

How can I construct a web based portfolio system as I create my own living educational theory?

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Alpha version of portfolio system available at: www.darragh.info – this version of the system is the one tested by users. All of the areas for improvement identified in the user testing remain on this version. In addition in this version it is not possible to upload a file currently as the hosting company hosting the site need to set up permission to do so on their server. This version will be available until August 2004.

ABSTRACT:

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CHAPTER 1 - INTRODUCTION.

1.1 Introduction

The use of technology to manage learning is not a new development, but the increasing proliferation of technological platforms, and information sources that exists currently is a situation which many educators have not been faced with before. This increase in the platforms and information available is matched by the increased production of digital assets by institutions and individuals. Individuals are generating more and more information and assets in a digital format, from documents, and theses, to web sites, photographs, videos etc. These digital assets vary from learning theses, to web sites, to documents, to assignments, to reports etc. This increase in the volume and variety of digital assets has led commercial organizations, educational institutions, and individuals to reflect on the different ways of managing digital assets. (Campbell 2004)

Among the many approaches to managing the emerging digital assets is the area of electronic portfolios (e-Portfolios). The advent of e-Portfolios is a relatively recent phenomenon with their value being debated and contested among a wide variety of interested parties. An e-Portfolio at its simplest is a collection of digital assets or a collection of a persons or peoples work in a digital format. An e-Portfolio may be individual, and designed and controlled by an individual, or it may be institutional, designed and controlled by an institution, with various combinations of both. There is an incredible diversity of e-Portfolio definitions, and also ways of implementing an e-Portfolio. These variations are often reflected in the differing needs of individuals and organizations and the resources available to both.

This dissertation will proceed as follows:

- Chapter One introduces the project, and the context of the dissertation.
- Chapter Two reviews the literature around e-Portfolios.
- Chapter Three analyses the living theory action research educational theory as a methodology
- Chapter Four analyses the process and results of the project.
- Chapter Five is the user testing and evaluation results.
- Chapter Six reviews the recommendations and conclusions that emerged.

1.2 Aims

The purpose of this research is to examine the design and implementation of an e-Portfolio system using open source software, and in doing so, I hope to learn the computer programming languages involved. I am a complete novice in the programming languages and applications I am using, but I am using them because they are popular across the web, and being open source, they are cheap in comparison to commercial alternatives. Barrett (2004) identifies that the majority of e-Portfolios used by individuals tend to be characterized by static content, and are not supported by a database. I also want to try to bring the functionality of a database and the dynamic data driven capabilities to individual learners, for their own use.

As a complete novice in the particular programming languages, and also in the design and construction of databases, I am conscious that I will need the assistance of others in the process of the development. I hope to make the contributions of others clear through including their own words where possible. The methodology I am using is “living I” action research, where I put myself, my learning and the relationships involved in my learning under the spotlight, and make public the process of my practice of learning and applying my learning. In this I am influenced by Whitehead (2004), Farren (2004) and McNiff (2004). For this reason I write using “I” and my values are an integral part of the process of a living theory approach.

I aim therefore to show the process of my own learning of open source applications, the computer programming languages involved, and the relationships and contributions of others that make my learning possible. The central focus of the study is my learning, but I also aim to test the artifact I develop with others and ensure that it is usable, and I will incorporate the user testing results as an evaluation of the product. I will be reflecting on is the support available to a novice in learning the technical aspects of the programming. The process is one which is characterized by a ‘conversation with materials’ (Schon 1996)

1.3 Context of the Study

The context of the study is my own practice of learning, and my practice as a trainer in a large commercial organization. For the study, I work with a group of fellow learners within my workplace, and colleagues from Dublin City University, to learn the design, technical and research skills to develop an e-Portfolio tool for use by myself and my fellow learners in our learning practices. The total number of people involved in the study is less than ten. I introduce the participants in the process in Chapter 4.

1.4 Technical background (A Glossary can be found in Appendix A).

The open source applications being used are Apache Web Server, MySQL and PHP, which are available to download as EasyPHP from www.easyphp.org. Open source is a type of license for software which makes the code used in the application visible and available for public scrutiny. The open source community tend to make their work publicly available through the internet, and invite contributions from other

programmers. This approach is one which appealed to my educational values. The applications being used represent three quarters of the LAMP platform which is favoured by large sections of the open source community. (LAMP stands for Linux (an open source operating system), Apache Web Server, MySQL and PHP). The difference in my study from the LAMP platform is that the development is taking place on the Windows XP operating system.

1.5 The applications explained.

Apache Web Server

This is a Hyper Text Transfer Protocol (HTTP) server used by more than 60% of internet connected computers (Williams and Lane 2003: p7). This processes HTTP requests which are the requests sent from web browsers such as Internet Explorer to web servers. In other words it allows users / clients to access servers which store information that is found on websites. It is designed and developed by the Apache Software Foundation.

MySQL

This is a medium scale Database Management System (DBMS) which runs SQL the structured query language used in Databases. MySQL is very popular and supports multiple databases. There are other similar systems available under open source licenses, but this one is often associated with PHP the programming language.

PHP

PHP is an acronym for Hypertext Pre-processor, which is a server sided scripting language, developed by the Apache Software Foundation. It is code which is stored

in a file on a server, and can be embedded or used with HTML which is a factor in its popularity. It is a language that allows for communication between a database on a server and a client or user with a web browser.

1.6 Background on living educational theory

As part of my practice as a trainer in a large commercial organization I wanted to address a concern in my practice which was, how do I provide a support for people in their development, which is centered on aiding the construction of their own learning, rather than a transmission of information required to be operationally proficient. This I found to be a 'living contradiction' between my educational values and my actions in practice (Whitehead 2003). My educational values are based in facilitating learning and development in a long term way which is user centered. I was not happy with my practice in doing this and I wanted to try to learn technical skills, and also to try to offer an opportunity for learners to learn and develop in their own way. This approach to pedagogy is premised on Dewey (1975) which suggests that learners make their own meaning based on their own experiences. It also takes on board the view of Knowles (1987) that adult learners value informal aspects of education and learning.

1.7 Background to the research and ontology.

In this study, the learners are considered as co-researchers in keeping with my educational values, which also means that they are co-designers in the process of design and development of an e-Portfolio system. Elliot (2004) suggests:

'Action' involves initiating change in a social situation to bring about something new in the web of social relationships that constitute it. The consequences of 'action' for the agent and those affected by them, where they will lead, cannot be entirely foreseen in advance. 'Action' therefore becomes a matter of continuous negotiation with others through the construction in

process of 'transient accounts' as it unfolds in the process. The full story of 'action' can only be pieced together after the event. (ibid 2004)

In keeping with my educational values the continuous negotiation and communication with the other participants is an integral part of the process, and their narratives are incorporated where possible in the research. Following Elliot's view (2004) there is no suggestion of uncovering a general objective truth in relation to the theory produced by this research. It is an emerging living theory in my practice. The choice of methodology and my educational values are discussed in greater detail in Chapter Three. I would state at this point that living action research educational theory is an ideal approach for me and my educational values.

As Elliot (2004) and Farren and Power (2004) suggest that inter-connectedness of people is a crucial aspect in learning, but this does not imply that everyone shares values, or shares similar perspectives or necessarily has to. Farren identifies this mutuality and summarizes the perspective:

The ontological and epistemological significance of moving from 'I' to 'We' emphasizes the relational knowing in I/We relationships in which 'I' is not lost in the 'We' but engages in relational processes of educational enquiry involving I-We relationships. (Farren and Power 2004)

1.8 Problems with off-the-shelf

I didn't choose an off-the-shelf package for this research. The simple reason for this is that I wanted to learn the technical skills involved in building dynamic database driven websites. At the same time I also wanted to research the learning process of gaining these technical skills, and to see what kind of support is available from the open source community to a novice in the field. There are many vendors in the technical marketplace selling products and applications. However, by designing the product myself, I retain control of the design process and the learning process. I also

thought that it would be a more valuable learning experience as I would really have to learn the basics, and the essentials of the computer programming. The ongoing administration of the site would then be in my own hands, which would put me in a position to improve the product as I attempt improve my practice, and my programming skills. An off the shelf package would possibly supply similar functionality but if anything went wrong with the process I would not know enough about the packages to be able to amend them accordingly, and would therefore be relying on support services. I would also probably not learn as much from the process. My preference is to be as empowered as possible in my own practice. When I learned how to design web pages in HTML (Hyper Text Mark Up Language) I found I learned more by learning the languages syntax than by using an editor like Macromedia Dreamweaver or Microsoft FrontPage which will write much of the code for you.

In the module Educational Applications of Multimedia, in the M.Sc in Education and Training Management Ken Maher, who taught web design, began by teaching HTML, before introducing the class to HTML editors such as Macromedia Dreamweaver. My practice benefited from this approach as I was able to consistently trouble shoot on the HTML code when things went wrong. In other words because I knew the syntax involved in the language I was more empowered to manage its use. It is in reflecting on this experience that I decided to go through this process rather than choosing an off the shelf package. The modules covered in the H.Dip / M.Sc in Education and Training Management for the Information Communication Technology (ICT) stream were:

- Pedagogies and Learning
- Educational Applications of Multimedia

- Collaborative Online Learning Environments

Through these modules I learned how to program in HTML, and as I reflected on my own learning and the way the modules were taught I decided that this approach of learning the basics would be the one I would take myself. I then began to consult the relevant literature which suggested the need to bridge the gap between the designer and the researcher of education.

There's no doubt that educational research is essential to the development of successful learner-centred practices, but there's a considerable disjuncture between the worlds of the educational researcher and the instructional developer.
(NLII Annual Review 2003)

CHAPTER 2 – LITERATURE REVIEW

2.1 Background

In many ways Wittgenstein's metaphor for language, that of a city, could equally be applied to learning and Information Communication Technology (ICT) (Wittgenstein 1953). There are old quarters, which though admired for their antique value, are often the home of dying languages and cultures with declining numbers of people aware of them and their influence. There are the stable current environments, with clear communication channels, and a highly developed infrastructure, and agreed structures and planning processes and standards. Finally, there are the under construction areas representing the newly emerging areas of the city that require time to mature and develop before they become accepted. Each area of the city and grouping of people has their own vocal community groups, advocates and critics.

When you add to this diverse mix the divergent perspectives of the open source (non-commercial) and the commercial communities, ICT and learning becomes a sprawling metropolis, with different groups of individuals describing the territory according to their own positions. The meaning of this global level of super-complexity (Barnet (1999)) is negotiated by individual educators and learners in their own contexts, who very often are placed into a certain area of the city by the technology platforms that are available to them in their practice and learning contexts.

2.2 e-Portfolios – A New Quarter

One of the many emerging quarters in the metropolis of ICT and learning is the idea of an e-Portfolio. There is a proliferation of terms and terminology in relation to on-line learning and digital assets. As well as e-Portfolios the concepts of virtual

identity, web folios, learning objects and digital repository's also arise in the literature. As you can see from these various descriptors, the identities and identifiers of e-Portfolios are not fixed. The semiotic ground rules for what labels and descriptions to use in relation to web based identity and digital information are emergent and chaotic. Indeed Phil Long of Massachusetts Institute of Technology (MIT) suggests that the area of e-Portfolios is the subject of a "tribal discussion" (Batson 2002) among the higher education community. As with any new quarters the mapping of the territory is subject to enormous debates about issues like planning, planning standards, construction costs, security, resources, access, transport in and out, and what kind of living space will it be when it matures. There is also considerable debate over who can tender for the construction business, with both commercial and non commercial approaches being taken in a large and diverse market place. In addition there is also the crucial issue of the pedagogical and educational value of this kind of resource.

2.3 Questions:

Much of the literature on electronic portfolios and ICT for portfolio purposes is from the last five years. The issues involving e-Portfolios and learning are centred on the following concerns.

- What is an e-Portfolio?
- Who uses e-Portfolios?
- How are they used?
- Do they have educational value?
- What are the benefits / advantages of e-Portfolios?
- What are the disadvantages of e-Portfolios?
- What issues are there around security, access, storage and technical considerations?

Let us now look at how the literature answers these questions and what we can learn from the answers given.

2.4 What is an e-Portfolio?

2.4.1 Definitions from America:

According to Helen Barrett et al. (2003 American Educational Research Association (AERA) Presentation):

Portfolios range from highly structured online databases to meet an organisation's need for uniformity and accountability of standards to open-ended formats that foster creativity and a sense of ownership for learners in constructing their own evaluation of their work.

Trent Batson (2002):

A portfolio, electronic or paper, is simply an organized collection of completed work.

David A. Wiley (2003) on learning objects.

...any digital resource that can be re-used to mediate learning.

Learning objects are different from the information stored on e-Portfolios in that they tend to be small highly granular pieces of information which can be re-used, generally by multiple users. Digital repositories are slightly different from e-Portfolios in that they are similar to a library and contain large volumes of small highly granular data. In other words a digital repository tends to be a storage centre for learning objects. Learning objects are any small reusable digital resource. These systems tend to be used by institutions to manage the increasing proliferation of digital assets. (Campbell 2004). This study is focused on e-Portfolios as opposed to digital repositories and learning objects. The primary reason for this is that e-Portfolios tend to be focused on the user, rather than the institution.

These definitions of the management of digital assets through e-Portfolios and learning objects are also discussed in relation to control of one's 'Virtual Identity' by Treuer and Jenson (2003) who expand the concept and state:

Most of us have passively let institutions – hospitals, schools courthouses, and so on – manage our records. In the digital age, we can no longer afford this luxury.

2.4.2 European Definitions:

The Quality Assurance Agency (QAA) organization in the UK responsible for quality in third level institutions describes learning progress files:

..should consist of two elements: a transcript recording student achievement which should follow a common format devised by institutions collectively through their representative bodies; a means by which students can monitor, build and reflect on upon their personal development.

This progress file is similar to a portfolio in that they reflect on the process, and the building of resources for a student. As a result of this report Universities in the UK are working hard to try and accommodate progress files through management of digital assets. These progress files can therefore be seen in similar terms to e-Portfolios, as they are focused on managing a user or multiple users digital assets over time, and allowing the user to see what they have done to facilitate their development. At the recent Association of Learning Technology (ALT) conference Lorna Campbell of the Centre for Educational Technology Interoperability Standards (CETIS) in her keynote address reflected this proliferation of e-Portfolio types and digital asset management systems, and suggested that none of these approaches or strategies are qualitatively better or worse than any of the others but they depend on the use for the portfolio system (keynote (2004) lecture notes). This conference was run in partnership with SURF. (“SURF is the Dutch higher education and research partnership organization for network services and information and communications technology.” (SURF 2004).

2.4.3 Concept of e-Portfolios discussed

The two ends of the scale for e-portfolios as identified by Batson (2002) and Barrett (2004) are:

- Those with relatively low technical knowledge which are set up by individuals on static html pages, to suit their personal needs.

- Those designed by institutions supported by dynamic database driven pages for use both by individuals and the institution.

There is a further differentiation between e-Portfolio, virtual identity, web folio, learning object or digital repository. The e-Portfolio is different from a digital repository in that there is generally an individual user or small group of users. They are similar in that permissions are set on what content is viewable to which user in both e-Portfolios and Digital repositories. Control of permissions for an e-Portfolio is often at the discretion of the user in small scale applications. Digital Repositories on the other hand tend to function for larger communities of users and contain larger volumes of information with permissions to view information being centrally controlled by the institution.

