Students are not hampered by firewalls or geographically sensitive restrictions |
| **Appropriate corporate style** | Units adopt a corporate style for websites to ensure a benchmark quality of presentation | • Layout and presentation should incorporate common elements on the unit homepage reflecting a corporate style<br>• (The corporate style should enhance rather than dictate a pedagogical approach)<br>• Fonts, resolution etc should conform to the corporate style where possible, but alternatives should be possible when needed |

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# ECU on-line learning quality checklist

## 1. the pedagogies

| | never | sometimes | always |
|---|---|---|---|
| **Authentic tasks**<br>The learning activities involve tasks and contexts that reflect the way in which the knowledge will be used in real life settings | | | |
| **Opportunities for collaboration**<br>The environment encourages and requires students to collaborate to create products that could not be produced individually | | | |
| **Learner-centred environments**<br>There is a focus on activities that provide degrees of freedom, decision making reflection and self-regulation. | | | |
| **Engaging**<br>The learning activities challenge learners and provide some form of encouragement and motivation to support the engagement | | | |
| **Meaningful assessments**<br>Authentic and integrated assessment is used to evaluate students' achievement | | | |

## 2. the resources

| | never | sometimes | always |
|---|---|---|---|
| **Accessibility**<br>The resources are organised in ways that make them easily accessed and located. | | | |
| **Currency**<br>The age of resources are appropriate to the subject matter | | | |
| **Richness**<br>The resources reflect a rich variety of perspectives | | | |
| **Strong use of the media**<br>The materials use the various media in appropriate ways | | | |
| **Inclusivity**<br>The materials demonstrate cultural and gender inclusivity | | | |

### 3. the delivery strategies

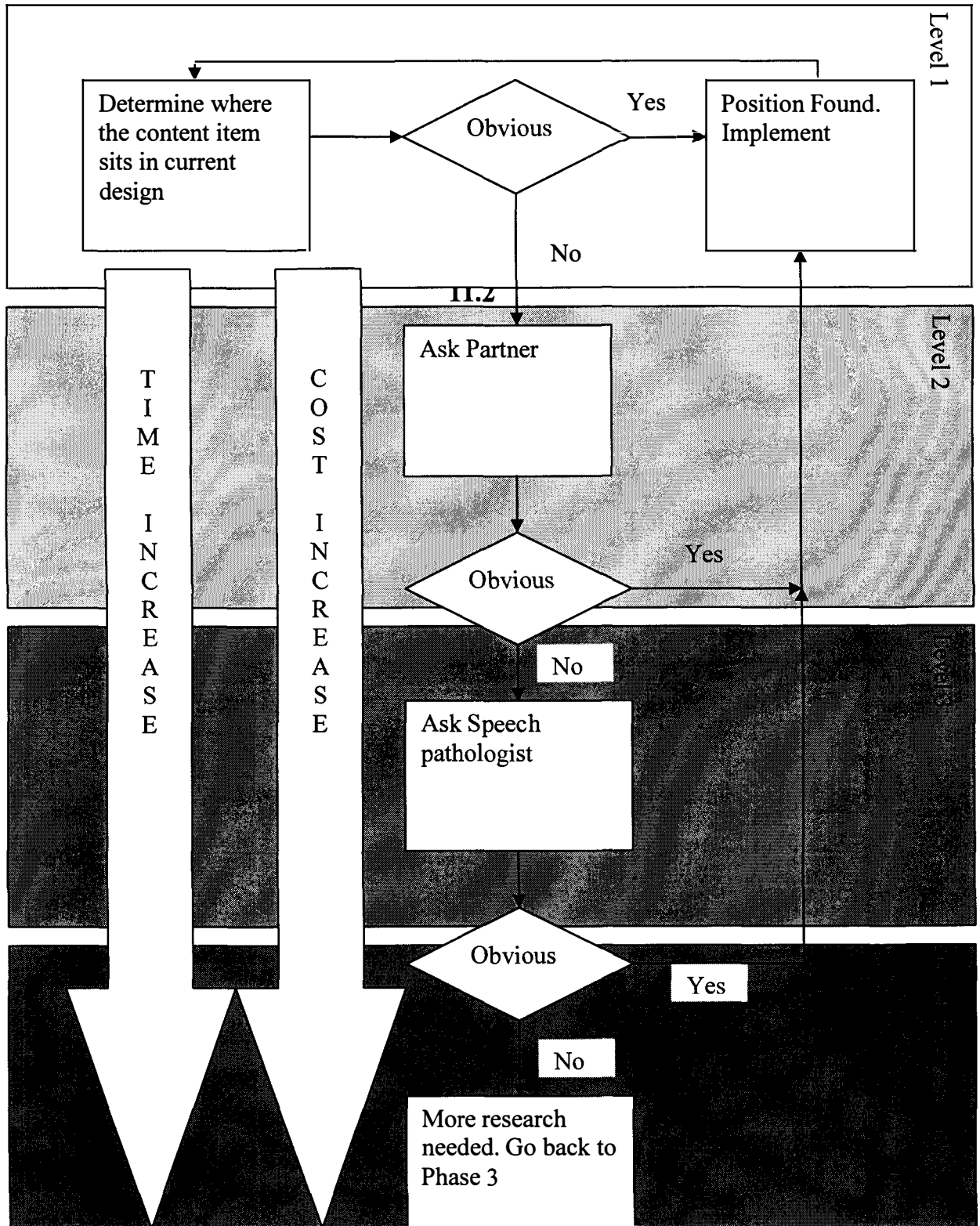| | never | sometimes | always |
|---|---|---|---|
| **Reliable and robust interface**<br>The materials are accurate and error free in their operation across all platforms and browsers | | | |
| **Clear goals, directions and learning plans**<br>Unit information and expectation of student roles are clear | | | |
| **Communication**<br>The unit provides opportunities and encourages dialogue between students and between teachers and students | | | |
| **Appropriate bandwidth demands**<br>The materials download without lengthy delays | | | |
| **Equity and accessibility**<br>The unit materials and activities are accessible and available to all students enrolled in the unit | | | |
| **Appropriate corporate style**<br>The materials use a style that is compatible with ECU policy and guidelines | | | |

