PROS (Promoting Researchers Online Supervision) Project: The ViPER (Virtual Project Environment for Research) Taxonomy and Needs Analysis Study

Anthony 'Skip' Basiel

Middlesex University
abasiel@hotmail.com

ABSTRACT

The PROS (**P**romoting **R**esearchers **O**nline **S**upervision) project aims to provide the necessary resources and tools to support the online supervision process for projects and research. One of the objectives is to develop a mediation tool to aid the instructional designer and the subject matter expert during the conversion process of traditional face-to-face teaching to web-based delivery and collaboration. Another objective is to take an evidence-based approach in the design process of the Virtual Project Environment for Research (ViPER) by conducting a needs analysis and usability study.

E-learning projects are commonly done based upon previously conducted research or worse, with no measurement of the learner's needs at all. This paper addresses that particular gap in the research process. Details of the needs analysis and usability study conducted with this project are also presented.

This paper offers the **Vi**rtual **P**roject **E**nvironment for **R**esearch (ViPER) taxonomy as a focus of discussion. A 'taxonomy' is a scheme of classification or, in this study, a matrix that is defined as a situation that aids a person (or society) grow and develop. This document argues that the ViPER taxonomy supports the online learning and development process. As applied to this study, the definition of an educational taxonomy can be refined to: *'A general sequence in the growth of the structural complexity of many concepts and skills that may be used to guide the formulation of specific targets or the assessment of specific outcomes.'* Several topics are discussed leading to the design of the taxonomy. The presentation of the taxonomy is developed into a three-dimensional (3D) model. Two examples are offered: a real world paper-based tool and an online 'navihedron'. An interactive Javascript form is used to input the taxonomy data producing a graphical guideline for the instructional designer as to the appropriate online tools to use in supporting the learning process. (http://www.iclml.mdx.ac.uk/research/viper/ViPERprofile.HTM)

Expert review will be the evaluation method used to assess the taxonomy. Online pedagogical academics will be interviewed and surveyed to gauge the value of the research as well as live events such as the NLC'02 conference.

Web-constuctivism, the adaptation of Constructivist learning principles to a web-basedVLE, and the Transitional Autonomy Model (TAM) are the supporting theories for this study supported also by the Transactional Distance Theory (Moore, M 1993).

Keywords

Virtual learning taxonomy, online pedagogy, Web-Constructivism, Research-based VLE, 3D data representation, VLE needs analysis,

HCI usability study, research-based learning, online supervision

Introduction

The aim of this research is to answer the question, How can a research-based web learning environment support the needs of the online researcher? The preliminary proposition is that a web-based virtual learning environment (VLE) designed from online pedagogical principles and using communication protocols produced through this study can facilitate the research process via online tools. According to Laurillard (2000), virtual project environments for research (or research-based web-learning systems) will be the 'next generation' of managed learning environments (MLEs) from current instructionally-based systems. This paper explores two aspects of the PROS (promoting researchers online supervision) project:

A needs analysis and usability study conducted to provide evidence in the ViPER design,

A 3D taxonomy to serve as a mediation tool between the VLE designer and the subject matter expert in the construction process of the ViPER system.

ViPER Needs analysis and usability study

The PROS research needs analysis aims to prioritise the importance of various generic online investigation methods and tools. The objectives are to gather data on these key research stages: getting registration information online, using online registration forms, conducting an online registration interview, submitting a research proposal online, communication media between research team members, on/offline literature review, on/offline qualitative and quantitative data collection, web-based search tools, online research workshops and seminars, online peer and expert review of research material, and online mock (practice) viva.

The ViPER usability study has two main areas of focus; navigation and resources. The objectives for gathering data on the navigation within the system were to establish the ease of logging into the system and the ease of moving about the system using the tracking bar, icons and left menu text. The objectives for gathering data on the usability of the resources were to rate the: start and Help feature, online Resources, communication tools, presentation section and the overall usability of the system to support online research. The survey statistics are not presented in this paper due to space constraints but are available online [1.0].

Telephone and face-to-face interview summary –

Interviews were conducted by telephone and in person with individuals and focus groups. This was conducted using a semi-structured approach starting with the survey topics listed above. A review was also conducted in person with research expert Professor Peter Newby to highlight any issues concerning online research factors. There were four emergent themes that rose from the interviews. Listed in terms or priority from highest to lowest they were: online resources, communication, research community and research workshops/seminars.