Batson (2002) differentiates between web folios which are essentially static HTML generated pages, and e-Portfolios which he identifies as being characterised by dynamic content, supported by a relational database. Barrett reflects that:

It is difficult to conduct comparative research on electronic portfolios because of the emergence of very diverse model of implementation.... (ibid 2004).

She suggests that the e-Portfolio approach is one which is student centred, used for a variety of purposes, in control of the developer, and requires more advanced skills to use. Another aspect of the e-Portfolio is that it is open to be structurally amended by the user, and is characterised by qualitative data. The Online Assessment Management Systems which is supported by a relational database, which is institution centred, produces quantitative data and requires minimal skills from students to use.

These definitions reflect the fact that the pedagogy behind learning through technology varies hugely. Most of the definitions take into account making progress of learning over time visible to learners. They also reflect different needs.

Individuals are being encouraged to take responsibility for their own virtual identity through control of their digital assets, in e-Portfolios. Institutions need to cater for the emerging area of virtual identity and digital asset management, in order to be compliant with the requirements of their own advisory bodies. The differences in pedagogy and needs are also reflected in the different technologies in operation with institutions using databases to manage large volumes of information with dynamic data, and individuals tending to use static content to maintain personalized information. These differences in pedagogy, needs and technology are significant across the various users and the various models of implementation of digital asset management strategies.

2.5 Who uses e-Portfolios?

The use of e-Portfolios in educational contexts is still an emerging area with organisations in America such as the American Association of Higher Education (AAHE) in association with the National Learning Infrastructure Initiative (NLII) producing a Taxonomy of Electronic Portfolios (AAHE 2004). This taxonomy identifies the context, author, and purposes of an e-portfolio. In identifying the purposes of e-Portfolios the taxonomy outlines the purposes of development, evaluation and presentation. A variety of universities including Universities in Minnesota, Washington, Virginia, and Indiana have taken up the usage of e-Portfolios (NLII Annual Report 2003). These university led initiatives have led to a number of public and private partnerships including the Eportconsortium and the open source portfolio initiative (OSPI). The Open Knowledge Initiative (OKI) based at Massachusetts Institute of Technology (MIT) is a similar venture into the construction of an open source application.

2.5.1 Europe

The general picture is the emergence of a proliferation of approaches to e-Portfolios and digital asset management strategies. Following the 1997 Dearing Report and the QAA guidelines for third level institutions in the UK many Universities have adopted e-Portfolios in order to be compliant in managing progress files. At the ALT SURF conference in April 2004, the faculties of medicine in Edinburgh and Newcastle presented their e-Portfolio systems, which are embedded in the University Virtual Learning Environment (VLE). In the case of the Newcastle system it was developed in collaboration with the Universities of Dundee, Leeds, and Sheffield. Also presented were examples from the Netherlands from the Universities of Amsterdam, Utrecht and Maastricht. The adoption of e-Portfolios has crossed faculties in the Netherlands, but the innovation tends to be centred in the faculties of medicine and education, environments where reflective practice is a part of the curriculum. (Ellaway and Cameron 2004; Cotterill 2004)

[A listing of some of the e-Portfolio systems, the different vendors involved, both academic and commercial can be found in Appendix B.]

2.6 How are e-Portfolios used?

As the AAHE taxonomy points out, the purposes of e-Portfolios are Development, Evaluation and Presentation.

E-Portfolios for Development.

Self-assessment:

Advising: using portfolios to help students in academic planning.

Documenting learning over time: using portfolios to present evidence about individual or organizational growth and development, and the differentiation and integration of knowledge.

Documenting professional development: using portfolios to present evidence about job-related accomplishments, effectiveness, or achievements.

Building the curriculum: using portfolios to support curricular innovation, connection with scholarship, and course design.

Adding to the knowledge base of or among the disciplines: (scholarship of teaching and learning): investigating questions of teaching effectiveness in light of impact on student learning.

E-Portfolios for Evaluation

Demonstrating achievement of learning outcomes: presenting evidence of achievement in relation to an expected standard, rubric.

High stakes evaluation: using portfolios to address stakeholders' concerns with performance, effectiveness, and results such as legislative mandates, graduate school admission, or job selection

Accreditation: using portfolios as part of the voluntary regulation and review process by which institutions and programs certify that they are meeting their goals as well as accepted standards.

Promotion and tenure: using portfolios to present evidence of teaching, research, and service. Work performance review: presenting evidence of achievement in the workplace as part of a reflective or evaluative process.

E-Portfolios for Presentation

Showcasing achievement: providing a record of evidence of personal or professional attainment.

Publicizing organizational reflection and progress: increasing the visibility and value of organizational effectiveness in light of the organizations' specific mission and context.

Responsiveness to state and national need for information: the responsibility of higher education to provide evidence to stakeholders about effectiveness.

Adapted from AAHE Taxonomy (2004)

The divergent approaches drawn here illustrate the range of uses of e-Portfolios, from personal use, to use for the purposes of career progression, to use for assessment purposes by an institution, or group of institutions. Portfolios for assessment purposes are constituted differently depending on the values of the educators involved and the curriculum requirements.

2.7 Current examples of e-Portfolios in a learning context:

In the instances of the medical faculties the focus tends to be on the demonstration of skills in order to provide evidence of competency, combined with reflections on practice, and assignments, which is focussed on individual records and data management. (Ellaway and Cameron 2004, Cotterill 2004) These tend to combine formative and summative assessment, and seek in summative assessment to pick up on 'Cinderella' themes over the course of a program. 'Cinderella' themes are cross curricula themes with qualitative aspects such as pain, disability, patient care. The formative assessment is shaped by the needs of the institution certifying competence and is focussed on assignments and a viva at the end of five years work (Ellaway and Cameron 2004). The overall features of the system are centred on the institution, where records are designed with ownership, records and assessment in mind. This skills and competency model is based on Miller (1990) (Ellaway and Cameron 2004). The individual student's records are viewable by multiple internal and external assessors, and the students records tend to be characterised by assignments and self reflections.

2.7.1 An example in an educational context:

Jan Van Tartwijk of the University of Utrecht Education Studies Department outlined a more personalised approach where individual student teachers pick the aspects of their practice they are reflecting on, with their coach and include the coach, students and teachers own reflections in the assessment. This is also based on Miller (1990), though the assessment is largely summative. (Van Tartwijk 2004) In addition Van Tartwijk outlined that the construction of the elements of the e-Portfolio was a social one, in which the student teacher, their students, and their coach are all involved in the portfolios construction and contribute various elements. The emphasis is on the social

aspects of learning. A further feature of this approach is the presence of a number of narratives, and the grading of the portfolio by the student teacher and their coach. Only in the event of a disagreement is the portfolio passed to an assessment committee. In other words a portfolio in this context demonstrates competency, but the competency reflects the views of multiple participants in addition to the user of the portfolio – there is self reflection, coach reflection, student reflection and multimedia aspects such as photographs. This differs from the medical department approach towards individual's records, being centrally controlled in order to be viewed by multiple assessors.

So we can see that in addition to the technical differences, the pedagogy behind assessment also contribute to the diversity of approaches in e-Portfolios.

2.8 Do e-Portfolios have educational value?

The chief debate on the educational value of portfolios centers on their use as assessment vehicles. A chief barrier identified by many organizations is that of standards. (NLII Annual Report 2003, Treuer and Jenson 2003, QAA 2001). In particular agreed standards between institutions, interoperability standards. The NLII annual report cites Ali Jafari of Indiana University Purdue:

..without a set of standards for interoperability, students will, at best, be frustrated by the limitations imposed on their efforts to compile their work and, at worst abandon their e-portfolio efforts altogether. (NLII 2003 p28)

This brings to the fore the issues identified earlier, in the proliferation of approaches to e-Portfolios. The chief drivers of the different approaches are differences in technical and technological infrastructures and also the different pedagogical approaches.

Theorists like Barrett (2004), Batson (2002) and Treuer and Jenson (2003), point to e-Portfolios gaining increasing credibility as alternative assessment vehicles with benefits for students, faculty members and institutions. Barrett (2004) states:

As noted in SITE conference proceedings since 1997, many Teacher Education programs are adopting electronic portfolios... (ibid 2004)

When used as an aspect of an overall assessment strategy Barrett suggests they are an effective way of showing the process of learning in addition to the product of learning. Veuglers and Van Tartwijk (2004), Ellaway and Cameron (2004), and Cotterill (2004) also point out the potential benefits and added value that an e-Portfolio can bring. Due to the relatively recent emergence of e-Portfolios within institutions, the standards between institutions are not yet fully worked out, which means that accreditation is a critical issue in the future in terms of the realization of potential benefits. The interoperability standards in technical terms are matched by the differing pedagogies which means that finding a standard common ground for assessment is particularly difficult. Many of the efforts currently being made by CETIS are in the area of meta-data. Meta-data is the code that identifies and describes a digital file or a digital asset. These meta-data descriptors of what a learning object or digital asset is, has been identified as an area of commonality between institutions and certification bodies. (Campbell 2004).

For students the benefits of e-Portfolios centre on making the tacit explicit, and on real life experience, as opposed to theory. Ellaway and Cameron, and Cotterill (2004) and Van Tartwijk (2004) all point to the rationale of bridging the theory and practice divide for students, and providing the facility for reflecting on practice.

2.9 What are the benefits / advantages of e-Portfolios?

They allow students to integrate their own learning with the institutional requirements for learning. (Barrett 2004, Batson 2002, Treuer and Jenson 2003). This is particularly the case when an institution uses a relational database to allow students to access their own records and combine them with the institutions records.

Lee Shulman (1998) cited in Barrett (2004) identifies 5 factors:

- They allow for a longer period of time for assessment rather than merely observation.
- They reconnect the process and product of learning
- They institutionalize norms of collaboration, reflection and discussion.
- A portable residency
- Shifts agency from observer to teacher.

They allow for the building of a resume for faculty members, (Batson 2002) which may be used in assessment for career progression (NLII 2003 Annual Report). From an institutional perspective they allow students progress to be tracked and student work to be aggregated which may assist in course evaluation. (Batson 2002). Cotterill (2004) suggests ten value adds with using e-Portfolios:

1. Highly customisable
 2. Can be used for multiple purposes
 3. Allow multiple structures and views
 4. Allow for cross reference
 5. Shareable
 6. Secure access from a variety of locations
 7. Transportable
 8. Searchable
 9. Reduced Administration
 10. You cant leave it on the bus
- (ibid 2004)

2.10 What are the disadvantages / dangers of e-Portfolios?

Barrett (2004) again cites Shulman:

- Lamination – A portfolio merely becomes a vehicle for showing off
- Heavy Lifting – A portfolio if done well is hard work, is it worth the effort?
- Trivialization – Irrelevant information is included
- Perversion – If used for assessment, difficult to objectively assess

- Misrepresentation – The selection process is open to misrepresenting the overall opus of work.

Campbell (2004) suggests that the ‘ghost of napster’ and issues around authentication, copyright, access, ownership and identity are critical particularly if the architecture of portfolios moves from owner (institution) centered to user centered. The change in technological approach from client server architecture to peer to peer architecture is inherently problematic in this regard and reinforces the needs for strong standards, in particular around meta-data, security and storage. This brings up questions such as:

- How does an institution validate who has done work?
- Who owns the work?
- How is this work to be kept?
- How is it to be shared?
- Who controls access to sharing?

2.11 What issues are there around storage, security, access and technical considerations?

For those institutions advocating lifelong learning, and a constructivist approach the issue of secure storage is a considerable one, as there are costs involved in the long term storage of records, particularly when students move on from the institution, and wish to retain access to their portfolio and build on previous learning. As with the issue of standards, the issue of costs is central. The amount of data a student will compile throughout the learning process of life could be potentially enormous with the result that for many institutions the cost factor must be given serious consideration. This is identified by many of the reports from academic bodies including NLII (2003), to designers and those using e-Portfolios such as Ellaway and Cameron (2004), Cotterill (2004) and Campbell (2004).

On the issues of access and security obviously legislative issues around confidentiality are crucial, and must be considered in the design process, particularly for institutional e-Portfolio systems, which are used for assessment purposes. In addition the control of what data is entered, and who can view the data is a central concern, and Barrett (2004) differentiates between Online Assessment Management systems and e-Portfolios. The former being institution centred, and designed to manage assessment, with the former allowing students more flexibility over allowing guests to view their records.

The technical considerations have been identified in terms of costs, where commercial vendors providing off the shelf packages and support services in return for developing the products are an additional cost for institutions. This may mean a product with more functionality but also leaves institutions open to increased costs.

CHAPTER THREE – METHODOLOGY

When we compare the pragmatic consequence of behavioral social science with phenomenological human science we note that traditional behavioral research leads to instrumental knowledge principles: useful techniques, managerial policies, and rules-for-acting. In contrast, phenomenological research gives us tactfulness: situational perceptiveness, discernment, and depth understanding. (Van Manen. 1997: 156)

3.1 Historical and Social Background.

Research is changing and contested. The change is both evolutionary and revolutionary. The emerging paradigms in research parallel the movements across almost all fields of social science, with the advent of emerging movements such as – post-modernism, post-positivism and post-colonialism.

‘Traditional positivist research in the social sciences has its origins in the scientific method, with its propositional epistemologies, and methodology’ (McNiff, 2000). This seeks, as Van Manen (1997) outlines above, to make visible and codify the general principles underlying the universe. In other words it assumes the existence of general rules of things, and people and their interaction and it seeks to establish facts. ‘It is propositional in intention.’ (Mcniff, 2000: 39)

The positivist approach assumes a universal truth, or single objective reality, which can be discerned through an experimental methodology, enabling a neutral observer to make a claim to know something. These methodologies are essentially quantitative in nature, with a view to building a general body of knowledge. In other words the assumption of neutrality is based on the idea that objective truth can be discerned via applying scientific methods. An observer is neutral, and in gathering evidence contributes to the uncovering of an objective and universal truth. (Cohen and Mannion, 2003)

This assumption of an objective truth presupposes the epistemology to be politically and scientifically neutral. This neutrality is contested in many areas of inquiry and has been linked culturally to the enlightenment project, or modernity. To borrow Benedict Andersons phrase from a description of nationalism it is an ‘imagined community.’ These assumptions of neutrality, have an effect on people’s interactions with each other, people’s voices and people’s access to claims to knowledge. (Anderson, 1991).

It is from a position of reaffirming the voices of people, and the idea that people share and construct meaning together, that the emerging paradigms in the social sciences developed. In philosophy Habermas, Husserl and the Frankfurt school, expounded the concepts of hermeneutics and phenomenology where meaning is shown to be constructed in a context and as such epistemology, and epistemological claims to knowledge are relative to a context. (Cohen and Mannion 2003) This philosophical movement is then linked to issues of culture by people like Foucault, who talks about the *episteme* or ‘systematic conceptual frameworks that define their own truth criteria.’ (Milner and Browett, 2002: 110).