# Appendix 4: Phase 3, Research Flow Diagram
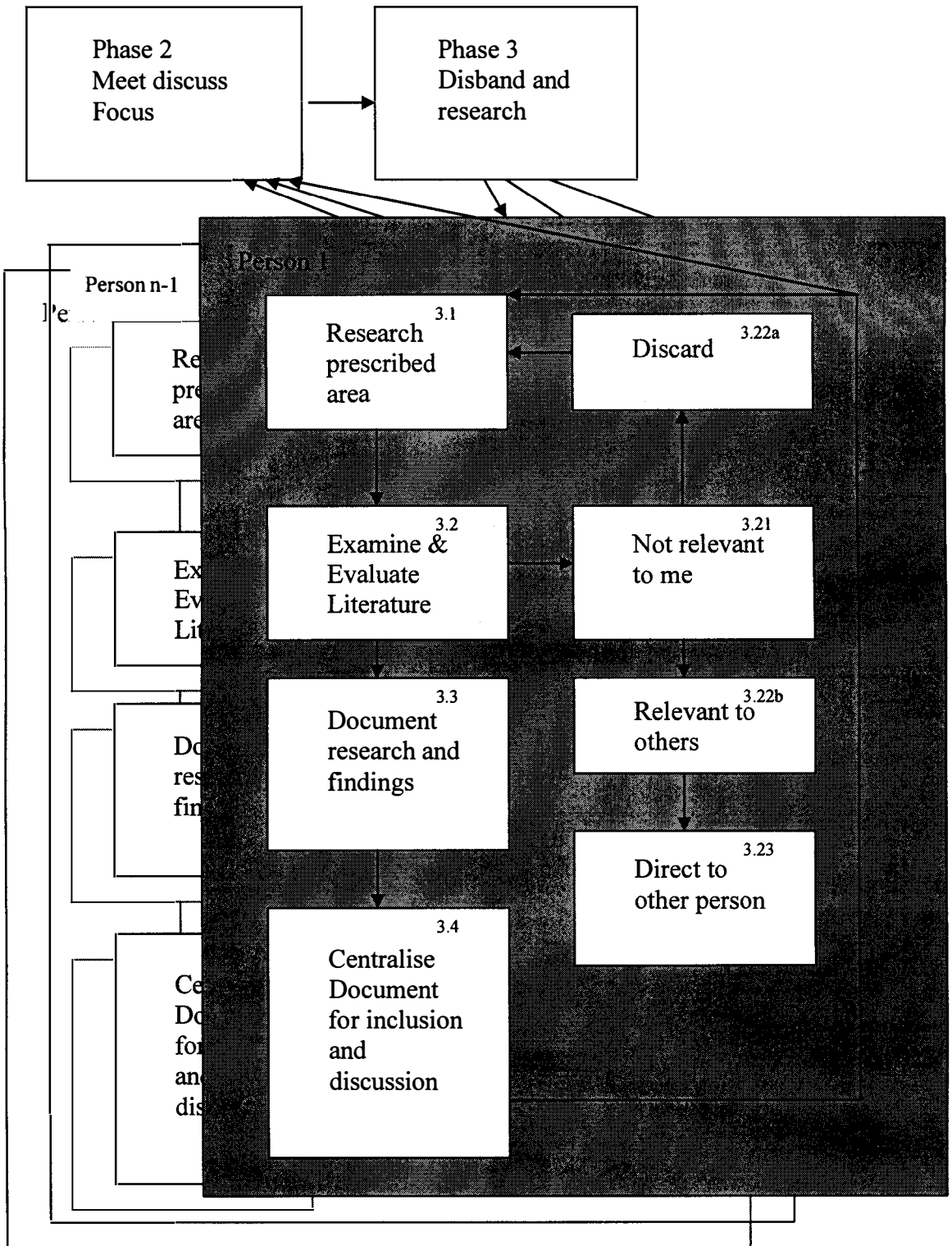
# Appendix 5: Phase 4, Production Flow Diagram