Online resources

Most DProf. researchers were primarily concerned with accessing library resources. The main reason was to "help with the theory part of the research". The difficulty was that at the moment ‘you must come in person to access Middlesex University library materials." Some students used the Library Plus facility to get information from other UK libraries. However, it was generally agreed that that for library provisions there needed to be a set of online resources. Examples of other suggested online resources include; sample research reports, case studies, a battery of sample survey/test questions and a research glossary. Additional links were made in the ViPER system to support these needs.

Communication

There were two areas of concern related to communication; accessing up-to-date NCWBLP (National Centre for Work Based Learning Partnership) information and student – supervisor/advisor feedback. Concerns about getting current logistical information was seen in these comments:

"I just started and missed the (f2f) meeting. Now I must wait for the next one." "My problem is not knowing ***what*** questions to ask." "There is just too much information in the handbooks that it is unclear."

The current procedures at the NCWBLP use a paper diary and postal delivery of information. Queries are answered primarily by telephone from administrative and academic staff. The ViPER system offers online support in several ways: online registration, online diary, online FAQ (frequently asked questions), online Board of Studies.

The PROS registration web server supports these key stages of the DProf. programme as provided by Dr. Kathy Doncaster, DProf. Academic Advisor. This is summarised in table 1.0 below.

DProf. Stage	Registration website feature
1. Inquiry	Website content
2. Application	Online forms and files
3. Interview	Web-cam/telephone desk-top video conference
4. Confirmation	Email
5. Registration	Email and ViPER (WebCT) account creation

Table 1.0 DProf. registration stages

The ViPER (WebCT) online calendar tool or diary provides a dynamic, accessible and central area of NCWBLP activity. Training manuals and workshops were developed to support the adoption of this online utility by the staff and students. It was suggested that 'the duty tutor role could also be supported online." A dynamic online FAQ utility was created to support the communication process. It uses a private guest book web form for the NCWBLP administrative staff to enter telephone queries and answers. This data is then sent to a public web page that is dynamically updated with each entry. The DProf. Board of Studies for the NCWBLP, November 2001, offered its students the opportunity to submit comments online. Since representation at the meetings in the past was a problem, this pilot website supported the communication process.

The last communication topic focused on interaction between the researchers and advisors. The current communication model at the NCWBLP uses the post and telephone as the default media between researchers and advisors/administrators. These comments summarised the current situation: "Working with my advisor (Carol Costly) keeps me on track." "One supervisor uses the post for comments. We then need to phone to translate." "(Some of) the advisors are technophobic. They only use the post to comment."

A transition is starting to take place with the use of email:

"My advisor is not (always) available by phone, so most work is done by email." "Email at work is fast but slow at home. I check my advisors comments in the morning." "My advisor uses BLOCK CAPITAL comments in the body of the email text."

But email alone is not always the best solution:

"The problem with email is the gap between the comments return." "I hate email with my advisors."

Other forms of online communication have been developed for the ViPER system as a result of comments like these:

"I would like to communicate online, but not in a bulletin board." "I'm interested in an online discussion list serve."

The list serve or news group is an email distribution list that is sent to each member. This differs from the discussion forum that requires the user to go to the website for use. The ViPER (WebCT) system supports asynchronous text chat in its bulletin board and a Javascript email distribution list. Live (real-time) interaction is facilitated in ViPER via the 'chat room' tool and white board (shared program) feature. Registration interviews were successfully completed in November 2001 and January 2002 with students in America using Microsoft NetMeeting. They were reviewed as successful by the staff involved.

Research community

Due to the nature of the NCWBLP DProf. programme, students often feel detached from other researchers as seen in these comments: "I need to be self-motivated. Work is lonely." "I lost momentum after two years." "I feel isolated because of the … administration."

The development of an online research community seems to be a solution:

"I would like to meet other 'like-minded' people." "There is (currently) a lack of a research community."

Research workshops/seminars

Face-to-face research events (i.e. – workshops and seminars) act as a meeting place for researchers and advisors to network and collaborate. There is a need for online training as well: "I need a tutorial on doing web searches." "I'm interested in online writing workshops." " I need to do a research module. Doing it online would be helpful."