Cultural analysis of epistemic knowledge are paralleled with political movements with post-colonial theorists like Homi Bhabha (1994) describing the position of the ‘Other,’ that is, those without the access to claims to knowledge, and how these people are constructed in the discourses of those with the power to claim to know. As Gayatri Chakravorty Spivak, (1987) amongst others outlines, there are the peoples who are completely written out of the narratives of modernity and the enlightenment project, both in national narratives, and narratives of knowledge. In other words they have no voice, and no-one can speak for them without this act of speech itself being disempowering. For theorists in the emerging paradigms, the grand narratives of nomothetic approaches across the social sciences are intrinsically political, in terms of who has access to them, and whose views they reflect. It is this challenge to the overarching claims to knowledge or *hegemonic discourses*, (Gramsci cited from - <http://www.infed.org/thinkers/et-gram.htm>) that is described in various contexts as either post-modern, post-colonial (Bhabha, 1994, Spivak, 1987) or post-positivist (Lincoln and Guba, 1985, Kemmis and Wilkinson, 1998, McNiff, 2000, and Cohen and Mannion, 2003). As Jean McNiff writes:

The metaphors of fragmentation and division underpin traditional forms of scholarship: analysis, correlation, contrast and comparison, variables, generalisation....They reinforce divides. (*ibid*, 2000: 6)

3.2 Action Research theory

As we can see the contesting of issues of knowledge and epistemology is essentially a struggle, and one which does not have the neat dichotomy, as outlined above. The reality is immensely complex. In Hegel's theory of history, there is a struggle between thesis, and anti-thesis before a resolution as a synthesis. This Hegelian dialectic is in itself a contested view with theorists like Francis Fukuyama claiming in The End of History and the Last Man (1992) that liberal democracy is the resolution of the dialectic in politics. This is another contested claim. Action Research as a discipline in attempting to escape the traditional dualistic view of Social Realm / Objective view versus Individualistic / Subjective methodologies (Kemmis and Wilkinson 1998), and favouring a reflexive and dialectic view offers a pragmatic attempt at a synthesis of the two world views not by eliminating the differences but by simultaneously holding the two positions as plausible:

In each case, we want to suggest that these are false dichotomies, and that we can escape from the partiality of each by seeing the two sides of the dichotomies not as opposites, only one of which can be true, but as dialectically related. (*Ibid* 1998: 28)

Action Research as an area of research respects this complexity and the contested views of knowledge, and positions itself in pragmatic terms of improving practice, based on Donald Schons notion of the 'reflective practitioner.' (Altricher, Posch and Somekh, 1993)

A useful concept map of the general research areas in the social sciences is the identification of the Empirical Research, Interpretive Research and Critical Theory traditions (McNiff, 2000). The Interpretive and Critical theory approaches are to be found in the Action Research approach which is an area primarily (though not exclusively) found in the critical theory approach. In putting the practitioner at the centre of their own narrative there is an emancipatory political implication, the power to make a claim to knowledge is shifted from the theorist researcher who works from outside a context and does 'research on subjects' to the practitioner theorist who investigates their own context in a disciplined and systematic way. (Cohen and Mannion, 2003: 231) There is also a movement away from making universal claims or nomothetic claims to knowledge towards pragmatic improvement of practice and contextual knowledge with idiographic claims to contribute to a body of knowledge. (Cohen and Mannion, 2003: 7)

Jean McNiff in Action Research in Organisations (2000) describes Action Research as a methodology that has its origins with Kurt Lewin in the United States and in the UK with John Elliot, Clem Adelman and Stephen Kemmis. A shift then took place with Jack Whitehead's 'Living "I"' approach where:

Whitehead came to insist on the production of research-based evidence to support practitioners' claims to knowledge that they had improved their practice. The 'living "I"' was at the centre of the inquiry.....

.....Here Whitehead broke with received social scientific knowledge. (*ibid* 2000: 199)

This is contested says McNiff. Why is it contested?

Firstly, there is an epistemological argument - in placing the living "I" in the position of being able to make a claim to knowledge Whitehead has challenged the ontology of the 'imagined community' (Anderson, 1991) of those engaged in traditional social science empirical research. Traditional social science would describe this methodology as being too subjective and not objective enough, and therefore not sufficient to make a claim to knowledge. The positivist view assumes that universal knowledge is both possible and better than subjective knowledge. Knowledge is equated with objective truth. (Kelly, 1983. Cohen and Mannion, 2003)

In this equating of knowledge with truth, the criteria for determining truth depend on the application of quantitative methodologies by a neutral observer to ensure objectivity. The implication being that the practitioner is not the best determinant of objective knowledge, they are not sufficiently skilled in quantitative methodologies and the scientific method to establish a claim to knowledge, nor are they objective. This aspect of the positivist tradition has been described in terms of a 'hierarchy of credibility' (Altricher, Posch and Somekh 1993) where by the credibility of the 'practitioner researcher' (Schons terminology) depends on their position in relation to policy makers or the theorists of the academy. (*ibid.* 1993: 202)

This positivist approach is one which is directly contradicted by theorists in the phenomenological tradition following Habermas and the distinction between the 'life-world' and the systems of society (Cohen and Mannion, 2003). For phenomenology, and for Van Manen (1997), *a theory of the unique* is a logical response to

phenomenological investigation into the possibility of research. (*ibid*, 1997: 6 & 7)
Each individual case must be dealt with in the moment, based on the life-worlds and values of the individuals in an educational context.

It is a naïve rationalism that believes that the phenomena of life can be made intellectually crystal clear or theoretically perfectly transparent. (Van Manen, 1997: 17)

As a further response, even within the positivist tradition one may find examples of contradictions. An example, would be in the foundation of the theory (which emerged from practice) of psychoanalysis by Sigmund Freud, some of the foundational cornerstones were myths like Oedipus and Elektra which is inconsistent to a large degree with the concepts of science. There is a blurring of the distinctions of the paradigms, even within traditions, they are inconsistent – ‘loose coupled’ (Lincoln and Guba 1985: 16).

Secondly, there is a political issue. The living “I” approach and action research as a practice of people could be viewed as a political challenge to those who wish to retain exclusive rights to claims to knowledge, and in making claims to knowledge produce discourses which reflect their own interests and silence the voices of others. McNiff paraphrases Chomsky who was in turn paraphrasing Thomas Jefferson – the choice is to be a democrat or an aristocrat. (McNiff 2000: 83) That is that you side with people, or you decide that you should govern people for their own good because that they cannot govern themselves. This opinion is also supported by Altricher, Posch and Somekh (1993) who cite Elliot in that action research:

...democratises research by bringing those who are usually ‘subjects’ of research to a position where they have equal rights and responsibilities. (*ibid* 1993: 207/8)

3.3 My Values

The movement towards empowering learners and participants in the research is in keeping with my educational values. I previously studied for an MA in Culture and Colonialism and one of the things that strikes me is the way hegemonic discourses evident in much of the enlightenment project alienate people from their own practice. (I use alienation in the Marxist Literary Critical sense). For me as an individual

learner and educator, my experience of the socialization process of education is one which tended to move towards conformity and socialization. As a result I have often personally felt constrained by the educational system into conforming to beliefs, attitudes and structures with which I don't necessarily agree, although I accept others hold. My adoption of Whitehead's model therefore for this research is a statement of my own values, though one to which I don't advocate that anyone else subscribes to. This points to the emancipatory aspect of "living 'I'" as an approach to research. It is in a sense, the improvement of "I" as a person in as much as it is "I" as a researcher, and the acknowledgement of the contributions of others in my learning process, is evidence of a 'web of between-ness.' (Farren and Power 2004)

In following a living theory approach and not presenting this study as a sole answer, or objective truth I wish to clarify my educational values, which significantly influence both living theory as a choice of methodology and also the way this living theory is emerging in my practice. In putting "I" at the centre of the research study my values are central parts of the process.

- The learning process in addition to the products of learning should be visible to users.
- A commitment to my own learning and making this learning explicit to myself and to other learners.
- Learners should be actively involved in designing their own learning tools and experiences.
- Commitment to open communication and sharing between learners.
- Commitment to challenging hierarchies of knowledge.
- Acceptance of learners where they are, and meeting them on their terms.
- Commitment to modifying my practice as an educator and learner to incorporate a variety of views.
- Commitment to open dialogue in the research process.

3.4 Research Questions

Following Whitehead's model I identify the following research questions.

- What is my concern?

- Why am I concerned?
- What solution can I imagine?
- How can I gather evidence to show changes in the situation as they happen?
- How can I show my influence in the situation?

3.5 What is my concern?

I identified a concern in my practice where my educational values were not being practiced to the extent that I would have liked them to be. I believe educators should try to support others in developing their own learning paths and structures. In my practice as a trainer, I found the model of knowledge transmission to be hierarchical and rooted firmly in a technical rational epistemology (Schons terminology). In other words there was a ‘living contradiction’ between what I believe as an educator and the way I was living that in my practice as a trainer. I felt I wanted to offer some sort of development option for those who wished to avail of it.

3.6 Why am I concerned?

This ‘living contradiction’ between my values and my practice echoes a long standing issue for training and development practitioners. Garavan (1997) cites a number of studies in revealing that there is often a conflict of interests between the training and development specialists who value longer term development of staff and the line management who have a short term results driven focus. (*ibid* 1997: 664) I initially believed there was a conflict of interest between my focus on development and the organizations strict focus on operational goals which reduce the time available for development related activities. On reflection I began to realize that I needed to take the responsibility for my own values and my own practice and try to bridge this gap for myself and other learners. This is in line with my values where I believe rather than being critical of the role I should acknowledge that both operational training and

development are important, and try to offer an option to fellow learners to avail of if they so chose, which would support their own development.

3.7 What solution can I imagine?

In a previous assignment I had constructed a website with the assistance and contributions of my classmates, which collected a series of resources, for each of us to share when it came to doing assignments and other research. The web site <http://student.dcu.ie/~powerd3/classweb> featured an A to Z of useful websites (see the favorites / links page) to which many people contributed. Reflecting on this experience I began to envisage the possibility of a database driven website which would have dynamic content and be focused on the user's requirements. In other words I was thinking of a way in which individuals could over a period of time amass a lot of information in relation to various research areas, areas of interest, or even personal artifacts such as photos or videos. Given this previous experience I decided to try to learn the rudiments of database driven websites with a view to offering other learners the power of a database driven website, to which they could submit and search their own content. Given that the learners would be in control of the content I decided to ask other learners for contributions to the design process as well. A key value for me in this is the idea of the democratization of the research process to include these other learners.

3.8 How can I gather evidence to show the situation as it changes?

The method I am using to collect data in relation to this research is my own reflections on my learning and education practice. A central aspect of this meta-reflection process is my commitment to:

- Make explicit the difficulties I have in the research

- Make explicit the difficulties I have in learning the technical aspects of programming
- Publicly acknowledge the contributions of others to my learning through incorporating their own narrative where possible.

The second aspect of the data collection method is a user test of the e-Portfolio systems by the users and co-participants in the project.

3.9 How can I show my influence in the situation?

This question is normally applied to practitioners attempting to change the social web of relationships which they are members of. The way I attempt to show my influence is through making explicit my own values, and the reasons why I am attempting this study, and why I am taking each step along the process.

3.10 Research Cycles

Action research is often referred to as a process of cycles. Rather than a series of clear and distinct research cycles, the process of development of this artifact is characterized by what Donald Schon describes as ‘a conversation with materials’ (Schon 1996), and also an ongoing dialogue with other learners and contributors in developing the design. As this process is a dialogic and conversational process the research cycles in evidence are not clean and clear cut but overlap to some extent.

There are three cycles:

- Cycle One – Database design
- Cycle Two – Starting to program
- Cycle Three – Becoming more technically proficient

3.11 Criticisms and Rigour

Central to the criticism of the living action research approach is the question of data collection and rigour. As I identified earlier the ontological and epistemological gulf

between the positivist and post-positivist traditions is one which action research methodologies seek to hold in contradiction. Inherent to a living action research approach is the making explicit of contradictions, the exposure to public scrutiny the claims of educators to improve their practice. This making explicit the difficulties of the research process, and acknowledging the difficulties involved in learning is one way in which the living action research approach as I am using it in my practice is attempting to show rigour, following Winter (1989). As Van Manen (1997) outlined above it is a naïve rationalism that holds the possibility of a single right answer.

Another critique of the living action research model is that it is egotistical in that it incorporates the 'I', the individual, and is therefore open to self indulgence, bias and lack of rigour. I hope through incorporating the influences of others, and their own narratives where possible to safeguard against this and demonstrate rigour through the provision of evidence from my practice of the voices of other contributors. In addition following the position of Elliot (2004) I do not make the claim of this approach being the only one possible, but rather suggest that it suits me and my practice within my context.

CHAPTER 4 - ANALYSIS

This chapter takes the form of a narrative reflecting on my learning and the contributions of others improving my learning. The order of it is largely chronological, based on an extensive research diary I kept throughout the process. Where others have made contributions their own words are included. The next chapter deals with the testing conducted with users in relation to the artifact constructed is presented and analyzed. Central to the process even at the initial stages were the other participants in the process.

4.1 Overview

In terms of the AAHE Taxonomy of Electronic Portfolios the artifact created in this study is situated as follows:

- Author – Darragh Power
- Context – A small scale study focused on my own learning, and facilitating the learning of other fellow learners, in an informal way, as part of my training and development practice, and learning as a student in DCU.
- Context - Technology Platform – Open source applications
- Purposes – The purpose of this e-Portfolio system is for self development and documenting learning over time. As the AAHE (2004) taxonomy says:

E-Portfolios for Development.

Self-assessment: using portfolios to track an individual's process of reflecting on and analyzing activities and performance; identifying strengths and weaknesses.

Documenting learning over time: using portfolios to present evidence about individual or organizational growth and development, and the differentiation and integration of knowledge.

(ibid 2004)

4.2 Initial Stages – The People.

4.2.1 The Participants

David Gallagher and Tariq Ali – third level students and co-workers.

John Flynn – A manager in the organization.

Darragh Power – The researcher.

In keeping with my educational values, the participants in this study are considered as co-researchers. In incorporating the contributions of others in their own words I hope to live my educational values, and allow for multiple voices to emerge. This plurality of voices is a factor in demonstrating rigour in qualitative research according to Winter (1989).

4.2.2 Other contributors and supervisors

Cormac Moran and Cathal Gurrin have provided considerable assistance with database design and SQL. In addition Cathal is a supervisor for my thesis. Margaret Farren is also a supervisor, and has provided tremendous support throughout the study. Realtan Ni Leanain, another supervisor on the course has also provided considerable assistance in relation to the focus of the study. Enda Lydon, Aoife O'Brien, Fiona Williams, Fionabarra Hallissey, Brendan Ryan, Claire Thomas, Trudy Corrigan, and Miriam Fitzpatrick, some of my class mates in the M.Sc in Education and Training in DCU have contributed significantly to the research process. All of the people listed above have at various times influenced my thinking in relation to the study.

A tutorial which I found out about through contact with Bob (not their real name) a student in another Irish University is also a vital contributor to the design process. I met Bob through the Living Action Research Listserv forum run by Rev. Je Kan Adler-Collins, an action research practitioner in the medical profession based in Japan. Bob requested that I maintain their anonymity and the anonymity of the tutorial.

4.3 Knowledge and Experience

None of the participants including myself have any experience with the open source applications Apache Web Server, MySQL or PHP. I have some experience in HTML and have designed five websites in the last 18 months having learned the skills in year one of the H.Dip / M.Sc. in Education and Training Management in Dublin City University (DCU). I have a very basic understanding of JavaScript, in that I can manipulate it, but I don't understand its syntax. I have no experience of database design theory or practice, having previously attempted to design a database in Microsoft Access for an assignment in DCU, which was a flat tabled database, with no entity-relationship modeling etc (see Appendix A for a glossary of terms). Tariq Ali has some experience in HTML and JavaScript and assisted me in learning HTML. David Gallagher has no experience in programming. John Flynn has experience in Microsoft Access Databases.

