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Creating an e-portfolio application for the development of educational leaders

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Abstract

This paper is a result of a study which followed the development of aspiring and current school leaders as they negotiated an e-portfolio application created by the author. The portfolio aimed to promote reflective practice, professionalism and accountability in users. The following outlines the authoring of the portfolio software and reports on the perceptions of users as to its efficacy during a one year trial period. It outlines in detail the architecture of the portfolio and the engineering of the application. The portfolio design, which was influenced by Quintana, Reiser, Davis, Krajcik, Golan, Kyza, Edelson and Soloway (2002) underpins concerns in terms of cognitive considerations for scaffolding the process management, sense making and articulation issues in software construction. The features and stages of implementation are provided and an overview of the conceptualisation and design of the portfolio is described. Access and navigation details are detailed and illustrated. Examples of how participants in the project negotiated the portfolio and inserted artefacts to demonstrate leadership qualities and characteristics are discussed. The study found that designing an e-portfolio which provides for the growth of educational leadership requires careful preparation in terms of design elements such as planning and goal setting, the development of collaboration between participants, linking capabilities, flexibility of application, transportability, start up costs and maintenance. It needs a foundation of a well researched conceptual framework, (in this case the Wildy & Louden, 2002 Leadership Framework), thoughtful implementation and training and it needs to be easy to use. Participants were positive about the impact of the portfolio on their capacity for the creation of a vision which transformative leaders aspire to. Creating a portfolio had the additional effect of a growing perception of improved ICT skills by participants. The study concludes that an e-portfolio such as described in this paper, has the potential to be a powerful tool for developing educational leadership skills

Key Words

Portfolio Architecture, Creating a portfolio. Developing Educational Leadership using an e-portfolio

1. INTRODUCTION

When this project was first conceptualised, the technology available for creating web- based portfolios was in its infancy and quite unsophisticated by today's standards, although a number of software producers such as Concorde for example, had begun distributing more complex applications for large scale projects. A few early adaptors were experimenting with the technology for developing portfolios specifically for the education market but tended to concentrate on the Kindergarten to Year 12 (K-12) and Higher Education sector in a bid to satisfy perceived market needs.

Some of the main software options available at the time included the use of "flat files" (Worcester, 2002) which utilised Microsoft Word documents (MW), Portable Document Files (PDF) and Web based hypertext mark-up language (HTML). The multimedia platforms available were characterised by the inclusion of animation, audio, slide shows and hyperlinks, used Microsoft Power point, Wagner's Hyperstudio, or Claris's Filemaker Pro and could be converted to HTML which enabled

viewing through a web browser such as Netscape and Internet Explorer. The features of construction could be manipulated through the use of applications such as Front Page, Coffee Cup, HTML Editor, and Gif Construction, Set Thumbs, Plus Graphic Organizer, Paint Shop Pro, Adobe Acrobat, Real Audio Dazzle, Multimedia Video Editing Picture, and It Photo Manipulation to name but a few.

Given the reliance of the structure of the portfolio on a very detailed conceptual framework, the fact that much of the information which underpinned the values, attributes and knowledge descriptors of leadership characteristics, the competencies scenarios and the literature explaining reflective practice and the fact that they were accessible on a database through the Leadership Centre, a hybrid Web Based model which enabled Multimedia Authoring Software, Hypermedia was developed and authored into CDROM technology for this project.

This had the dual purpose of keeping the cost of the project to a minimum, (all participants had everything they needed on their desktop computer, including the software and hardware requirements) whilst enabling the possibility of wider distribution and use in the future (the development of a web based server database as a central repository).
The portfolio software was written using HTML, because it has several distinct advantages of writing in machine language (which is a complex and perplexing language for the beginner) as it gives the author the means to:

- Publish online documents with headings, text, tables, lists, photos, etc.
- Retrieve online information via hypertext links, at the click of a button.
- Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.
- Include spread-sheets, video clips, sound clips, and other applications directly in their documents (Massachusetts Institute of Technology, 2002).

This suited the flexibility and interoperability desirable for the effective functioning of the portfolio without the need for high level technical skills of the participants, avoiding the need to learn a computer language such as C+ for example, whilst maintaining the integrity of the conceptual framework which informed it.

2. FEATURES OF THE PORTFOLIO

The portfolio concept is defined and described in detail in a number of studies for a wide range of purposes and audiences. Most of these studies however, fall short in that they omit defining the

architecture of the portfolio and how artefacts (and the format of the artefacts) are captured; this must be taken into consideration to create effective design features. Grant (2005) attempted to address this issue by providing clear definitions of the characteristics covering the "... essential concepts in this domain" (p.14). He asserts that artefacts ("Portfolio Items"):

" …in the field of education, personal and professional development, may be defined as any of:

- A unit of information structured so that it can be integrated with other portfolio items
- A unit of information that enables a related object to be integrated with other portfolio items
- An object relating to the focal person; that satisfies all these conditions
- It must be related to a particular person
- It must be valued by the person it relates to;
- That person must have relevant rights over it." (p. 4).