Expert Review

Professor Peter Newby, Director of the Centre for Higher Education Research (CHER) at Middlesex University, was interviewed for an expert review of the needs analysis while Dr. Stylianos Hatzipanagos, an HCI usability expert for VLEs in the School of Computing Science at Middlesex University, rated the system for usability. Their complete comments can be found on the web [1.0].

Summary and conclusions

Three main issues arose in this study. First, the ICT experience / confidence level of the stakeholders needs to be established. Next, a research methods module for web-based delivery should be created. Lastly, the research should address the current gap in VLE design concerning organisation through the Transitional Autonomy Model (TAM) online pedagogy. Once a profile is established for the ViPER stakeholder's ICT experience and confidence a conclusion can be formed about the current preferences in the use of online communication tools. Email and web forms ranked high in the survey, while the use of web-cams was low. Further study should indicate if this is due to the default level of ICT use or restricted access to the web-cam hardware. Developing online research seminars and workshops, such as the School of Lifelong Learning and Education research module at Middlesex University, will be a key task in the next phase of this study. One objective is to investigate its affect on the 'online research community'. Lastly, the Transitional Autonomy Model (TAM) is the ***'telepistemolgical'*** underpinning that will be developed in the second phase of the research. This will produce guidelines and protocols for VLE design and organisation.

ViPER 3D Taxonomy

The next part of the PROS project concerns the construction of the VLE. Now that the needs analysis has provided valuable data as to issues concerning the online research process, the online instructional designer and subject matter expert need to sit down and make decisions on various key factors for the VLE. A 'taxonomy' is a scheme of classification (Oxford Dictionary 1996), or in this study, a matrix that is defined as a situation that aids a person (or society) grow and develop (Longman 1996). This document argues that the ViPER taxonomy supports the online learning and development process. As applied to this study, the definition of an educational taxonomy can be refined to: *'A general sequence in the growth of the structural complexity of many concepts and skills that may be used to guide the formulation of specific targets or the assessment of specific outcomes.' [1.1] An educational taxonomy may also 'provide a useful structure in which to categorise test questions.' [1.2]* The ViPER taxonomy is a *'framework*' or structure that helps to organise a complex subject, identifying relationships between parts and relating the areas in which further research and development is required (Duncan W. 2002).

A virtual 3D ViPER taxonomy is offered as an online mediation tool to support the communication process between the VLE construction stakeholders. This model is generated online using the software from Navihedron.com. [1.3]. Six stages comprise the virtual 3D Viper taxonomy. First, establish the virtual autonomy values for geographic location, telepistemology, cognitive types, tutor-student role and curriculum. Next, enter the values into the Javascript chart maker. Thirdly, apply the total range to the suggested online models for suggested appropriate online tools and protocols. Fourthly, consider web-conversion options. Fifth, check the QAA guidelines. Lastly, complete the online review survey.

Figure 1.0 is a screen capture of the interactive Shockwave program that allows the learning environment designer to 'click and select' points of the Navihedra to display text description of the VLE elements. A scale for virtual autonomy used in this study is: [1] low, [2] medium and [3] high.b

Figure 3 Starting screen of ViPER virtual 3D taxonomy

The following is an overview of the VLE Taxonomy virtual autonomy topics and values:

GEOGRAPHIC LOCATION AUTONOMY LEVELS:(a) physical location (b) peer contact (c) support

[1] Local [2] Mixed [3] Distance (remote)

TUTOR / STUDENT ROLE: This describes the stakeholder's relationship in the learning process:

[1] Teacher: leads / Student: passive [2] Teacher: leads / Student: active [3] Teacher: moderator-coach / Student: autonomous self-managed learner

TELEPISTEMOLOGY - WAY ONLINE KNOWLEDGE IS VIEWED: This is the general view of your learning system: Online knowledge is...[1] a product [2] a guided procedure [3] an individually constructed process

COGNITIVE TYPE: This rates the level of cognitive skill:

[1] Propositional - rote facts [2] Procedural - incremental skills [3] Abstract - analyse, conclusions, predictions

CURRICULUM DESIGN: This describes the nature of the learning material or content:

[1] Fixed, static [2] Semi-open, changes periodically (each term) [3] Flexible, dynamically generated by students

The animated .gif rollover was made in the popup window for Stage 1 using screen recorder software called Camtasia [1.4]. This created an .avi movie file of the Navihedra that was then converted to an animated .gif with a Javascript ‘on mouse over’ rollover added.