4.4 Expectations

David Gallagher's narrative

I hope that the e-Portfolio enables me to collect, organize and store data in a clear and concise manner. This would be very advantageous as it would enable me to access stored information quicker than I can at the moment. I am particularly looking forward to seeing how the search function operates. The majority of search engines and databases I use are inconsistent and

incomplete and anything that enables me to accurately search through stored information would be most welcome.

Email excerpt – 31/3/04

Tariq Ali's Narrative

I would be particularly interested in the diary function. I think it would be ideal if, once all of the diary entries are complete for a particular project they could be printed or exported in formatted manner. This would be ideal for project reviews and to submit as an appendix to project work. This could illustrate that a methodical approach has been taken. Also, if feasible, would it be possible to include some sort of project-planning aspect to the portal? I think it may be useful to have a visible project plan on the customized homepage. This would assist with the time management of a project.

Email excerpt – 31/3/04

John Flynn the third participant did not respond with his reflections on what functions he would like to see as part of the artifact.

4.5 My Expectations

I hope to learn the basics of database design, and apply them in MySQL. I hope to learn the basics of programming in PHP and SQL, in terms of the syntax of the languages and how to apply them. I hope to have a working e-Portfolio system which has been user tested which can be used by learners in their learning and development. My aim is to monitor each contribution made by all the participants in my learning, and make this process of learning and design visible to myself and other learners. I aim to incorporate the design requirements of the participants in the study into the e-Portfolio, in so far as my technical abilities will allow.

4.6 – Cycle One.

4.6.1 Reflections on the Installation – Technology.

Downloading the applications is relatively straightforward if they are downloaded in a bundled package where they are all pre-configured such as EasyPHP. Downloading the individual applications and configuring them on a windows XP platform proved beyond my capabilities as it involved using the Dos shell and configuring the

operating system in that way. I could not find any simple explanation which explains to a layman, how this is done on any of the web resources of which I compiled a large number. This may be due to the fact that most developers using these applications develop them on Linux, and already have knowledge of the hardware and how to configure operating systems. It may also be due to the fact that Apache, MySQL and PHP can be located in bundled packages such as EasyPHP. The only disadvantages I can imagine in relation to this approach is that if something goes wrong, not understanding what is happening in the background may mean difficulties in recovering data. The other disadvantage is that the bundled packages are not the latest releases of any of the applications, so for a more advanced user they may lose functionality.

4.6.2 Downloading and installing the applications.

The diary entry below is my diary reflections on the downloading and installation of Apache Web Server, MySQL and PHP, which I had significant difficulty with, primarily due to the fact that I downloaded the individual applications prior to finding a bundled solution.

4/3/04 – Diary – Downloaded EasyPHP

Downloaded EasyPHP and took notes from <http://moodle.org> regarding installing it. The link for the download was through <http://moodle.org> also. My initial intention was to use Moodle in some way to support my education and learning practice, and I also wanted to learn how to use Apache Web Server, MySQL and PHP.

5/3/04 – Diary – Installing EasyPHP - Difficulties

I had already downloaded and installed individually, PHP4, My SQL and Apache Web server with different configurations, in about January 2004. These I was never able to configure properly as I found that many websites supporting the LAMP platform are pitched at a level above where I am at. IE – The tutorials available from www.webmonkey.com and www.codewalkers.com assumed that the person downloading the tutorials had a reasonable knowledge of object oriented programming terms like, strings, arrays, and were comfortable using the DOS Shell command line in Windows etc. In other words I completely failed to get to grips with the configuration as the supports available for a novice are inadequate. Maybe this is a recommendation for the Open source community. It also reflects the problems with

the Windows platforms market penetration as the point and shoot and plug and play philosophy doesn't encourage or support adequately the use of open source software such as Apache Web Server, MySQL and PHP.

These initial separate installs that I couldn't get to work, I had to uninstall as I am not technically literate enough to edit the properties of the already installed files. Also on the Moodle installation documents it suggests uninstalling all previous versions of the above packages.

The installation of EasyPHP was considerably easier as it did not involve any configuration editing. The documentation from Moodle was very useful in installing and running it, and pointed to the folder www as being the one in which to store php and html files. It also has already got MySQL set up in a separate folder and pointed out that there is a difficulty in MySQL in setting it up for multiple users and linked tables.

Having downloaded and installed the EasyPHP package I wondered how I was going to configure it to run correctly. I also wondered how I would learn the syntax of the languages SQL and PHP, and how they would interact and work together. I would not have managed to resolve these without the contributions of others. A key example is discussed in the next section.

4.6.3 Social aspect of research is vital – The People.

16/3/04 – Diary Reflections – The Tutorial

As a result of my correspondence with Bob the student from the other that I met through Rev. Je Kan Adler Collins Living Action Research forum, I downloaded a tutorial from a contributor to the course in the other university. I had a look at Bobs own Reflective Practitioner tool which they designed, and it influenced my thinking in terms of what I would like to see possible for my own reflections. The tutorial shaped my thinking around the rough structure of the PHP and HTML and how they interact, and I will probably use much of the source code from this tutorial which I will tailor to suit my own artifact.

This tutorial proved to be an invaluable source of source code for the application and much of the structure for the application is taken from it. Without this overview of how an application might work, this research would be impossible for me as an absolute novice in programming in PHP and application development. I made contact with Bob through Living Action Research List Serv which is run by a Rev. Je Kan Adler-Collins an action researcher in the medical profession based in Japan. I posted a link to a web page I designed with my class mates on the M.Sc in DCU

<http://student.dcu.ie/~powerd3/classweb> which prompted Bob to make contact, and as a result of corresponding about action research methodologies on e-mail Bob suggested I take a look at the tutorial. (Bob and the tutorial remain anonymous at their own request).

Reflecting on this process I am struck by the living interventions of others shaping the course of my learning practice, and that sharing information is a very constructive process. I am also struck by the ideas of Winter (1989) on rigour which suggest that multiple voices and perspectives show rigour in a qualitative research study. Another factor in establishing rigour is the interaction between theory and practice.

4.6.4 The three tier design approach – Technology.

My initial thoughts in relation to the usage of Apache web server, MySQL and PHP were very chaotic. In not understanding the way the applications interact I found it very difficult to conceptualise the design process. An intervention from theory in this regard was Williams and Lane (2003) which I found very helpful. My diary entry below illustrates this.

17/3/04 – Diary Reflections - Hugh Williams and David Lane – Web Database Applications, with MySQL and PHP – Book

I've just purchased the book which seems to be the definitive text on the creation of web database applications with MySQL and PHP. I found many of the tutorials on the web pitched at too high a level in that I can understand the logic of object oriented programming, but the syntax and language of strings, arrays, variables and objects is a difficult concept as I don't have a background in C or Java, which is assumed by many tutorials. Over 60% of web based applications are on the MySQL and PHP platform. This absolute novice explanation may be a recommendation for the open source community in the future in their construction of tutorials.

The three tier architecture structure – namely MySQL database – PHP tier – Client Tier – fundamentally shaped my thinking about what needs to be programmed, and more importantly what the design structure should be like.

I was going to dive in and try to get a feel for programming and I started constructing a frontpage, and login screen using PHP and HTML, however the complexity of the structures involved made me re-think.

4.6.5 Designing the Database

22/3/04 – 24/3/04 - Diary Reflections – Tables – Database design

I drafted a number of basic database structures to try and conceptualise the database design for the artifact. Cormac Moran made a valuable intervention here as well in his advice to plan, and diagram the process. Cormacs' inputs can be seen on Database tables revision tables2basic1.xls and in particular from tables2basic2.xls to tables2basic4.xls. I also distributed copies via e-mail of the table revisions to each person involved in the design process.

Cathal Gurrin also suggested that I add a first name and last name field to the user table, in addition to the username, which will be important should the artifact develop to a wider user base.

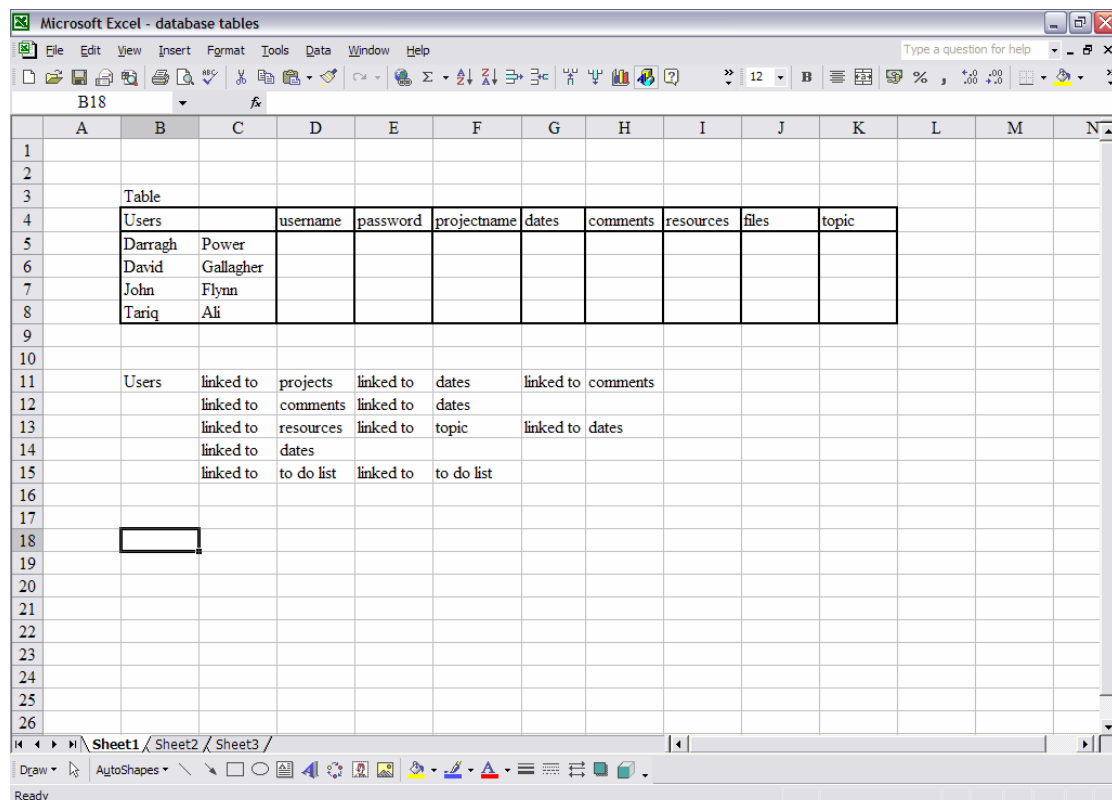
4.7 Excel Files:

Each Excel file represents a change in my thinking and the learning process as I modify the design of the artifact with the help of Cormac, Cathal, David and Tariq. A brief synopsis of the changes is outlined below. The full files can be viewed on the CD accompanying this study in the folder marked databasetablerevisions. You will note that my reflections on the three tier design structure refer mainly to the database tables. My concern at this time was that if the database tables were not correct it would be problematic later in the process, particularly in terms of querying the database using SQL. I will take you through the development of the design process now showing you the various changes in the design process and explain the rationale for the amendments, based on the contributions from each of the participants. This stage of the process is focused almost exclusively on the database table revisions, which took place in eight steps.

4.7.1 STEP 1 - Database tables.xls – Initial concept plan for the artifact.

Note that this essentially a concept document, an attempt to get a handle on what users will use. You will notice from **Fig. 4.1 database tables.xls** below that this is a single tab excel spreadsheet, with a view to figuring out the structures of the tables of the database which will underpin the application. It will be evident to those who are experienced database designers that there is no attempt at figuring out the tables in relation to an entity relationship model. The entity relationship model of database design is the standard model for database design. It involves identifying the separate entities involved, in this case, users and the projects they have to do, and the files, comments and resources that constitute the project. The ways separate entities relate to each other are called relationships.

STEP 1 - Fig. 4.1 – database tables.



4.7.2 STEP 2 - Tables1basic.xls - Initial design following three tier approach as a result of reading Williams and Lane (2002) – Note the introduction of the three tabs:

- MySQL – Database Structures
- PHP Tier – Server Sided Scripting
- Client Side – What the user will see

This intervention from the literature fundamentally shaped my thinking on what was needed for the design. The database needs to be interpreted by the PHP tier in order to be sent out to Internet Explorer or an equivalent browser.

STEP 2 - Fig. 4.2 – tables1basic.xls

The screenshot shows a Microsoft Excel spreadsheet titled 'tables1basic.xls'. The spreadsheet contains three tables defined in rows 3-7, 9-12, and 16-18. The first table is 'users', the second is 'project', and the third is 'date'. Each table lists fields, their data types, and constraints. The 'date' table has a 'foreign key' constraint on the 'projectID' field. The spreadsheet also includes a note at row 20: 'Files to be stored on server in a separate folder'. The status bar at the bottom shows the file path: 'mysql / phptier / client side'.

Table	Field	Data Type	Constraint	Other
users	username	varchar	primary	
	userpassword	varchar		to do list
	userID	smallint	primary	foreign key
	projectID	smallint		
			not null	not null
project	title	text		
	projectID	smallint	primary	
	description	text		
	dateID	smallint		foreign key
date	dateID	smallint	primary	
	comment	text		
	resource	text		
date	filepath	text		
	projectID	smallint		foreign key

4.7.3 STEP 3 - Tables2basic.xls – Developing design through contact with Cathal and Cormac. I am learning the entity and relationship model of database design through trial and error with the help of Cathal and Cormac, with the result that the number of tables and fields in each table, and how these relate to each other is changing. Another key contribution I made by the book ‘Database Design using Entity-Relationship Diagrams’ by Bagui and Earp (2003), which was very helpful with regard to learning the basics of database design. There is an increase in the

numbers of tables here and in addition the types of information stored in the columns, which has changed from having the table fields across the columns to having the table fields in the rows instead. This was a direct result of Cormacs intervention and helped the design to correspond to the conventions of database design. At this stage I am very much trying to conceptualise what the database will look like.

STEP 3 - Fig 4.3 tables2basic.xls – MySQL tab

	A	B	C	D	E	F	G	H	I	J	K	L
1		Table structures										
2												
3		Table users	type	size								
4		userID	smallint	1	not null	auto_increment						
5		username	text	16	null							
6		userpassword	text	16	null							
7		projectID	smallint	1	not null							
8		commentID	smallint	1	not null							
9		resourceID	smallint	1	not null							
10		fileID	smallint	1	not null							
11												
12		Table projects										
13		projectID	smallint	1	not null	auto_increment						
14		userID	smallint	1	not null							
15		title	text	50	null	full index						
16		date	Timestamp		not null	full index						
17		description	text	200	null							
18												
19		table comments										
20		commentID	smallint	1	not null	auto_increment						
21		userID	smallint	1	not null							
22		date	Timestamp		not null	full index						
23		comment	text	400	null							
24		projectID	smallint		not null							
25												
26		table resources										

4.7.4 STEP 4 - Tables2basic1.xls – Cormac contributed a new tab pointing out problems with the initial database design tables. The tab CM_mysql is Cormacs work and was a major factor in my thinking about how entity's and relationships work. Note Cormacs contributions highlighted in yellow. These contributions again point out how crucial the contributions of others are for me in the process of my learning. Cormac in knowing the way queries are constructed in SQL had a good understanding of the way a query in SQL would work. In particular Cormacs intervention can be

seen in the way the primary and foreign keys are changing. The keys define the relationships between entities. So a user doing a project would need the users ID to appear in the project table of the database. This is called a foreign key. The primary key in the user table is the users ID. As the users ID appears in the project table, it shows the link between a user and the project that the user does. This learning is evident in Fig 4.4 – Tables2basic1.xls.