Determine where the content item sits in current design

Obvious

Yes

Position Found. Implement

No

11.2

Ask Partner

Obvious

Yes

No

Ask Speech pathologist

Obvious

Yes

No

More research needed. Go back to Phase 3

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# Appendix 6: Project Decomposition Diagram

## A: Small project

Deliverable

Low Risk
Low Gain
Smaller management effort
required
Less time

## B: Large project

High Risk
Large Gain
Larger management effort required
Long time

Deliverable

## C: Large project

Phase 1          Phase 2          Phase 3          Phase n

Deliverable      Deliverable      Deliverable      Deliverable

Low Risk
Large Gain
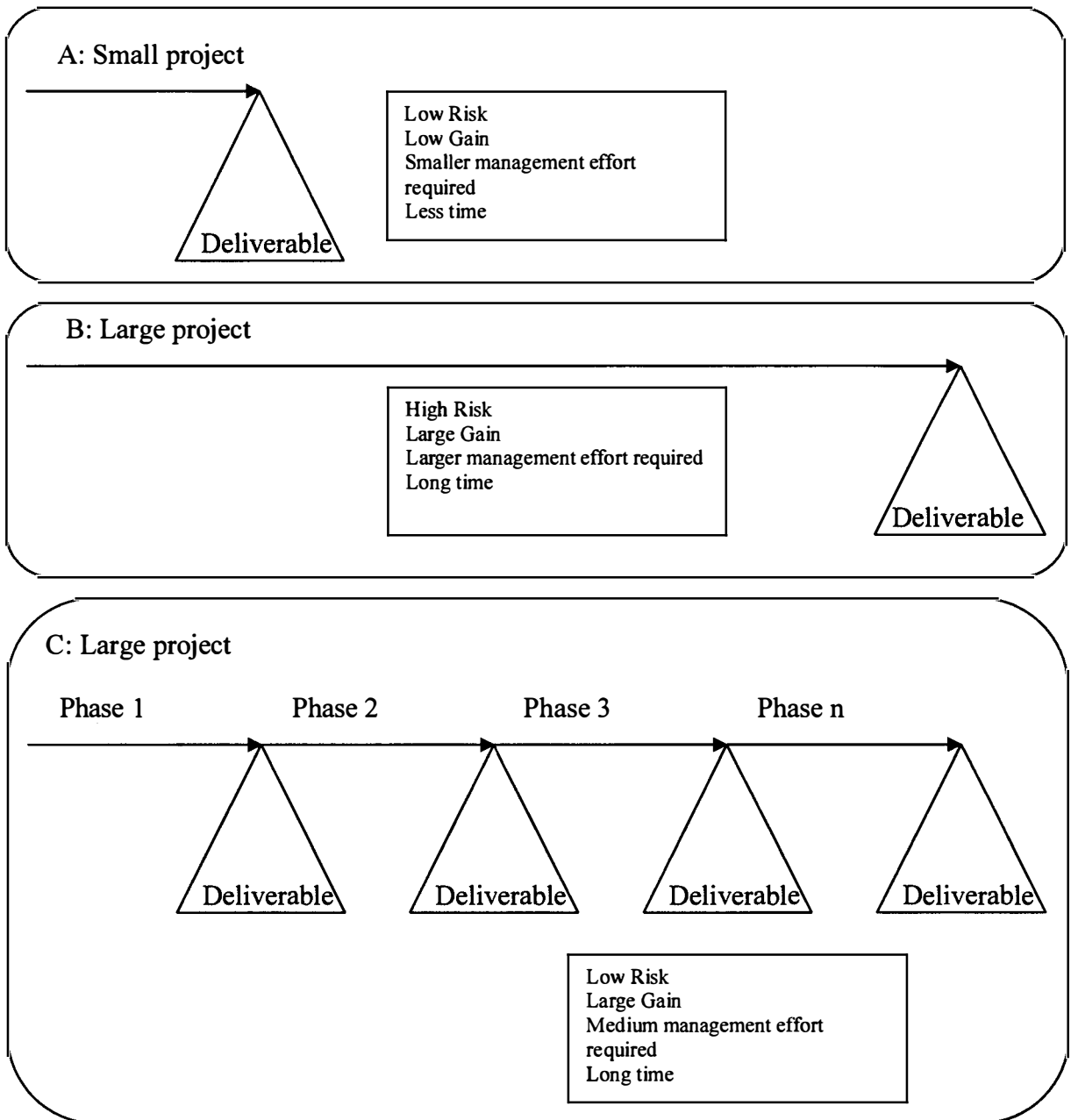Medium management effort
required
Long time