He explains further that these items do not necessarily have to be an integrated element of the portfolio presentation, which had implications for the structure of the portfolio in that it had to provide a repository base for those items separate from categorised artefacts. It had implications for the organisation of the materials within the portfolio, the contextual arrangement of artefacts and explanatory notes that made it important to the contributor and the consumer of the information. It had implications for the consideration and structure of the navigation features, memory limitations and the overall purpose of the portfolio in the first place (presentation, reflective etc).

Barrett (2000) provided a concise overview of the development of the stages of developing a portfolio which has distinct links with the training and implementation phase of providing for participants to develop the necessary skills to create their own portfolio. It provided an understanding of how they would assess their own work, choose artefacts which demonstrated competence associated with the leadership framework, how it would be presented, what learning is taking place in the process, and explained how this advanced professional development. Furthermore it helped people to express an understanding of self in a reflexive and meaningful manner.

Gibson and Barrett (2002) outline a set of criteria in the evaluation of a portfolio, which were key considerations in the design of the portfolio developed for the current study:

- Planning and goal setting (evaluation against a variety of standards)
- Creativity and ability (the capacity to create a portfolio which reflects individuality)
- Collaboration tools (providing the opportunity to share)

- Support for reflection
- Connection and linking capabilities
- Flexibility of application (the capacity to adapt and reframe the portfolio)
- Transportability (cross platform authoring)
- Data and Information (variety of customized reports able to be generated)
- Start up costs and maintenance
- System functionality and usability (Fiedler and Pick, 2004)

Another important consideration in the design phase was the cognitive challenges faced by the participants in a learner centred environment during development of their portfolio. Work by Quintana, Reiser, Davis, Krajcik, Golan, Kyza, Edelson and Soloway (2002) in the design of educational software, developed a scaffolding framework which was adapted as the underpinning strategy for the structure and function of the portfolio. Quintana et al., (2002) identify three cognitive challenges faced by learners; Process Management (the need for support to navigate through the different work processes and activities); Sense Making (support to analyse and make sense of work products); and Articulation (support to express understanding of work through explanations and descriptions of material).

During the 'Process Management' challenge, Quintana et al., (2002) postulate that to support learning, the structure of complex tasks had to have clear boundaries articulated. Complex tasks had to be visualised and deconstructed within constrained space. Guidance and metacognitive information and support needed to be provided by an expert in the field. Where possible the organisation of artefacts and using the tools provided in the portfolio had to be automated where possible to prevent wasting time on "extraneous cognitive demands". This was facilitated in the portfolio with explicit instructions, clearly marked overviews of each concept within the Leadership Framework and hypertext links to thorough and detailed explanations. Boundaries were defined by providing examples that acted as models providing the depth, breadth and length or type of artefact that would satisfy a particular component of the conceptual framework.
In the 'Sense' making challenge Quintana et al., (2002) assert that the design of the software had to fit with the semantics of the discipline and the concepts inherent within these disciplines and those participants using the application had to be able to investigate all of the information presented and make their own links in a variety of representations. These representations needed to be provided with visual cues based in the terminology of the conceptual framework built on intrinsic knowledge. This was integrated into the portfolio design through the use of specific icons, explicit and colourful framework models, which linked language directly with the concept and navigation.

In the 'Articulation' challenge, Quintana et al., (2002) argue that the features and explanations that support the conceptual process be made explicit, that plenty of space for planning and organisation of the portfolio products and reminders and guidance is provided to enable full functionality. Reflection questions are organised around narrative vignettes hyperlinked together as developmental tools for demonstrating understanding and promoting professional growth of participants. The framework is scaffolded with a constant flow of information which explains the notions of educational leadership, makes the nomenclature accessible and provides opportunities to take this forward in their own reflective practice by providing opportunities for them to apply these concepts to their own circumstance.

From the experiences generated by the abovementioned studies, all of these considerations were taken into account in the design stage of the project. The heuristics of the technical development of the portfolio are described next.

3. DESIGN OF THE PORTFOLIO

Designing a portfolio application, meant for the author, who had limited programming and computer technology skills, undertaking a thorough review of what information was available and how it could be used for constructing a portfolio. A vigorous interrogation of designers and programmers within Curtin University was undertaken. Although the conceptual framework was well established, a model for analysis of the task, design features, implementation, evaluation, to inform the development of the prototype was needed to ensure nothing was omitted. Chang's (2002) model adapted for the development of an assessment portfolio contained the requisite features which informed the technical construction. Chang (2002) adapted Dick and Carey's (1997) five stages of building effective training and performance model (Analysis, Design, Development, Implementation and Evaluation, referred to as ADDIE) to develop an approach to building a Web Based Learning Portfolio. The analysis phase for this project required a thorough needs analysis which included: understanding participant needs; finding out their level of technological expertise; what access to appropriate equipment was available to them; discovering if they had, the capacity to "parse" in technological terms; finding an appropriate setting in which to undertake the necessary training and development; and to consider the tools and techniques required to get school leaders to the readiness stage for an effective start. The WA Leadership Centre was able to provide all of the information needed, as well as the venue and the tools.