STEP 4 - Fig 4.4 – Tables2basic1.xls – CM_mysql tab

Table users	type	size			
userID	smallint	1	not null	auto_increment	
username	text	16	null		
userpassword	text	16	null		

if you want a transactions table put a transactionID field in each table and link to the transaction table

should only have one instance of each user, - can link to everything you n

don't need userID as you have project ID (you find the user f

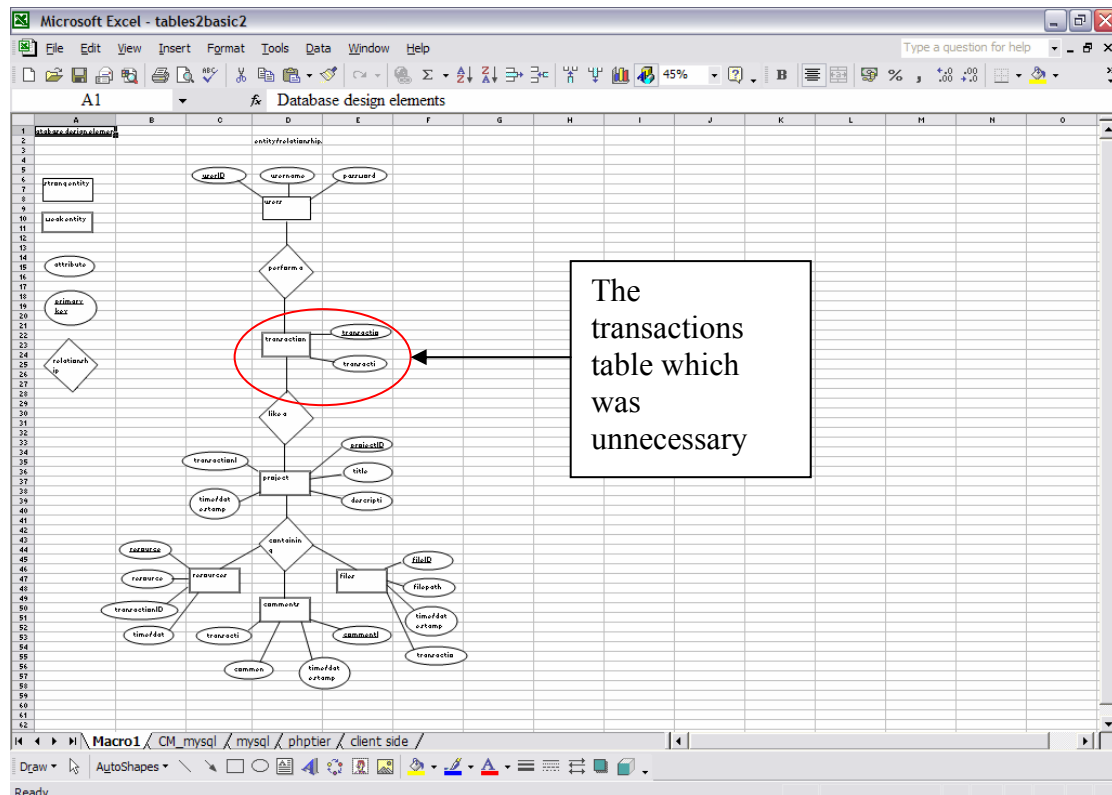
don't need userID as you have project ID (you find the user f

4.7.5 STEP 5 - Tables2basic2.xls – Following a suggestion from Cormac on an e-mail a new TAB Macro1 has been added to provide a visual representation of the database structures, to help to get an overview of how the database will look. This was done with help from Bagui and Earp (2003). The learning involved in doing the visual representation of the database involved learning how to use database design

entity relationship visual diagram models, for strong and weak entities, attributes, relationships, primary keys and foreign keys. (See Appendix A – for a glossary of terms)

Note the addition of a transactions table which I thought would be necessary for querying the database, but as the structure emerged I found to be irrelevant, as each user, will have projects and the projects will have files, comments and resources. Therefore queries can be constructed using the user and project ID's. In database language this would be that the foreign key in the project table would be the userID, and the files, comments and resources tables which are in relationship to the project table, have the projectID as the foreign key.

STEP 5 - Fig 4.5 – tables2basic2.xls – Macro1 tab



4.7.6 STEP 6 - Tables2basic3.xls – Note the addition of a project ID field in the tables files, resources, comments which is for querying in SQL. This reflects the learning from the previous table. For a full visual representation of these tables please see the file **Tables2basic3.xls** on the accompanying CD.

STEP 6 – Fig 4.6 tables2basic3.xls – The MySQL tab

Table users	Type	Size			
userID	Smallint	1	not null	Auto_increment	primary key
Username	Text	16	Null		
Userpassword	Text	16	Null		

Table transactions	Type	Size			
transactionID	Smallint	1	not null	Auto_increment	primary key foreign key
userID	Smallint	1	not null		
Transaction	Text	10	Null		

Table projects	Type	Size			
Projected	Smallint	1	not null	Auto_increment	
transactionID	Smallint	1	not null		
Title	Text	50	Null		full index
Date	Timestamp		not null		full index
Description	Text	200	Null		

table comments	Type	Size			
Commented	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
comment	Text	400	Null		
transactionID	Smallint		not null		

table resources	Type	Size			
resourceID	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Resource	Text	100	Null		
transactionID	Smallint		not null		

table files	Type	Size			
fileID	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Filepath	Text	100	Null		
transactionID	Smallint		not null		

STEP 7 - Tables2basic4.xls – Addition of first and last name fields in the user table following a contribution from Cathal. Note the removal of the transaction table which Cormac suggested is unnecessary if the projectID and userIDs are to be used for querying the database.

STEP 7 – Fig 4.7 – tables2basic4.xls – MySQL tab

Table users	Type	Size			
userID	Smallint	1	not null	Auto_increment	primary key
Username	Text	16	Null		
Userpassword	Text	16	Null		
Firstname	Text	16	Null		
Lastname	Text	16			

Table projects	Type	Size			
Projected	Smallint	1	not null	Auto_increment	
Title	Text	50	Null		full index
Description	Text	200	Null		
userID	Smallint	1	not null		
Date	Timestamp		not null		full index

Table comments	Type	Size			
Commented	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Comment	Text	400	Null		
Projected	Smallint		not null		

Table resources	Type	Size			
resourceID	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index

Resource	Text	100	Null
Projected	Smallint		not null

Table files	Type	Size		
fileID	Smallint	1	not null	Auto_increment
Date	Timestamp		not null	full index
Filepath	Text	100	Null	
Projected	Smallint		not null	

4.7.8 STEP 8 - Tables3basic1.xls – Following Tariq Alis narrative the to-do-list table has been added to allow for the project management element of the portfolio system.

STEP 8 – Fig 4.8 – tables3basic1.xls

Table users	Type	Size			
userID	Smallint	1	not null	Auto_increment	primary key
Username	Text	16	Null		
Password	Text	16	Null		
Firstname	Text	16	Null		
Lastname	Text	16			

Table projects	Type	Size			
Projected	Smallint	1	not null	Auto_increment	
Title	Text	50	Null		full index
Description	Text	200	Null		
userID	Smallint	1	not null		
Date	Timestamp		not null		full index

Table to do list	Type	Size			
todolistID	Smallint	1	not null	Auto_increment	
list item	Text		Null		
due date	Date		Null		
userID	Smallint	1	not null		
Projected	Smallint	1	not null		

Table comments	Type	Size			
-----------------------	-------------	-------------	--	--	--

Commented	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Comment	Text	400	Null		
Projected	Smallint		not null		

Table resources	Type	Size			
resourceID	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Resource	Text	100	Null		
Projected	Smallint		not null		

Table files	Type	Size			
fileID	Smallint	1	not null	Auto_increment	
Date	Timestamp		not null		full index
Filepath	Text	100	Null		
Projected	Smallint		not null		

4.8 Database

Using MyPHPAdmin which is a web interface to access MySQL I constructed the database “thesis” which contains all the tables as per **Fig 4.8**.

4.9 Reflections on Politics

My diary entry below indicates some of the issues I was reflecting on, around the management of my time and resources while working in a commercial organization. I was hoping to be able to use some of the computer facilities in work, and also avail of some time in work to develop the artifact as part of my training role. As my organization is developing a culture of reflective practice for managers involving a construction of a portfolio of their work, I thought that some of the programming I was doing might be useful in helping with this, and also when the artifact is finished, I will be making the research available to some of my colleagues. My diary entry at the time illustrates some issues that arose in terms of support. Fionnuala Flanagan a contributor to the H.Dip / M.Sc in Education and Training Management in DCU

suggested that these issues may occur in a similar way for other people in their own practice contexts, and may offer a transferable aspect of the research.

26/3/04 - Diary

The development of the artefact in work is problematic for a number of reasons.

1. The technical support company for my employer have specific commercial tie ins with a number of other vendors, which means that open source material such as PHP and EasyPHP cannot be installed on PC's in the office. This means that I need to have my own computer.
2. There is a politics in the use of open source, with the LAMP (Linux, Apache Web Server, MySQL and PHP) platform being a low cost competitor of the commercial software vendors. The aspects of the platform that are transferable to a windows platform are difficult to install, and are subject to an environment where the commercial vendors are openly hostile to the use of open source software. This reflects the potential loss of earnings that they represent to a commercial vendor. It also means that the artefact I develop is necessarily focussed on individual learners rather than towards organisational learning.
3. There is also a parallel perception in the open source community in terms of using MySQL in a commercial environment, whereby it is strongly advised on the MySQL website that commercial users purchase a commercial license for the product.
4. This dichotomy would be significantly more problematic for a larger scale project in a commercial environment, and may make the use of open source software prohibitive for other trainers and developers of learning objects. A recommendation may be that some middle ground be found which reduces the conflict between the open source community and commercial vendors. This may have to be negotiated at a local level within the users context.

As this diary entry indicates the fact that the computer support function in my organisation is outsourced. This outsourced organisation has tie-in connections with other commercial database and server sided scripting vendors there is a significant problem in terms of support in my organisation. The use of commercial products could not be countenanced in terms of the cost of buying licenses and also in terms of the ongoing support for such applications. This financial cost in addition to the costs in terms of time of learning to program in server sided scripting languages and SQL is potentially prohibitive for anyone seeking to go down this route. In addition the recurring fees in terms of licenses etc are an additional annuity cost.

These reasons are my motivation for using open source software which being financially cost free provide an opportunity for low cost development for me. I also felt that the open source community being one where collaboration is in evidence through the releasing of source code, would provide reasonable support through online tutorials etc. One of the difficulties as a result of this approach however is that I am relatively unsupported in terms of bringing the research into my daily practice as a trainer, so the development is taking place outside work on my own computer, which puts the users in a situation where they cannot see the development process except periodically.

4.10 Configuration Details

In order to start the development process I needed to be able to set up my own local computer to run the Apache Web Server, MySQL and PHP applications and configure them to run simultaneously and allow MySQL and PHP to read each other. This difficulty arose later at the stage where I was uploading the artefact to a server in order to allow for user testing. I will discuss this further later, but my reflections on the initial configuration on my local computer are outlined below.

29/3/04 – Diary Reflections - Technical Difficulties

I am struggling to configure MyPHPAdmin and MySQL for multiple users which is very frustrating. At this point I keep getting the error message:

“Error

The additional Features for working with linked Tables have been deactivated. To find out why click [here](#).

Clicking here brings me into a manual that is written for someone with considerably more technical knowledge than I currently possess. In other words it’s not particularly user friendly – an example is:

*“• HTTP and cookie authentication modes are recommended in a **multi-user environment** where you want to give users access to their own database and don't want them to play around with others.*

*Nevertheless be aware that MS Internet Explorer seems to be really buggy about cookies, at least till version 6. And PHP 4.1.1 is also a bit buggy in this area! Even in a **single-user environment**, you might prefer to use HTTP or cookie mode so that your user/password pair are not in clear in the configuration file.*

- *HTTP and cookie authentication modes are more secure: the MySQL password does not need to be set in the phpMyAdmin configuration file (except for the "controluser" -see the [Configuration section](#)). However, keep in mind that the password travels in plain text, unless you are using the HTTPS protocol. In cookie mode, the password is stored, encrypted with the blowfish algorithm, in a temporary cookie."*

```
GRANT USAGE ON MySQL.* TO 'pma'@'localhost' IDENTIFIED BY
'pmapass';
GRANT SELECT (
    Host, User, Select_priv, Insert_priv, Update_priv,
Delete_priv,
    Create_priv, Drop_priv, Reload_priv, Shutdown_priv,
Process_priv,
    File_priv, Grant_priv, References_priv, Index_priv,
Alter_priv,
    Show_db_priv, Super_priv, Create_tmp_table_priv,
Lock_tables_priv,
    Execute_priv, Repl_slave_priv, Repl_client_priv
) ON mysql.user TO 'pma'@'localhost';
GRANT SELECT ON mysql.db TO 'pma'@'localhost';
GRANT SELECT ON mysql.host TO 'pma'@'localhost';
GRANT SELECT (Host, Db, User, Table_name, Table_priv,
Column_priv)
    ON mysql.tables_priv TO 'pma'@'localhost'
```

This is definitely geared to a more technically literate user.

This type of error message I think could be explained in significantly easier terms for a layman, and this use of technical language is something that maybe the open source community could try to simplify for inexperienced users. I've included it in full to illustrate how difficult it is to understand. After a lot of trial and error and frustration over about five days I managed to configure the applications as my diary entry below shows.

3/4/04 Diary Reflection – Breakthrough in Technical Knowledge

I finally managed to configure the database and login successfully. The steps to this are as follows:

Step 1

In myPHPAdmin – the config.php file the line:

```
$cfg['Servers'][$i]['auth_type'] = 'config';
```

Needs to be changed to:

```
$cfg['Servers'][$i]['auth_type'] = 'http';
```

So that apache can process the http requests.

Step 2

A new user needs to be created on the specific database, to allow the user to access this database only, and not the entire database library. In my case I created a new user in myPHPAdmin, called thesis with a password thesis, and ran the following SQL query to grant this user all privileges on the database.

```
GRANT ALL PRIVILEGES ON thesis.* TO thesis@localhost IDENTIFIED BY 'thesis';
```

Step 3

The db.inc.php file which contains all the details of the database I edited to read.

```
<?php
//This file defines the database settings. It can be included in all your php scripts that
interact with
//your database. Then if you need to change the passwd or the databaseServer, etc you will
only have to change it once

//define some parameters for the connection
$dbdatabaseServer="localhost"; //specifies the database server. Can be changed if the
database moves
$user="thesis"; //specifies a username to log on to the database with.
$password="thesis"; //specifies a password for the username.
$dbdatabase="thesis"; //specifies the database on the server you wish to connect to.
//NOTE: in this case user, passwd and database are all set to the same value.
//This is for simplicity, but it won't always be the case when using databases on other
servers.
?>
```

This combination of factors allows the user to access the database. The register.html form processed by register.php inserts the new users details into the table on the database 'thesis.' This is a very satisfying breakthrough as it has taken me a long time to figure out these steps, as I could not find any simple explanations of how to do this.