Diagram developed from principles in Maylor (1999) and Gido et al.,(2003).

**Figure 11-1 Project Decomposition Diagram**

## Appendix 7: Disclosure and informed consent

## The Development of an Interactive Multimedia Based Professional Development

## STATEMENT OF DISCLOSURE

Thank you for your interest in this study.

The aims of the study are *"To determine the effectiveness of using a team of teachers, to create an interactive multimedia resource for the purpose of professional development."*

And in determining this, answer the following questions.

Is it effective for the school to develop their own IMM based professional development?
How does the team cope working in unfamiliar territories?
What costs are involved (financial, time, other work responsibilities)?
What path does the project execution take?

Other than the professional commitment you have made as a staff member involved in the "PD on a CD" project, that serves as the basis for the study "The Development of an Interactive Multimedia Based Professional Development " the impact on you will be minimal. Most data will be collected in the form of meeting minutes, and two surveys. The meeting minutes will take up no extra time than has been allowed for project meetings. These will be used to collect information on the direction of the project, and the problems that arise during the project lifecycle.

The surveys will be used to ask questions about your observations, feelings and the impact on you. One survey will be delivered at the start of the project, the middle and the one near the end.

The perceived benefits will be the opportunity to participate in the development of an Interactive Multimedia Resource.

The project will empower the participants to develop further Interactive Multimedia Resources. It is envisaged that these resources will be used to educate the wider mainstream teaching community on the issues surrounding language development.

As a participant in this study your current position will not be prejudiced in any way by your refusal to participate in the study component of this project;

Any questions concerning the project entitled "The Development of an Interactive Multimedia Based Professional Development"
can be directed to James New of SCIS on ▮▮▮▮▮▮ or ▮▮▮▮▮▮

If you have any concerns about the project or would like to talk to an independent person, you may contact Dr Shirley Bode on email ████████████████ or phone ████████ .

## Informed Consent

I (the participant) have read the information above and any questions I have asked have been answered to my satisfaction.

I agree to participate in this activity, realising I may withdraw at any time.

I agree that the research data gathered for this study may be published provided I am not identifiable.

I understand that I will be interviewed and the interview will be audio recorded.  I also understand that the recording will be erased once the interview is transcribed.

**Participant :**                                   **Date:**

**Investigator :**                                  **Date:**