During stage 2, the development phase, the portfolio was created using an Intel Pentium 4 computer central processing unit (CPU) with the MS Windows 2000 operating system and Word 1997, (because that was what was available at the time). Macromedia's Dreamweaver MX was

chosen as the design software because it had become established as a reliable industry standard for visual authoring in web based applications and it also supported Java technology and HTML as well as being relatively user friendly.

A template was first developed using MS Power Point to enable the planning and connection of appropriate pages through hyperlinks so that navigation could be intuitive, efficient and explicit. Multimedia clips (animations, .GIF, .Jpg, .Mpg, .Wav files) were inserted to test the platform, its speed, its capacity to retrieve them and to test the storage database in which they had been placed. The tasks for participants to undertake had been drawn from the Leadership Framework; using Power Point helped to clarify how they would be connected, the logical sequencing of the activities and how many pages of information were required to capture everything needed in the final prototype.

Once the template was satisfactory, it was converted to HTML (a built in feature of .PPT files) then opened in Dreamweaver for the development of the aesthetics and inserting appropriate program code. The count ended up being 22 pages allocated for artefact storage (embedded in word docs), 16 pop-ups, 46 .gif and .jpg, 22 hyperlinks to web pages and 16 internal hyperlinks cross referenced contained within an .exe self extracting file (created by Macromedia Projector, V 9.0r383) which downloaded from a compact desk through the disk drive which opened as the portfolio on the participant's desktop:

HTML code= [autorun] open=prof_portfolio.exe

The design phase, stage 3 of the portfolio was in collaboration with a professional web designer colleague who had both the technical and aesthetic expertise. Design quality and usability features of the project were drawn from Ivory and Hurst (2002) in terms of:

- text elements (amount of text, type, quality, and complexity)
- link elements (number and type of links)
- graphic elements (number and type of images)
- text formatting (how body text is emphasized; underlined text links; how text areas are highlighted; font styles and sizes; number of text colours)
- link formatting (Colours used for links) graphic formatting (minimum, maximum, and average image width and height; page area covered by images)
- page formatting (colour use, fonts, page size, use of interactive elements, page style)
- page performance (Page download speed; page accessibility presence of HTML errors) site architecture (Consistency of page elements, element formatting, page formatting and performance) (Ivory and Hurst, 2002, p. 2).

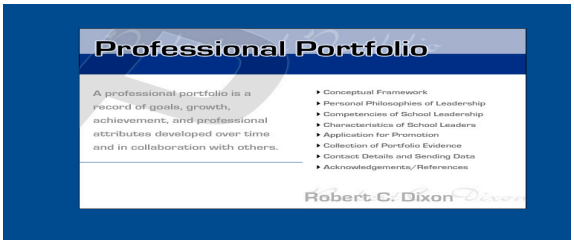

Figure 1 Opening page of portfolio

The product was then tested to ensure each of the phases connected properly, the navigation bars and java script prompts worked and that the portfolio performed in the manner expected. Colour palettes (soft pastels generally) were negotiated with consideration to ease of reading. Harder colours (strong blue hues) were used as headers and covers. The style of font, the text size, page distribution and layout and content were all examined and finally determined during this phase attempting to reflect professionalism, vitality and importance of the task.
The basic tenet of this aspect was grounded in simplicity and ease of use. Figure 1 provides a screen capture of the opening page.

Data were written to a CDROM; nestling within a data file folder (consisting of 1.21 megabytes contained in 129 files and 7 folders,) an extras file (680mb folder, containing 23 files and 2 folders) and the autorun information, was the Application itself (2.55mb). See Figure 2.

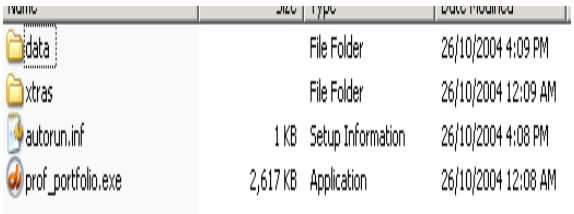

Figure 2 Data contained on CD

The architecture of the application, illustrated in Figure 2 above demonstrates the hierarchy of the archived directory structure from the CD from the external shell (prof _p_folio), through the data, html codes, downloads, images, generic folder, notes menu, extras images and sub folder images.

4. EXPLORING THE PORTFOLIO

The amount of information required to understand the portfolio was immense and complex. To keep things as simple as possible the navigation palette (Figure 3) was reduced to nine headings including the home page, contact details and acknowledgements.