The Javascript chart maker graphically represents the virtual autonomy values. Each section is given a value of [1], [2] or [3], from low to high and then totaled for an overall score. In the Netscape 4 + browser it will be necessary to reload the window (reload button or control + R) [NB: This script will not work in Internet Explorer or Opera Browsers]. The Javascript takes the values entered into the text fields and generates horizontal and vertical charts. A working model can be tested at:
http://www.iclml.mdx.ac.uk/research/viper/ViPERprofile.HTM

The VLE elements and the suggested models based upon the virtual autonomy values is summarized in table 2:

Online Autonomy Values			
Rating scale	**[1] LOW**	**[2] MEDIUM**	**[3] HIGH**
Geographic location	**Local**	**Mixed**	**Distance**
Telepistemology - knowledge as…	**Product**	**Guided procedure**	**Individually constructed**
Cognitive types	**Rote facts**	**Incremental skills**	**Abstract** **(analysis, conclusions, predictions, etc.)**
Tutor / student role	**Tutor: leads** **Student: passive**	**Tutor: leads** **Student: passive**	**Tutor: moderator** **Student: autonomous (self-managed)**
Curriculum	**Fixed content**	**Semi-open** **Changes each term**	**Flexible content is dynamically generated by the students**
[Total Score] **General Models**	**[Score = 5]** **Content-Support Model** **Lecture notes & FAQ /email support**	**[Score = 6–10]** **Wrap-around Model** **Activity-based** **Small group discussion**	**[Score 11- 15]** **Integrated Model** **Collaborative problem-solving** **Peer review**

Table 2 VLE elements and general VLE models

Now the suggested sample models are broken into more detail for table 3 providing examples of online tools and support for content presentation, communication, assessment and knowledge management (Mason, R 1998).

Table 3.0 Samples of VLE Models

VLE Sample Models

MODEL	*Element*	*Content*	*Communication*	*Assessment*	*Management*
CONTENT & SUPPORT		**Type:** **Static – mostly** **Interactive – some** **Dynamic – none** **Design: linear** **The core curriculum leads the delivery. Needs a strong, stand-alone, flowing –narrative** **Self-assessment throughout with content FAQ**	**Tools:** **>Content FAQ:** **static, dynamic, AI** **>Email tutor & individuals** **Protocols:** **Email procedures for student-tutor response must be explicit from start.**	**Criteria-based** **Traditional tests online delivery:** **> T/F, Y/N** **> multiple choice** **> matching** **> fill in the blank** **Self-assessment throughout** **> basic feedback**	**CHOICE OF:** **> System FAQ** **> Progress tracking** **> Diary** **> Annotation** **> Compile** **> What's New (dynamic content)** **> Sitemap** **> Search** **> Language translation**
WRAP-AROUND		**Type:** **Static – some** **Interactive – some** **Dynamic – mostly** **Design: individual activity content supported** **> linear narrative not critical** **> presented in small 'chunks'** **> content FAQ**	**Tools: Strong conferencing tools -small group** **> bulletin boards** **> list serve** **> email** **> live text chat** **> instant messenger** **> web video conf.** **> telephone** **Need moderation guidelines**	**Criteria-based** **Some use of traditional short answer and essay online tests** **Peer review** **indirect through discussion comments**	**CHOICE OF:** **> System FAQ** **> Progress tracking** **> Diary** **> Annotation** **> Compile** **> What's New (dynamic content)** **> Sitemap** **> Search** **> Language translation**
MODEL	***Element***	***Content***	***Communication***	***Assessment***	***Management***
INTEGRATED		**Type:** **Static – some** **Interactive – some** **Dynamic – mostly** **Design:** **problem-based collaborative group project** **> multi-level task** **> mostly distributed resources** **> some content** **> optional sample solution** **> mostly student argument**	**Tools: Strong conferencing tools for groups** **> bulletin boards** **> list serve** **> email** **> live text chat** **> instant messenger** **> web video conf.** **> telephone** **Need moderation guidelines**	**Pre-post evaluation** **traditional assessment to measure learning experience** **Peer-expert review** **> solution essays reviewed** **> Rubric evaluation scales** **Portfolio** **> work experience to academic credits** **> oral exam (viva)**	**CHOICE OF:** **> System FAQ** **> Progress tracking** **> Diary** **> Annotation** **> Compile** **> What's New (dynamic content)** **> Sitemap** **> Search** **> Language translation**