Note any line beginning with // is not read by the browser, only the lines ending in “;” are PHP lines. As you will see I have just named everything “thesis” for convenience sake. This is the source code from the tutorial Bob introduced me to, which I modified to suit my needs, and to read my database “thesis.”

4.11 Reflections on the Design process to date.

As is evident from the chronology above it is now a month since the start of the project and it has taken four weeks of hard work to get to the point where I could start programming. One of my commitments with this research was to be very clear and honest with the difficulties in relation to the study. I do not want to underplay how difficult it has been in learning:

- the database structures
- how to draw an entity relationship diagram correctly
- how to put the design elements together in a group of tables that are workable
- how to download the correct software applications
- how to install and configure the software applications
- how to learn how to do these technical tasks and research the process at the same time

The result to date is workable but is by no means a definitive way of doing this kind of project, and as with the entire project it would not be possible to have got this far as a novice in the field without the assistance and contributions of other people in the process, in particular Cormacs input on the database was crucial to building a working model. At this stage in reflecting on the process to date I realise that most of my learning has been in relation to the database design theory and the configuration of MySQL to allow for multiple users to access the database. The full source code for each page is viewable in Appendix D, and the actual files are available on the CD attached.

4.12 Cycle Two

4.12.1 Starting to Program

Gary Greenberg cited in the NLII Annual Review (2003) discusses e-Portfolios and:

..advised session attendees to get started before waiting for the time when they think they can get it right.” (ibid 2003: 28)

Given the length of time for this study I found the quote above to be a pragmatic cue to learning the programming by doing. Reflecting on how I learned how to programme in HTML I found that learning by trial and error and by actually doing the programming was the only way I could get to grips with the syntax of the language. With this in mind I started to learn to programme with PHP.

4.12.2 Initial steps in PHP

The first step in the process of learning to program in PHP was to copy all of the files from the tutorial that Bob introduced me to, into the folder C:\Program Files\EasyPHP1-7\www and seeing how they worked. I became aware that this is the folder to use for web files in PHP from reading through documentation at the <http://moodle.org> site which uses EasyPHP to support Moodle. Moodle is the open source course management system (CMS) that DCU use.

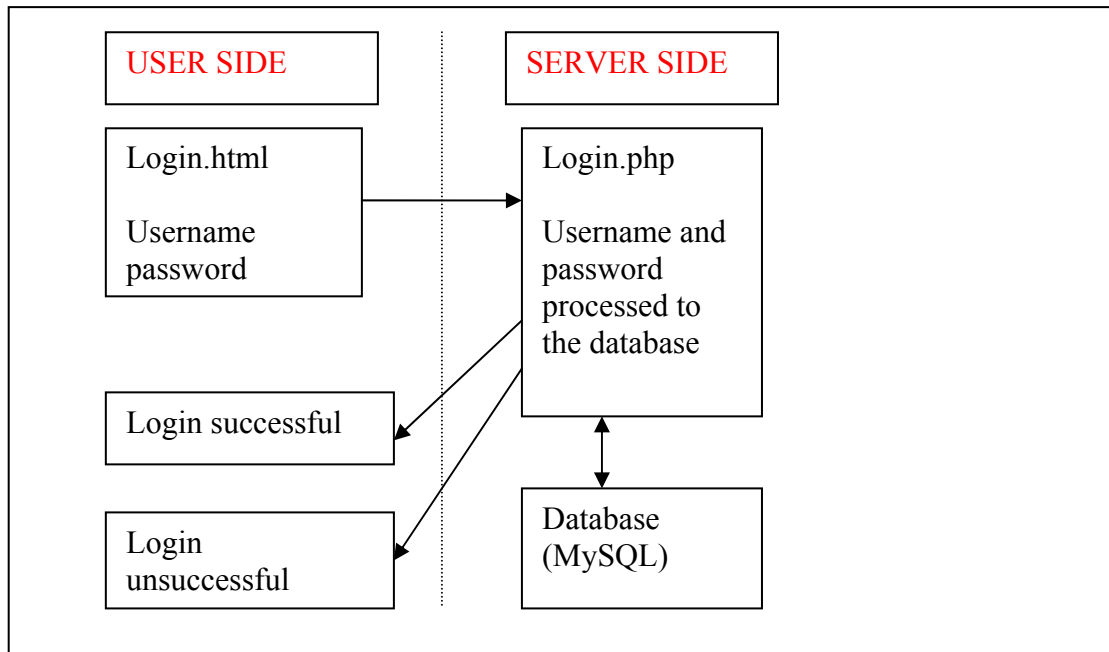
At this point I do not understand the technical syntax of the programming language PHP in terms of variables and arrays. As with HTML programming I adopted the view that why learn to re-create the wheel if I can pick up what I need from other websites which is a feature of open source development. Many open source sites exist which make source code available such as www.phpfreaks.com and www.php.net which is a significant reason in my choice of the applications. The result of this view was I decided to take as much of the source code as possible from the tutorial Bob introduced me to, and configure it where possible to suit my own needs. As my database is unique to my application much of the source code from the tutorial had to be re-written and re-configured, and in some cases added to. After the initial configuration of db.inc.php I moved onto the files register.html and CreateUser.php, and login.html and login.php. A major learning point for me was the realization that these files work as a pair. The file login.html creates a set of variables which are processed by login.php.

The following excerpt from login.html illustrates this. Note the action is to send the username and password to login.php which then processes it.

```
<form name="form1" method="post" action="login.php">
```

The page login.php then processes the form by sending the information to the MySQL database, and depending on whether the username and password are recognized by the database sends out a message to the user that their login was successful, or unsuccessful. This is illustrated in **Fig 4.9 login.html / login.php below.**

Fig 4.9 login.html / login.php



It is the same situation for the register.html and CreateUser.php files which also work in pairs. “Include(db.inc.php)” tells PHP to include the database “thesis,” the “\$query” section is an SQL query which posts the username and password to the database and if the user is registered will collect their userID and allow them to open a session on the database. You will notice that there is a section at the top of the login.php page which mentions a teacher and admin log in which is a relic from the tutorial, but as it didn’t effect the workings of the script I’ve left it in. It also gives me the option to setup an administrator function as my technical skills develop. The code that I can amend in the future is quoted below. Currently my technical knowledge is not sufficient to process this but I may gain these skills in the future and it is with a view to leaving the option open that this code remains rather than being deleted.

```

    if($username=="teacher"){
        //if they did we will have to check that they got the right
password
        if($password=="admin"){
            //if all is correct we can set the teacher session
variable
            //and direct the teacher to the teacher menu
            $_SESSION['teacher']=true;
            echo "Successfully logged in <br>";
            echo "<a href=\"teacher.php\">Go to the teacher home
page</a>";
        }else{
            //if they got the password wrong we can print out the
form again
            ?>

```

It is through understanding that these files work in pairs and that a variable can be set on one page (login.html) and processed by another page (login.php) that I began to understand variables. Any piece of code with a “\$” in front of it is a variable. In other words \$username is a variable. The combination of username and password variables in the one piece of code are an array, and the array then is posted to the database. In other words the table columns in the database “thesis” correspond to the arrays created in PHP in the login.html and login.php are posted to the database. Through conversations with Cormac I began to make the connections between the data structures of the database tables and the way these data structures are reflected in the PHP use of arrays. Specifically I began to realize that the column titles in the database needed to be matched exactly by the data being submitted through an array (collection of variables) in PHP.

Another amendment to the tutorial files is the inclusion of the headers for the portfolio system with the images and navigation menu. This section is:

```

echo "<html>

<head>
<title>Welcome to Your Portfolio / Research Manager portal
page</title>

```

```

<link rel="stylesheet" type="text/css" href="style.css">
</head>
<table width="100%">
<tr>
<td width="25%">



</td>

<td width="50%" valign="top" align="middle">

<h1 align="center" valign="top">
<h1>You have logged in successfully
</h1>

<a name="top"></a></td>

<td width="25%">
</td>

</tr>
<tr colspan="3"><td colspan="3" align="center"><a
href="template.php">To My Projects page</a></td></tr>
</table></body></html>;

```

Note the difference between HTML and PHP is that when embedding a HTML page in PHP the backslash character needs to be included before any “ otherwise PHP will not read it correctly.

4.12.3 Cascading Style Sheet – Style.css

A cascading style sheet defines the font sizes, and styles for all the HTML code on the site. It can be embedded (included in a HTML page), or it can be external, which means that it is stored as a separate page and then linked to each HTML page. I set up an external cascading style sheet at this stage with a view to managing all the styles on the site to ensure consistency and be visually appealing. I have included the file style.css on the accompanying CD. If I had more developed technical skills I would have liked to give users an option on what colour schemes and font / text sizes they

would like to see on the site, so they could choose for themselves. This would be in keeping with my values, though my current skill level doesn't allow for it. I would not rule it out in the future as an option though. The cascading style sheet is one of the standard ones on Microsoft FrontPage which is installed on my local computer, and I use as a HTML editor. One of the functions available in Microsoft FrontPage is the generation of standardized external cascading style sheets. I have just copied a standard cascading style sheet into my own site as style.css (.css is the extension for a cascading style sheet. This sets the standard for each of the HTML tags such as the <a> tags for links and <h> tags for text etc. In the future I would hope to offer users the capability to choose their own style sheet, which reflects their own taste, but this is currently beyond my technical abilities. The style sheet is incorporated into each page on the site with this code:

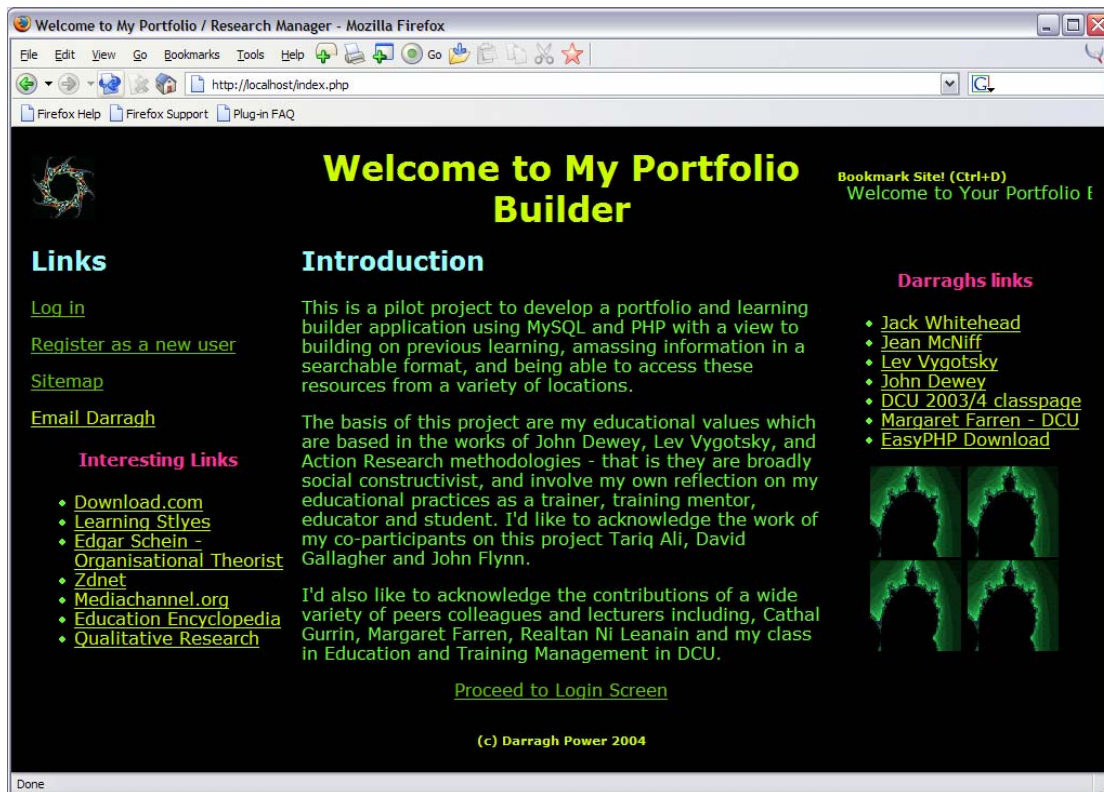
```
<link rel="stylesheet" type="text/css" href="style.css">
```

This appears between the <head></head> tags in the html code.

An example of how the homepage looks with the cascading style sheet is below in **Fig**

4.10 Cascading Style Sheet – Home (Index.php)

Fig 4.10 Cascading Style Sheet – Home (Index.php)



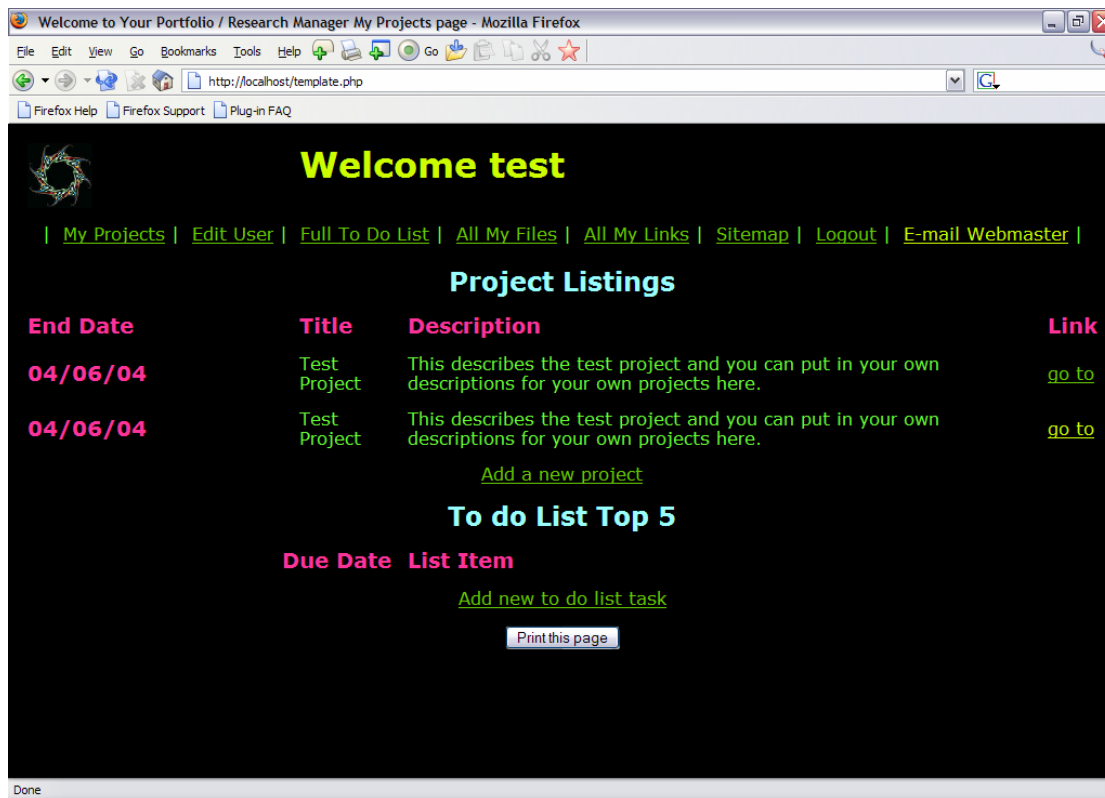
4.12.4 The Design Process

The user manual in Appendix C gives a comprehensive breakdown of each of the pages in the site and how users can access each page and the features of each. The next section focuses on the design process involved in the pages and in particular the technical issues in relation to the design process.