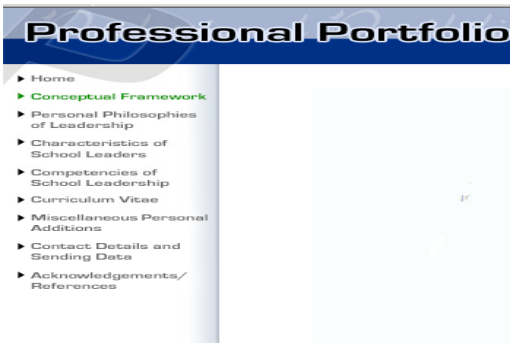

Figure 3 Selection from Navigation hyperlinks

Access to navigation features from the home page using “crumbs” provided easy traverse of the complex embedded pages; these were reproduced throughout each page to ensure that participants could easily find what they were looking for. The focus was concentrated primarily on providing easy access to the areas from which data was to be collected for analysis (personal philosophies, characteristics and competencies) through hyperlinks to the appropriate pages.

As an illustration of the navigation protocols, Figure 4 demonstrates the user accessing the personal philosophies page which includes a link to an example of useful websites that provide people with some assistance regarding the length, breadth and depth of what was expected of them.

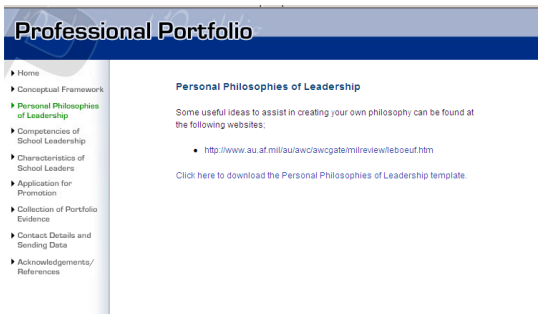

Figure 4 Selection from Personal Philosophies page

Once the participants had decided what information or artefacts to provide, in this case their personal philosophy on educational leadership, the user would click on the hyperlink, activating a java script dialogue box pop up (Fig 5) which directs them to open a template and insert their work in a word document. It also prompts them to save it.

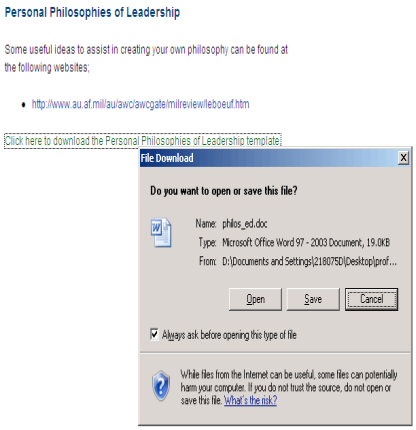

Figure 5 Selection from dialogue pop ups leading to artefact insertion

Access to navigation features from the home page using “crumbs” provided easy traverse of the complex embedded pages; these were reproduced throughout each page to ensure that participants could easily find what they were looking for. The focus was concentrated primarily on providing easy access to the areas from which data was to be collected for analysis (personal philosophies, characteristics and competencies) through hyperlinks to the appropriate pages. As an illustration of the navigation protocols, Figure 6 demonstrates the user accessing the personal philosophies page which includes a link to an example of useful websites that provide people with some assistance regarding the length, breadth and depth of what was expected of them.

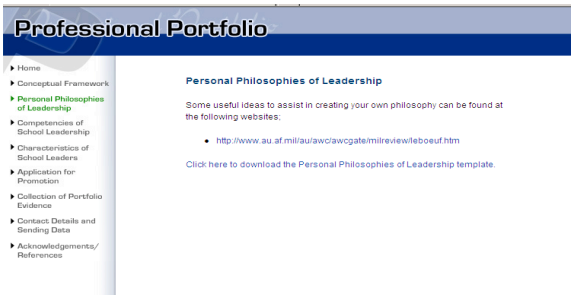

Figure 6 Selection from Personal Philosophies page

Once the participants had decided what information or artefacts to provide, in this case their personal philosophy on educational leadership, the user would click on the hyperlink, activating a java script dialogue box pop up (Figure 7) which directs them to open a template and insert their work in a word document. It also prompts them to save it.

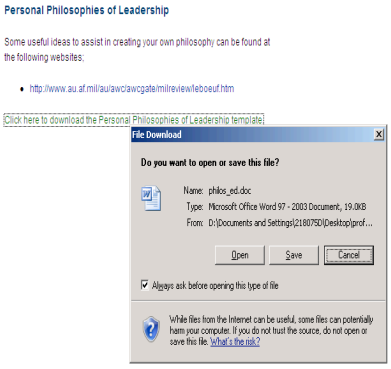

Figure 7 Selection from dialogue pop ups leading to artefact insertion

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Professional Portfolios</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--
function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0;
i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}

function MM_swapImgRestore() { //v3.0
  var i,x,a=document.MM_sr; for(i=0;a&&i<a.length&&(x=a[i])&&x.oSrc;i++)
x.src=x.oSrc;
}

function MM_findObj(n, d) { //v4.01
  var p,i,x;  if(!d) d=document;
if((p=n.indexOf("?"))>0&&parent.frames.length) {
    d=parent.frames[n.substring(p+1)].document; n=n.substring(0,p);}
  if(!(x=d[n])&&d.all) x=d.all[n]; for (i=0;!x&&i<d.forms.length;i++)
x=d.forms[i][n];
  for(i=0;!x&&d.layers&&i<d.layers.length;i++)
x=MM_findObj(n,d.layers[i].document);
  if(!x && d.getElementById) x=d.getElementById(n); return x;
}