As stated earlier in this chapter (VLE Set Up – Web-conversion) a model should be established to facilitate the conversion process of current real-life teaching into a supported virtual learning environment (VLE). This research offers three general options: the parallel model, the fixed model and the open choice model. In this stage of the 3D taxonomy an expanded description is given to the designer and tutor to discuss [1.5]. The Quality Assurance Agency (QAA) in the UK [1.6] has a set of guidelines that must be followed to obtain academic accreditation. Each country has a national agency for this purpose. It is important to include this factor in the discussion process with the VLE designer and tutor for validation awareness.

At the time of this writing only one expert review was conducted on the taxonomy. Although the "descriptions of the VLE elements could be expanded" the reviewer found the online Navihedra model as 'very good'. Stage one of the online 3D ViPER taxonomy, the click-and-drag interactive Shockwave animation, was seen as 'a good way to support discussion, but had some gaps in the descriptions." It was rated between fair and good. The Javascript chart maker (where the online autonomy values were entered) used in stage 2 was seen as 'good'. Although the sample VLE models in stage 3 was only seen as 'fair' it did "help make the user's needs more obvious." The web conversion models were rated as 'good' and "a nice way to find the polarities as an introduction (to VLE elements)." Full details are online [1.0].

Summary Conclusion

This paper takes an evidence-based approach to provide analysis from on and offline surveys and interviews by researchers and experts of two parts of the PROS project; the Needs Analysis/ Usability Study and the ViPER Taxonomy. It is recognised that due to size constraints placed on this paper that not all of the data was presented. The reader is encouraged to read a more detailed account of this report on the web [1.0]. However, a good framework was presented in this paper through its pilot study to suggest a continuation of this

research. At this stage some answers have been provided to the initial research question of how online research supervision can be supported.

References

Duncan, W. 2002 "Unit 5 BIS4224 E-Commerce", Global Campus – School of Computing Science, Middlesex University – London, England http://www.gc.mdx.ac.uk

Laurillard, D. 2000 "Interactive Learning Environments for Learning Conversations"

ILTAC 2000 Conference Keynote Presentation

http://www.ilt.ac.uk/archives/iltac2000_resources/laurillard/sld042.htm

Longman Dictionary 1996 - Oxford Press, England

Mason, R. (1998), "Models of Online Courses" ALN Magazine 2 (2)
http://www.aln.org/alnweb/magazine/vol2_issue2/Masonfinal.htm

Oxford Concise Dictionary 1996 – Oxford University Press, England

Moore, M.G. 1993 "Theory of transactional distance" In: Desmon Keegan (Ed) Theoretical principles of distance education London, New York: Routledge 1993

Moore, M.G. 1983 "On a theory of independent study" In: Stewart, D. Keegan & B. Holmberg (Eds.) Distance Education International Perspectives, London: Croom

Web references <as of Feb. 2002>

[1.0] http://www.iclml.mdx.ac.uk/research/#Transfer.

[1.1] Teaching and Educational Development Institute, University of Queensland - Au. 2000
www.tedi.uq.edu.au/assess/assessment/classgol.html

[1.2] Counselling Services, University of Victoria, Canada- 1996
www.coun.uvil.ca/learn/program/hndouts/bloom.html

[1.3] http://www.navihedron.com/

[1.4] http://www.techsmith.com

[1.5] http://www.iclml.mdx.ac.uk/research/viper/ViPERprofile.HTM#stage4

[1.6] Quality Assurance Agency (QAA) http://www.qaa.ac.uk/public/dlg/guidelin.htm

[1.7] http://www.iclml.mdx.ac.uk/research/viper/ViPERprofile.HTM