4.12.5 My Projects (Template.php)

To a user the title of this page is My Projects page. Following a successful log in this is the first page that a user will see. The example below shows a user with two projects already uploaded.

Fig 4.11 – Template.php – cascading style sheet



The features of this page are that a user when they login can see when their project is due – End Date column. The Title of the project, and a Description of it. The user then has an option to click on the link to the project. Originally this page had three columns on it and a similar layout to index.php. I had to change this for technical reasons rather than design reasons. My technical skills are insufficient to embed the query results from the database within `<td></td>` tags that are already in existence, and retain the side columns which would have allowed for the ‘To Do List’ to appear in it. This ‘To Do List’ is another SQL query, and I had tremendous difficulty in putting more than one SQL query on a page with the page returning blank results sets for the to do list repeatedly. I found this very difficult to resolve. The resolution came by placing the query for the ‘to do list’ I placed between the `<body></body>` tags in the HTML code, instead of the `<head></head>` tags as I had it initially.

The SQL syntax of the query for the projects includes the variable \$userID which is set earlier on the page:

```
$userID=$_SESSION['userid'];
```

This sets the session ID (the logged in user) as the user whose records are to be searched in the query. The query reads:

```
$query = "SELECT * FROM project WHERE userID='$userID'";
```

This queries the database and the results are processed as follows:

```
<?php
    //loop until we are out of rows
    while ($row = mysql_fetch_array($result, MYSQL_ASSOC)) {
        //$row will contain the current row of the table so we print
        out the values of it
        print "<tr>\n";
        //this will get the date but it will be in the format
        YYYY-MM-DD
        $dbDate=$row['enddate'];
        //to put it in the format d/m/y we do
        $niceDate=date("d/m/y", strtotime($dbDate));
        print " <td><h3>$niceDate</h3></td>\n";
        print " <td>".$row['title']."</td>\n";
        print " <td>".$row['description']."</td>\n";
        print " " " <td><a
href=\"project.php?id=".$row['projectID']."\">go to</a></td>\n";
        print "</tr>\n";
    }
?>
```

Again this is an amendment of the source code from the tutorial. The database stores the date in the form Year – Month – Day and the PHP code transforms this to Day – Month – Year before printing it on screen. The results of the query from the database are printed as table rows <tr> and table data <td> within table rows. This query result structure meant that I had to restructure my initial design template as I didn't understand how to put the query into an existing <td> or <tr> tag at this point in time.

4.12.6 Tariq's influence

The 'To Do List' / project management aspect was developed with through reflecting on Tariq Ali's narrative where he states:

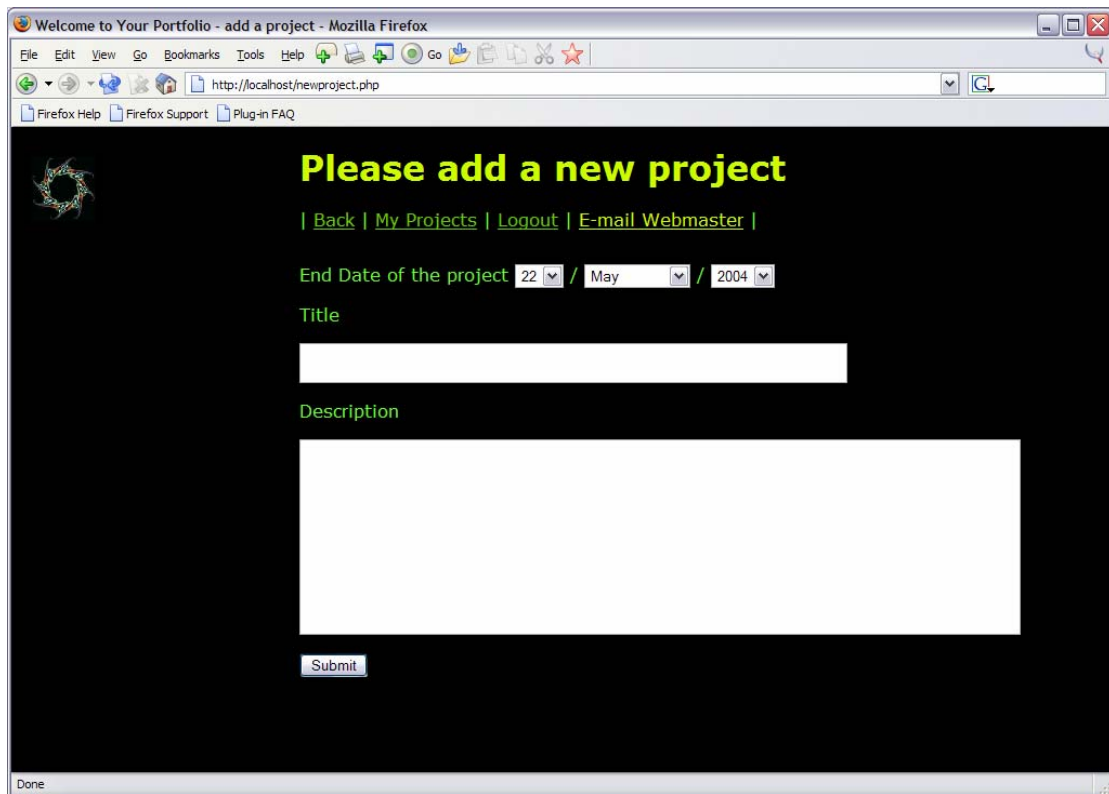
Also, if feasible, would it be possible to include some sort of project-planning aspect to the portal?
I think it may be useful to have a visible project plan on the customized homepage.
(e-mail extract – 31/3/04)

Initially the plan was for the 'To Do List' to appear on each page in the same place but the technical skills needed to program this are currently beyond my skills to do. The chief problem I am finding is in running two SQL queries side by side on the one page, with both sets of results being output into a table. The best compromise I can currently come up with is to have the projects shown by their end date.

4.12.7 Adding A Project – newproject.php and addnewproject.php

In a similar way to the login.html and login.php pages the pages newproject.php and addproject.php act as a pair. The newproject.php page sets the variables, and the addproject.php puts the variables in an array and submits them to the database. I adapted this from the tutorial.

Fig 4.12 newproject.php



This page allows the user to set the end date for the project which will hopefully work for the users in helping them with their project management. These pages work in the same way as login.html and login.php in that the submission form on login.html sets the variables and the login.php page processes the submission of the variables to the database. The code for the submission in this case is as follows:

```
$query = "INSERT INTO project VALUES (NULL, '$userID', '$date', '$title', '$description')";
```

As you can see the array details match the column names on the table 'projects' in the database.

This paired approach is evident throughout the design of the artifact which is again a feature of the original tutorial design structure. The same structures that newproject.php and addproject.php use to process data are found in the files, newlink.php and addnewlink.php, newcomment.php and addnewcomment.php,

newtodolistitem.php and addnewnotodolistitem.php. The first page sets the variables and the second page processes the details. The one difference is that the links and comments are attached to a project rather than to a user. In other words for the purposes of querying the database the user accesses their comments and links to a particular project. (See Macro1 - tables3basic1.xls for an overview of the database structures)

4.12.8 Uploading Files – myupload.php and uploadmyFile.php

Like the resources and comments that are added by users, files are added to a project. The myupload.php and uploadmyFile.php were slightly different from adding comments or resources, in that the files that are uploaded onto the web are actually stored in a separate folder on the server called userfiles. The database stores the Filepath for the uploaded file. The file size is limited to about 1.5 MB. All of this is similar to the tutorial that Bob introduced me to. The chief difference is in the types of extensions allowable for uploading which are:

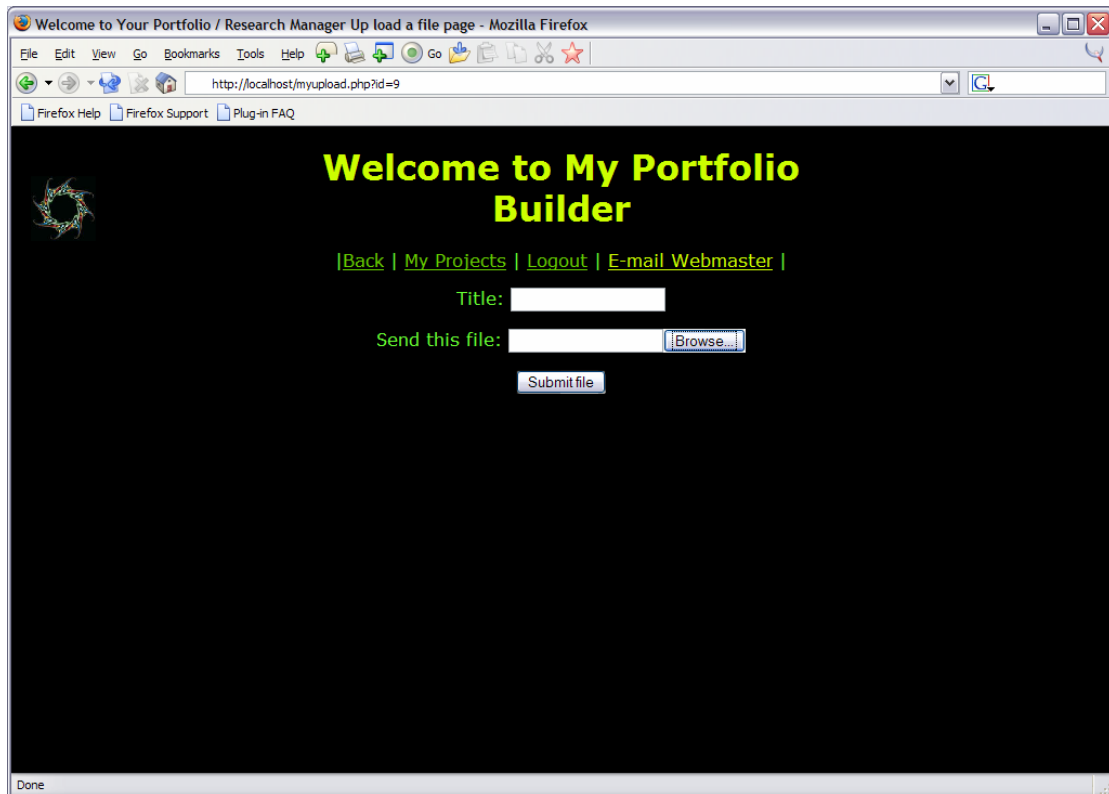
```
.rtf, .pdf, .doc, .jpg, .gif, .xls, .ppt, .pps, .mp3, or .wav
```

The original tutorial allowed:

```
.rtf, .pdf or .txt
```

The page the user sees is:

Fig 4.13 – myupload.php



I struggled with getting these files uploaded into the correct directory for a number of days. I discussed this with Cathal on the 4/6/04 and as a result of this conversation I edited the following piece of code in uploadmyfile.php which processes the form shown above:

```
$uploaddir="C:\Program Files\EasyPHP1-7\www\userfiles\";
```

So that it read:

```
$uploaddir="C:\Program Files\EasyPHP1-7\www\userfiles\\";
```

The addition of the second backslash is necessary for the upload to take place correctly.

4.13 Cycle Three

4.13.1 Becoming more technically proficient

The stage of learning PHP is one which is characterized by trial and error, and a lot of time spent trying to get the pages to work properly. As is evident from the progress above from March to early June I was learning a number of things simultaneously, in terms of database design, SQL queries and also PHP language and syntax.

4.13.2 Passing projectID numbers through URLs

At this stage I embarked on another cycle of learning how to query the database properly and ensure that multiple queries could appear on a page. Up to this point just getting the results of HTML forms passed to the database has been difficult, particularly for the add files, comments and resources. The chief reason for this difficulty is that I didn't know how to pass the project ID around from page to page once a user had selected that particular project. On the template.php page the query result I discussed earlier makes the projectID a link. The section in question is highlighted.

```
<?php
//loop until we are out of rows
while ($row = mysql_fetch_array($result, MYSQL_ASSOC)) {
    //$row will contain the current row of the table so we print
    out the values of it
    print "<tr>\n";

        //this will get the date but it will be in the format
    YYYY-MM-DD
    $dbDate=$row['enddate'];
    //to put it in the format d/m/y we do
    $niceDate=date("d/m/y",strtotime($dbDate));
    print " <td><h3>$niceDate</h3></td>\n";
    print " <td>".$row['title']."</td>\n";
    print " <td>".$row['description']."</td>\n";
        print
                                "                                <td><a
href=\"project.php?id=".$row['projectID']."\">go to</a></td>\n";
    print "</tr>\n";
}
?>
```

This makes the URL to the linked page read as:

```
http://localhost/project.php?id=9
```

The link therefore incorporates the projectID. Now the next thing I needed to understand how to do was to pick up the ID and incorporate it into queries in the linked page. Again I discussed this with Cathal on the 4/6/04 and through trial and error we figured out that in the page that is being linked, in this case the project.php page. The key to collecting the ID number in the target page is the PHP code:

```
$projectID = $_GET['id'];
```

This code takes the projectID number from the URL and sets it as the variable \$projectID, which then allows this variable to be used in all the links from the project.php page. In other words the files, resources and comments are linked through the URL to the projectID in the same way as the link to add a comment from the project.php page demonstrates.

```
<?php echo "<a href=\"newcomment.php?id=".$projectID."\">Add a comment</a>"; ?>
```

I then had to understand how to incorporate this projectID into the SQL syntax in order to update and read the database.

4.13.3 Query construction in SQL

This is not actually that difficult as long as the database structures are known and clearly understood. An example from addnewcomment.php which processes the form newcomment.php is:

```
$query = "INSERT INTO comments VALUES (NULL, '$projectID', '$comment', '$date')";
```

This means that the projectID now accompanies the comment when it is submitted to the database. Now that the projectID is linked correctly to the comment it allows for this query to appear on the project.php?id=(whatever the projectID is) which brings

up all the comments in relation to this project, ordered by date. (The section “\$query” is the SQL for this).

```
$query = "SELECT * FROM comments WHERE projectID='$projectID' ORDER BY date";
```

4.13.4 Formatting the output of the queries and multiple queries per page.

At this time (6/6/04) the artifact functioned reasonably well in that users could add projects, within projects they could add resources, files and comments, and the additions would be correctly stored in the database under the correct user and projectIDs. I could now turn my attention to getting the queries constructed and formatting the output of the queries. At this time I am conscious of the fact that the Tariq and David both expected formatted output and clear search results. Through experimenting with using various tags in a trial and error way I managed to figure out that the query results could be printed within <p> (paragraph) tags and also (Un ordered list) tags, which allowed me to display query results within table structures like a row or a column, without having to restructure the design of the page.

The artifact was now developed to the point where the ‘alpha’ version could be user tested. David Dick (2002) suggests that many products are developed to a basic level, an ‘alpha’ version, which the designers are aware will have design flaws, but which are sufficiently functional to be tested.

CHAPTER 5 - EVALUATION AND USER TESTING

5.1 More configuration difficulties 8/6/04

As I found in relation to setting up EasyPHP and configuring it on my laptop, there were very similar issues that arose when I went to upload the site to a server with Cathal. On the 8/6/04 myself and Cathal spent the afternoon trying to upload the database and php files to a server in DCU, which we succeeded in doing. The Export function in EasyPHP under MyPHPAdmin was used to get the database details for “thesis.” We modified these details to be an SQL query to create a new database called “thesis” on the DCU server with the exact same structures. We then entered the query through a Linux interface to the particular server. The Grant all privileges query worked to give access to the database.