function MM_swapImage() { //v3.0
  var i,j=0,x,a=MM_swapImage.arguments; document.MM_sr=new Array;
for(i=0;i<(a.length-2);i+=3)
   if ((x=MM_findObj(a[i]))!=null){document.MM_sr[j++]=x; if(!x.oSrc)
x.oSrc=x.src; x.src=a[i+2];}
}

function MM_openBrWindow(theURL,winName,features) { //v2.0
  window.open(theURL,winName,features);
}
//-->
</script>
<link href="ppstyle.css" rel="stylesheet" type="text/css">
</head>
```

Figure 8 Selection from HTML code, Personal Philosophies popup

The HTML code (HTML 4.01) from the first of eighteen pages of code for the philosophies section is illustrated in Figure 8 above.

An example provided by one participant of the Philosophies of leadership section is provided in Figure 9. Note that the first two hyperlinks are used to illustrate aspects of the participant's assertions which are provided and contextualised in Figures 10 and 11.

Philosophies of Leadership

Setting your scene:
I believe it is essential that all stakeholders know what you expect for your school, from your staff, students and parents and that this should be clear from the moment you walk into your school. I believe it is essential that the environment reflect your beliefs and values. I strongly believe in the power of words and imagery. At Beldon PS I have made significant changes to the administration area That is there are positive affirmations and powerful images as you walk into the office that reflects what I think our school is all about, that is we are about children and learning. The Principal and Deputy's office reflect a warm, friendly and collaborative atmosphere. "Due to your knowledge, hard work and very professional attitude, the role was handled very successfully. As a result of your understanding and professionalism, the school has benefited in your care. Your work clearly highlights your collaborative and collegial style of leadership. It is both visually and at a deeper level, very apparent that is making enormous progress towards being a very effective school, for the children it serves." – District Director West Coast DEO.

Leading by example:
I believe primarily you need to lead through example. Personally I do not believe in asking my staff to do anything that I am not prepared to do myself. I pride myself on being a hands on leader, and being there alongside my staff. I achieve this through a number of ways:

- Getting into every classroom as often as possible, I am able to achieve this most days.
- Working alongside my teachers, eg taking demonstration lessons, providing physical support for teachers etc.
- **Modelling the characteristics I expect of my staff, for example I asked my staff to participate in an experiment in providing feedback to their students. I wanted to staff to focus on the type of feedback they provided their students, eg whether their classroom had a positive or negative tone. To determine this I asked staff to wear an elastic band for 1 week. They could give any type of feedback, however if it was negative they could only give it on the condition that they 'twang' themselves. The purpose of this was to focus teachers' attention on how much positive vs negative praise they gave. I too wore the elastic band to participate in the experiment.**

Figure 9 Sections from Philosophies of Leadership

Figure 10 Hyperlink .jpg illustration of positive affirmations

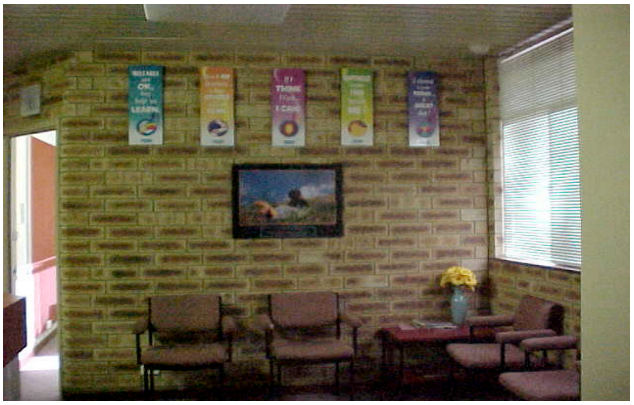

Figure 11 Hyperlink .jpg illustration of positive affirmations put into context (reception)

Embedded within the portfolios were examples of research projects which used .mpg video to illustrate need for funding (Figure 12 media player).

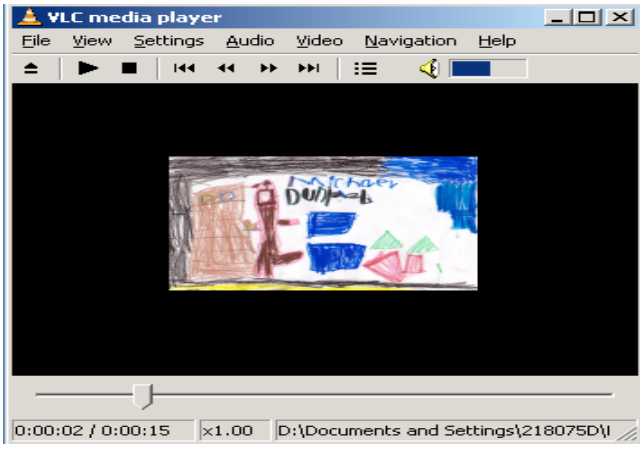

Fig 12 Media Player screenshot for action research project

Each of the competencies of the Leadership Framework were linked to both a repository for artefacts (highlighted) as well as critical element indicators and self reflection questions These helped participants to understand each one clearly as well as to provide illustration and examples to assist them in making decisions as to how they would tackle each page and what artefacts or narratives would be suitable within the context of their experience.

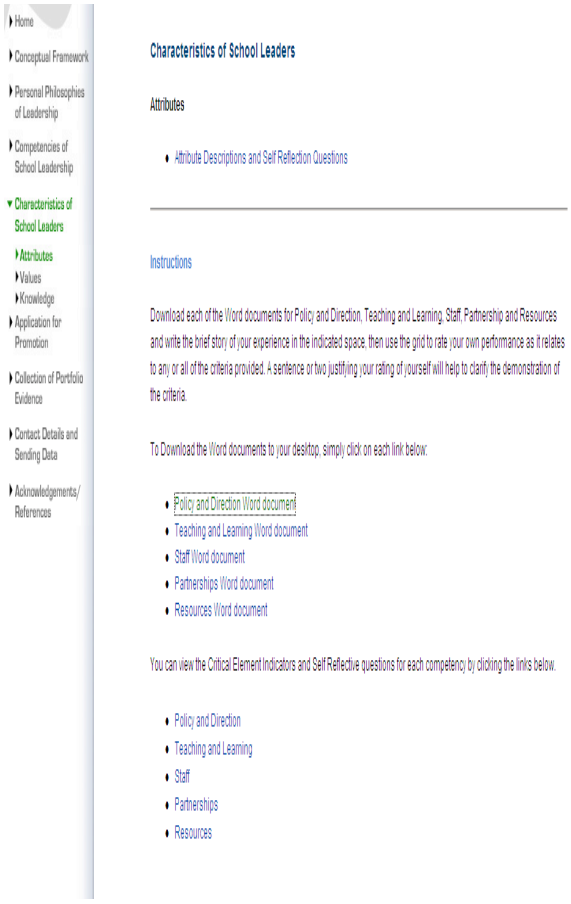

Figure 13 Section from Characteristics of School Leaders

A task was provided for each of the competencies which asked participants to reflect, write about critical incidents and experiences they have had and then to rate themselves on their performance. Figure 15 gives the first part of an example from one participant, who rated herself for the teaching and learning section. The hyperlink provided in the example gives access to an illustrative PowerPoint presentation which detailed background information contextualising the artefact and strengthening the vignette as a powerful demonstration of self reflection and competence.

Competencies of School Leadership

Policy and Direction

- Critical Elements Indicators
- Self Reflection Questions

Critical Elements Indicators

(Descriptions sourced from http://www.eddept.wa.edu.au/lc/).

- Click here to download the Policy and Direction template.

Critical Elements	Indicators
Sharing vision	Effective school leaders collaborate with staff and stakeholders to identify and develop a shared vision. The vision is realistic, challenging and oriented to improved student outcomes. School policies are written collaboratively. Staff develop strategies that enable them to check that learning and teaching programs are aligned with the vision.
Working collaboratively	Effective school leaders encourage staff and stakeholders to participate in school planning and decision-making. They inform and inspire others and provide opportunities for the open discussion of ideas. They understand that teams have with a mix of skills and abilities and work to capitalise on the strengths of team members.
Confronting complexity	Effective school leaders understand the complexity of the environment in which they work. They understand that stakeholders have different views and interests. They consider the potential impact of decisions before acting, and work to accommodate conflicting imperatives and points of view.
Promoting change	Effective school leaders support ongoing good practice and encourage improvement where needed. They demonstrate personal acceptance of and adjustment to change and are supportive of staff in the face of change.
Ensuring fairness	Effective school leaders consult and negotiate with staff and stakeholders. They facilitate accountability, responsibility and ownership through decision-making processes. Decisions are made fairly and ethically, and embrace the principles of equal opportunity and natural justice.
Maintaining direction	Effective school leaders maintain direction when working towards long-term outcomes. They demonstrate patience and persistence when pursuing goals and resolving issues.

Figure 14 Selection illustrating some of the indicators and explanations of competencies-in this case, school leadership

5. DISCUSSION

A great deal of research and care went into the conceptualisation and development of the portfolio. Consideration for the best available technology and the economics which constrained its production were important concerns. Helen Barrett's (1999-2009) work over a decade in the field of portfolio construction was a valuable source of information and inspiration, especially with regards to the phases of development, understanding purpose and defining the portfolio context and goals, the progressive stages of the working portfolio, (collecting artefacts, designing, planning) reflection (providing opportunity for deeper understanding, developing the portfolio) and working towards a presentation portfolio. Barrett also provided the first accessible information concerning the authoring applications and how and where they could be best employed.

Write your story here…

In 2003 at X school our WALNA data had identified a concerning trend that our Year 4 –7 students were disengaging from their reading program. This trend had been evident for the last three years. The school had received $27 000 a year for CLNP, how this had been spent over the last year or so was very difficult to track or understand. My aim was to engage staff in data analysis and have them identified this trend themselves, then to engage them in some self-reflection processes to try, determine why this was occurring and within that review how the CLNP had been spent and how it will continue.

Through our School Review processes the whole staff identified the trends our students were demonstrating and our Year 4-7 teachers identified the following areas as possible reasons for the students disengaging:

a) Class text books were very old (some of the 'youngest' being 42 years old) and are no longer relevant in today terms.
b) Class teachers felt they no longer read to the students just for the love of reading, it was always followed by a written activity.
c) Class teachers identified that they don't provide opportunities for the students to just read for the love of reading, lessons always included written activities.
d) Class teachers also identified that many students disliked reading.

Teaching and Learning

Instruction
In this section we are interested in the stories you have about incidents and experiences that have occurred to you personally. Self-reflection on these experiences and incidents may lead to demonstrating the Attributes, Values and Knowledge, which are integral to the leadership framework.

Write the brief story of your experience, then use the grid to rate your own performance as it relates to any or all of the criteria provided. A sentence or two justifying your rating of yourself will help to clarify the demonstration of the criteria.

	Attributes	L	S	H	ND
1	Fair			X	
2	Supportive			X	
3	Collaborative			X	
4	Decisive				X
5	Flexible				X
6	Tactful				X
7	Innovative			X	
8	Persistent			X	

	Values	L	S	H	ND
1	Learning			X	
2	Care				X
3	Excellence				X
4	Equity				X

	Knowledge	L	S	H	ND
1	Pedagogy		X		
2	Curriculum		X		
3	Legislation				X
4	Policies				X
5	Change management		X		
6	Technologies				X
7	Stakeholders				X

L – Low
S – Satisfactory
H – High
ND – Not Demonstrated

Place an "x" in the appropriate box.

Figure 15 Example of self reflection, self rating and narrative activity demonstrating Teaching and Learning

The portfolio design was strongly influenced by Quintana, Reiser, Davis, Krajcik, Golan, Kyza, Edelson and Soloway (2002) in terms of cognitive considerations for scaffolding the process management, sense making and articulation issues in software construction. Their ideas helped in the flow of information presentation, the style of presentation, the visualisation processes and the logic of the structure to maximise use and minimize cognitive overload in users. Chang's (2000) model for building a portfolio adapted from Dick and Carey (1997) provided the technical construction framework for the project, which integrated the analysis (needs analysis, learner analysis, content, assessment, tool and function), development (prototype, coding, and multimedia production), design (environment functionalities, navigation, activities) and the implementation (planning, creation, and training).