The problems arose when we tried to access the database with the files (which we had uploaded also). The database was created with the correct privileges, and all the code syntax was correct but unfortunately the DCU server version of PHP was not configured to read MySQL which meant that the site could not be put up on the internet through DCU. On the evening of 8th I purchased the domain www.darragh.info (this can be used to access the site until August 2004) and a hosting package in order that I could present my work for assessment, as the hosting package includes MySQL and PHP support. This would not be available for three days or so, so we needed a workaround solution to allow for a number of users to test the artefact at the same time. Cathal suggested we hook my laptop up to the network. We then located a network point to run the user test on my laptop where users on the network within DCU could type in the IP address of the particular machine into their browser

window to access the site. Cathal showed me how to access these IP address details on my laptop when it was connected.

Start Menu – Run – Type cmd into the command line.
The Dos Shell opens and then type ipconfig – this gives the IP address for a machine on a network.

If this number is typed into Internet Explorer or equivalent browser it will bring up the page as long as the machine is on the same network, provided the server programs are running on my laptop. This approach was the work around for the user testing on the 9/6/04.

On the morning of the 9/6/04 I tidied up some of the HTML code so that Internet Explorer and Netscape Navigator or Mozilla would produce the site with the same formatting.

5.2 User Testing 1. 9/6/04.

Testing is the process of locating errors in the project, with the aim of eliminating them before the project is distributed. (Dick 2002: 122)

The first user test took place in a computer lab in DCU on the 9/6/04. There are five users for this test. Three of the users I know, and two of the users I met on the day for the first time. The method I used for testing was to show the web site and demonstrate how I would use it. I then read out a series of questions that I was thinking about in relation to what users could think about which are outlined in my diary entry below. The users were given a blank sheet of paper and asked to logon and see how they got on, and to record their comments and ideas. Throughout the process I walked around the room and chatted to the users and noted their comments as I went around. The test is not designed to provide quantitative data, but to get an impression if the structure of the artefact is okay, and if the links are working okay. I

also made it clear that anything the users wanted to say about it was fine that I would not direct them. For this test the site was setup on the DCU network with the users typing in the IP address of my laptop to access the site as an intranet site.

5.3 User Testing 2. 18/6/04

John Flynn and Tariq Ali took turns in going through the artefact on the laptop for this test. The location of this test was an office in my organisation. As with the first user test it took the form of a brief demonstration Tariq and John being given a blank sheet to note their reflections as they tried the site.

5.4 User Testing results – the negatives.

There are definitely issues in relation to the user interface for the e-Portfolio builder, which were identified by the users. There are also some positives, but I will deal with the areas that were brought up by the users as needing work. David Dick (2002) identifies the fact that ‘no projects work correctly first time.’ (ibid: 122). He also identifies the fact that errors in an artifact or product can occur in three areas.

1. Design flaws - which occur prior to implementation.
 - a. Learning issues
 - b. Navigation issues
 - c. Omissions
2. Content errors – any mistakes on the actual screens of the project.
 - a. Incorrect statements
 - b. Misspellings
 - c. Grammatical mistakes
 - d. Poor quality images or video
 - e. Deviations from the design document criteria
3. Programming errors – any mistakes in the logic and operational flow of the project.
 - a. Links that don't work
 - b. Incorrect file handling

(ibid: 122)

5.4.1 Design Flaws

5.4.1a Learning issues

- Edit / Delete function
- Lack of initial validation of data – the database allows blank data and incorrect links to be uploaded.
- Allow for the exporting of a project to a text file like Microsoft Word.

The main learning issues identified in the user testing was in relation to the technical skills which I have yet to learn. The lack of an Edit / Delete function certainly is a significant design flaw in the artifact as it is currently constituted. This was pointed out by a three of the users, as a significant drawback. The reason for this lack of functionality at this stage is that I simply do not know how to program the required amendments. In addition to this lack of functionality effecting users, a knock on effect on the technical side of things is that the privileges in the database need to be carefully considered in the next version of the database in order to ensure that the users can update and delete content. This issue of privilege is an issue in most database systems like Microsoft Access, when it comes to updating and deleting content.

One of the users in the first user test identified that blank or invalid data can be stored in the database because there is no validation in place to ensure that the data is entered correctly. This is a significant problem and would need to be improved for the next version of the site. Again this is beyond my programming skills at this stage.

Tariq and John in the second user test suggested that it would be very useful to be able to export all the information for a project to a text file, in addition to being able to print the page. This is also beyond my skills at this stage.

These learning issues are significant and mark what is needed for the next steps in the design process.

5.4.1b Navigation Issues

- A help file for new users
- View the to do list by project
- When a user adds a “to do list item” in a project, the confirmation page sends them back to the My Projects (template.php) page.
- Links not working, www.mediachannel.org, and E-mail Webmaster
- Allow links to be categorized

In terms of navigation issues one of the users in the first user test, and Tariq in the second user test identified the need for some sort of aid to navigation for those logging in for the first time. There is a user manual in Appendix C of this project but the onscreen instructions need to be clarified, in the form of a help file. In addition to this another user in the first user test, and John in the second user test identified the need for a user to be able to view the ‘to do list’ for each project, which is another navigation issue. My own reflection on this is that when a user adds a ‘to do list’ item in project.php, within a project, they are forced to go back to My Project / template.php rather than back to the project they were in. I think that this whole area of the ‘to do list’ needs to be reconstructed in the next version of the site. Two of the users identified two links that were not working have now been amended. John suggested the development of a way of categorizing links to make them easier to search.

5.4.1c Omissions

- Edit and delete function
- Validation of data submitted by users
- Export a project to a text file function
- An alert or reminder for the to do list.

The lack of an Edit and Delete function as well as some sort of validation mechanism for links and files which are to be uploaded are significant technical omissions which need to be improved in the next version of the site. John and Tariq also suggested developing an export to text file function in addition to being able to print pages. In the second test John suggested adding a reminder function for the to do list, such as an e-mail.

5.4.2 Content Errors

- project end date defaulting to today's date
- comment and diary entry – two descriptions of the same thing could be confusing
- Existing picture could not be uploaded

The users in the first user test identified that the project end date is not picking up correctly but is defaulting to today's date, even when amended in the act of adding the project initially. The second user test did not pick this up. One of the users in the first user test identified that when a comment is added, the message “diary entry” added successfully is the result. This use of comment and diary entry for the same thing they suggested is potentially confusing, and should be amended for the next version of the artifact. One of the users in the first user test found difficulty in uploading a picture getting an SQL error message.

Other than this the users did not identify significant content errors. This I presume is due to the fact that there is very little existing content on the artifact and most content is submitted and generated by the users. Their inability to change and delete their own content as the artifact is currently constituted was a source of concern, so I believe that the content error issue is still a significant factor for consideration. It is a

learning issue for me as a designer, rather than something that is instantly changeable in order to improve the site, except for the project end date.

5.4.3 Programming Errors

In the first user test one of the users identified two links on the index.php page which did not work. Two of the users in the first test identified the problem in relation to entering invalid links into the database in two ways. The http:// is already present as a default and if a user enters a link (by pasting it in for example) then the link wont work due to the repetition of http://. The second issue with links is that there is no test to see whether the links work or not before they are entered.

The user testing was an excellent barometer of my progress to date and showed areas for improvement at all three levels of the design. At the technical end I need to work on the design flaws. I also need to ensure that the content produces correctly, and amend the programming errors.

5.5 User Testing results – the positives

5.5.1 User Test 1 – a user’s comments

Darragh’s introduction - aims outlined on Portfolio Builder – This is a very useful way of finding relevant sites / websites for research students / teachers all of the relevant websites are at your fingertips when you log into the portfolio.

I could see it of great benefit for teachers / students in the future. For example when you register to study for an M.Sc in Education studies, you would be presented with this Portfolio in addition to your username and e-mail account. All of the relevant educational sites would be on the site as now e.g. Vygotsky, McNiff, Whitehead.

User test 1.

This feedback is very interesting. It reflects a way of using the e-Portfolio system in a pedagogic way that I had not considered. This potential different interpretation of an artefact at the testing stage is identified by Donald Schon in an interview with John

Bennett (Schon 1996). Schon suggests that the users of a product may bring the applications for the product to new directions unforeseen by the designer. I had considered the home (index.php) page to be an introduction to this particular site, but the user suggests that this may be a start point with content to start the process of using the system, which may be tailored specifically to the users for the site. Schon also suggests that a “conversation with the materials” and the element of surprise are integral parts of the design process. This reinforces for me the importance of incorporating others expertise and collaborating, as this is leading my thinking about the next stage of the artefact in a different way than before.

5.5.2 User Test 2 - Tariq’s comments

The site is unfussy and easy to navigate for the end-user. Whilst appearing to be simple the complex functionality will allow users to effectively manage multiple workloads. The site is a perfect solution for creating a unified personal resource library – eliminating the need for many fragmented data sources.

User test 2. – Tariq’s comments

Tariq suggested that the sitemap was particularly well done:

useful because its not just architecture of site (it includes a descriptive sentence)
(ibid)

Tariq also suggested that the print page function allows for sharing resources relatively easily between people.

5.6 Reflections

Despite the undoubted improvements that can be made the users were positive in their comments in relation to the artefact throughout the user testing and some of them mentioned that they could see applications for the artefact. I am particularly pleased that Tariq was happy with the functionality the site offers as he was involved in the

design process from the beginning. Also satisfying was that none of the users identified any serious drawbacks to using the site, apart from the ability to edit and delete content. The next stage of the design process is outlined in the recommendations section of the next chapter.

CHAPTER 6 - CONCLUSIONS AND RECOMMENDATIONS

6.1 Limitations of the study - background

The issue of the management of personal information and in particular the work that has been done by a person is increasingly important in today's world. The management of your digital assets, is strongly linked to the management of your digital and virtual identity. The increased proliferation of tools to manage your personal work, your digital assets, and your virtual identity testifies to the potential growth in this area. With these new ways to do work, manage work, and make money from the systems involved in managing work, the empowerment of individuals to manage their own work is becoming crucial. The standards involved in terms of the technology and accreditation of work are still being in the process of being resolved by certification bodies, and in many ways e-Portfolios are emerging faster than the standards can be set. All of this dynamism is indicative of an area in flux. The potential problems of authentication of authorship are also significant.

6.2 Limitations of the e-Portfolio

In relation to this study the fact that the e-Portfolio system will be used for development rather than assessment means that many of these issues around standards, assessment and authentication are not significant factors in the design of the artifact. In other words as the system is focused on individual development, there is no claim in this study that suggests this approach is generalisable.

6.3 Context Limitations

All the development of the artifact took place on one laptop, without the support of the organization, due primarily to existing contractual agreements. The open source

software is not supported in my organization due to the technical support being outsourced to a third party vendor, and this third party vendor having a tie in with another commercial vendor for database applications. This means that the installation of open source software or indeed rival commercial products is not permissible. This is a significant limitation as all the development takes place outside of working hours, on a single computer, with all the costs being born by myself as the developer, in terms of the time spent developing the artifact. There are also costs in terms of time for the other participants in the process.

6.4 Limitation of Time

The artifact development took place from February 2004 to June 30th 2004. This spans the time from download, installation and configuration of the applications, through the design process and into the user test of the 'alpha' version of the artifact.

6.5 Limitation of Results

The artifact is as yet unfinished. The results of the user tests point to the need for amendments to be made to the design at all three levels, the design flaws, the content level and the programming involved in the artifact each require some amendment in order to fulfill users expectations.

6.6 Conclusions and Recommendations – Technical

The process of learning computer programming languages for me as a novice is a relatively slow one. I found that as the pace of technological advance is very quick the internet is a better source of technical information than books which can date relatively quickly in comparison to websites which are often updated regularly. I still

have not mastered much of the syntax of PHP, but I find that there is plenty of support to be found on the web in places like www.hotscripts.com, www.phpfreak.com, www.w3schools.com, www.onlamp.com, and www.webmonkey.com all of which offer source code.

This is indicative of the benefits from using open source applications. The chief criticisms I would have in relation to this is that the information on offer on the internet is that it is pitched at users who have mastered the basics of the language and understand how to use it to a certain degree already. I found this particularly problematic in relation to the downloading and configuring of the applications before I found EasyPHP and I would highly recommend a novice to learn the languages using a bundled application which combines the applications and largely configures them for you.

In relation to MySQL the crucial aspect of using this system is the initial design process. Without the assistance of Cormac and Cathal I would not have progressed as effectively in learning how databases work. Others may find it easier to work from a book like Bagui and Earp (2003). I personally found the combination of having a couple of experts available with advice and the books with theory to be very helpful. Were it not for the contributions of Cathal and Cormac I would have experienced considerably more difficulty in designing and building the database. In comparison to PHP, SQL is relatively straightforward in comparison once the database design structure is fully understood. I found SQL relatively intuitive because I was querying a database which I designed myself and understood the structures of it and the way the relationships between the tables are constructed which means that it is relatively easy

to identify what information is needed. I would recommend availing of as much support as you can at this design stage of the process, in particular in constructing the database.

6.7 Conclusions and Recommendations – User input

The input of users occurred chiefly at two points in the process. The initial consultation process with David and Tariq shaped the design of the artifact and the way the queries needed to be constructed. The contributions of David and Tariq meant that the user should be able to see all their work (searchability) and also that the user would have a project management or to do list function. This incorporation of the users in the design process I found to be a valuable one. The second point in the process that users have been involved in is the user testing which was also very valuable in identifying the next steps which need to be taken in the design process. So what are the next steps to be taken?

6.7.1 Immediate Recommendations

- Add an edit and delete function to the artifact
- Add validation to user entered information to ensure that blank data cannot be saved
- Fix any broken links
- Ensure that all the functions are fully operable, such as uploading pictures, and the project end date is appearing correctly
- Write a help file or frequently asked questions (FAQ) page for new users
- Add a function to export a project to a text file

6.7.2 Future Recommendations

- Make the e-Portfolio available as an open source download for other developers to work on, as part of the commitment to make explicit and public my learning
- Possibly add a level of encryption to ensure that user's information is secure.
- Add a search engine function so that users can search throughout their information and sort the information as they would like to.

- Add the function of a guest ID to allow users to give another user access to a particular project to allow collaboration.
- Consider different uses for the index.php initial page following the user from the first user tests comments.

6.8 Conclusions

The methodology of incorporating the views of others and being committed to sharing information is one which I believe has made this project possible. Without the assistance of others in the dialogic process the action of constructing this artifact and the “conversation with materials” that Schon (Schon 1996) identified, would have been considerably more difficult. I think this is the strength of a living theory action research approach following Whitehead (2003). This research doesn’t follow the clean cycles that can be found in other action research models, but the dialogic, and conversational approach is key to the development and learning process for me as a designer. It is this ‘conversation with materials’ and conversation with the experts and the people who will use the materials which points to the interdependence of designers, technical experts and users.

The relatively technical language that can be found describing open source applications means that for a novice to learn how to program in the languages and use the applications contact with other people is crucial, to be supported in the process. As discussed earlier the gap between the educational researcher and the instructional designer needs to be bridged (NLII 2003), as does the language that each group uses, in order to make the design process work better for users.

Designers need to be able to bridge this gap between the personal and the technical – to be able to work with the medium and to reflect on the surprises, and in the end to produce a design that works for the designer and for the audience. (Schon 1996: 184)

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