Ivory and Hurst (2002) provided a good overview which informed the functional considerations for the portfolio and an assessment checklist including the text elements, links, graphic elements, formatting, performance and site architecture. Their work provided a matrix for the evaluation phase from which information provided as to where efficiencies could be gained via appropriate modification.

The pilot project which informed the conceptual framework for the structure and functionality of the portfolio application, proved to be an excellent vehicle for ascertaining the philosophical approach to this study and for providing valuable insights into the unique world of educational leadership. Although the electronic portfolio described in was perceived to have some weaknesses in elements of its design, the participants found that with perseverance and guidance they were able to navigate the application successfully and to insert some sophisticated, thoughtful artefacts. Their

reflective artefacts seemed to invoke in them genuine surprise at the complexity of their task and their thinking when provided with such an opportunity for retrospection. Importantly, these artefacts addressed elements of the leadership framework with a poignancy and incisiveness which revealed much about modern educational leadership.

The situating and storing of these artefacts was at times tricky for the non - technically minded and there were difficulties with the performance of the application in some machines as opposed to others (depending on the age, and the specifications of the desktop hardware being used). A clear strength of the portfolio application was in its transferability, its interoperability and in its cost as opposed to the commercially manufactured behemoths some institutions have purchased. Storage can be simple and cheap, given that it takes advantage of the surfeit of space on the hard drive of a personal desktop computer and that it doesn't require a dedicated server and the incumbent administration and maintenance costs associated with large scale production. Furthermore there are a broad range of easy to use software applications which are readily available, easy to use and potentially provide the opportunity for the use of more sophisticated examples of evidence. Not only does this have the potential to enhance the professional presentation of the portfolio, but it assists the reader to make better informed judgements as to the leadership skills and the level of accountability achieved by the author.

The net effect of some of the perceived design and navigation faults was a ubiquitous complaint about the process being very time consuming - and time, according to these busy leaders was a precious and limited commodity. This feedback pointed to the need for simplifying the navigation palettes and the "crumb" trail and to the need for reducing the amount of text based information which could easily be replaced with established icons to speed up movement between pages. Ironically, and despite themselves, participants in the portfolio study reported that they very much valued the time they found to reprise their role by writing about their experiences and that the reflective writing in particular was a useful and growth promoting exercise.
These latter observations fit neatly with Gibson and Barrett's (2002) recommendations that the key issues for creating and operating an effective portfolio include:

- planning and goal setting (evaluation against a variety of standards)
- creativity and ability (the capacity to create a portfolio which reflects individuality)
- collaboration tools (providing the opportunity to share)
- support for reflection, connection and linking capabilities
- flexibility of application (the capacity to adapt and reframe the portfolio)
- transportability (cross platform authoring)
- data and information (variety of customized reports able to be generated)

- start up costs and maintenance
- system functionality and usability

Similarly, the kind of problems associated with the current portfolio application above reflect the recommendations of Quintana et al., (2002) who identified the three cognitive challenges faced by users: Process Management (the need for support to navigate through the different work processes and activities); Sense Making (support to analyse and make sense of work products); and Articulation (support to express understanding of work through explanations and descriptions of material). This was a theoretically sound set of challenges which were fully considered in the design of the portfolio; the practical reality found in the results of participant engagement demonstrated these to be crucial elements which deserved an appropriate level of attention.

Generally speaking, participants were positive about the impact of the portfolio on their capacity for the creation of their philosophy and vision, mainly because the tasks and the structure of the portfolio provided guidelines and examples from which they could crystallize their own views. This flowed over into the articulation of a vision which transformative leaders can aspire to. Creating a portfolio had the additional effect of a growing perception of improved ICT skills by the participants which were necessary for the construction and maintenance of the artefacts - this was also perceived to have a positive flow-on effect to staff and students.

5.1 Implementation and Training Processes

This project strictly adhered to the cycle of development of Analysis, Design, Development, and Implementation postulated by Chang (2002). Analysis of the evaluation phase provided evidence for the need to make some changes to perfect the technology supporting the portfolio, though these changes are relatively subtle and easy to achieve. Perceived shortcomings by some participants in the implementation phase did not appear at first to be linked to the training, or associated with the objectives of the project, because analysis of that data demonstrated that participants felt as though there was sufficient clarity provided in the setting of the tasks and that the training was adequate enough and that the goals set were well communicated. As the project progressed, it became obvious several participants had overestimated their technical and computing skills. This led to the result that most participants settled for word documents as being the main source of artefactual evidence - despite attempts at remediation by the researcher when he realised that this was occurring. One advantage of this bias in format was that content analysis of the word documents was made easier - but the depth of knowledge that could have possibly been conveyed

using more sophisticated electronic forms such as video and audio files was absent in most cases - thus it became more difficult to draw a complex understanding of them from the data. The lesson to be drawn from this is clear. Effective pre-training of the implementation process is crucial to understanding and essential to success.

Similarly there is evidence provided that not enough time was given to the training phase for Reflective Practice. Participants learned quickly as they progressed through the tasks set in the portfolio which clearly took more of their time away from the main objectives of the project – whereas a longer, more rigorous training scheme may have alleviated this problem to some extent.

Despite this, the participants reported that overall the purpose of the portfolio was made clear, that meetings with other participants helped to clarify the requirements of the portfolio, that individuals believed they were adequately prepared and properly trained, that the resources provided to them were adequate, that the goals and objectives of the e-folio were sufficiently well communicated, that the leadership framework was made clear and that there were no unexpected surprises from their point of view.

6. CONCLUSION

The portfolio concept was very optimistically received in the first instance as a potential line management tool, as a vehicle for professional growth and as a continuous development record which could be used to demonstrate leadership efficacy. However this tended to diminish somewhat over time for some of the participants - to the point where they were somewhat less optimistic. A minority found that it did little to enhance their own leadership and that they were ambivalent to future applications of the portfolio such as use as a tool for their staff - particularly in its existing form. Some participants were apprehensive about their personal narrative skills and inputting (typing, spelling, accuracy) skills and concerned that they were being encouraged to be self critical to the point that it created a degree of negativity and uncertainty which they found discomforting. This is sometimes seen as a typical response to someone engaging in some kind of semi-formal self-reflection for the first time.

However, the majority of participants provided positive observations about the project. Comments about the ease of transferability of the information collected and ease of updating were made. The portfolio was seen as an excellent store of information for future promotional applications especially by principal aspirants. For most, the personal awareness which resulted from the self-reflection phase was the most highly regarded aspect of creating their portfolio - and in many cases it was also seen as useful to goal setting and planning within their leadership role.

Other positive results for the cohort included a notable improvement in their ICT skills, a well developed knowledge and intimate understanding of the leadership framework and a personal record of growth and improvement. The people involved in the project were trusting and confident that their personal information was being ethically and anonymously handled - which (they claim) enabled them to be completely honest and straightforward with their reflective comments. This suggests that the findings in this study are an accurate record of their perceptions and experiences.

Portfolios are becoming increasingly important in the educational arena as a tool to showcase achievements, to reflect on action (particularly with regard to critical incidents) and as a formative and summative assessment vehicle. This study, found that a well designed e-portfolio linked to a solid conceptual framework, which is administered to participants through a thoughtful training regime, which provides timely support and regular feedback, has the potential to be a powerful tool for developing educational leadership skills.

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