EVALUATING E-LEARNING ENVIRONMENTS IN INITIAL TEACHER EDUCATION PROGRAMMES USING THE ONLINE LEARNING ENVIRONMENT SURVEY (OLES)

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Abstract: The research reported in this paper used the Online Learning Environment Survey (OLES) as a tool to evaluate e-learning environments in teacher education programmes (courses) in Hong Kong and Western Australia. Data from these classes were collected using this web-based instrument, and charted to display the 'actual' (experienced) and 'preferred' (ideal) online learning environments of students. Qualitative data (such as email interviews, reflective journals, and messages from discussion forums) were also analysed to gain more empathetic understandings of students' perceptions of the learning environments in each module. OLES was found to be a valuable instrument to identify successful and unsuccessful components of the online learning environments provided, and to reflect on changes which could be made when modules were revised and implemented on another occasion.

Keywords: Online Learning Environment Survey (OLES); information and communication technologies (ICT); evaluating e-learning; online learning environments; blended learning; online learning; initial teacher education

INTRODUCTION

E-learning has been defined as 'learning facilitated and supported through the use of information and communications technology'. The term refers to a range of activities from 'supporting learning, to blended learning (the combination of traditional and e-learning practices) to learning that is delivered entirely online' (JISC 2004:10).

Many recent reports have highlighted the potential of information and communication technologies to improve access to learning, enhance learning processes and facilitate learning outcomes. For instance, in the National goals for schooling in the 21st century (MCEETYA 1999), Goal 1.6 specifically addresses student outcomes in the use of ICT. More recently, *Taking Schools to the Next Level* (DEST 2004:38) highlights the impact of new technologies on teaching/learning processes. As noted in *Pedagogy Strategy. Learning in an Online World*, 'pedagogies that integrate information and communication technologies can engage students in ways not previously possible, enhance achievement, create new learning possibilities and extend interaction with local and global communities' (MCEETYA 2005:2). The potential of information and communication technologies to enhance the learning experience has also been emphasised in many other reports (ENA 2000; JISC 2004).

The introduction of user-friendly web-based learner management systems like WebCT, Blackboard and eClass has made it relatively easy for teachers to create e-learning environments

for their classes consisting of curriculum resources, readings, PowerPoint slides, access to library facilities and digital resources, class photos, student self-written profiles, course and term calendars, class email lists, discussion forums, online chat rooms, announcements and news bulletins of schools events. The way learning technologies and resources could be used requires careful planning, as noted by the Joint Information Systems Committee (JISC) in the UK:

> The availability of technologically mediated forms of learning . . . introduces . . . some additional decisions for the practitioner: from the technologies available for use, which should be used, when and with whom? (JISC 2004:11).

However, incorporating digital resources in learning activities may not necessarily mean they are effective in supporting student learning. Data on students' experiences with the learning environment need to be gathered so that 'what worked' and 'what didn't work' can be identified, and appropriate changes made next time the module is offered. In this paper, an outline is presented of the Online Learning Environment Survey (OLES), a web-based instrument designed to gather data on students' experiences of the learning environment which can be used to inform revisions of the design and implementation of online learning environments.

Recent research on classroom learning environments has focused on the evaluation of educational innovations (Fisher et al. 2001; Zandvliet & Fraser 2004) and, with the advent of the Internet, web-based learning (McLoughlin & Luca 2003; Trinidad et al. 2005). Research has identified links between classroom environments and student outcomes (Fraser 1998) and the effectiveness of outcomes-focused and technology-rich learning environments in promoting student retention, achievement, attitudes and equity (Aldridge et al 2003; Trinidad et al. 2001). Furthermore a correlation has been shown to exist between students' outcomes and the degree to which the learning environment matches their preferred learning environment (Aldridge et al. 2003). With the widespread adoption of e-learning, attention has also been given to the design and evaluation of online environments which promote effective learning (Pearson In Press; Trinidad & Pearson 2004).

ONLINE LEARNING ENVIRONMENT SURVEY (OLES)

OLES is a web-based instrument [http://www.monochrome.com.au/oles/survey.htm] available in two forms – the student version and the teacher version. In the student version, respondents are asked to indicate their 'actual' and 'preferred' experience with components of online learning in a module they have just completed. In the teacher version, the lecturer-in-charge makes an assessment of the 'actual' use of online learning in the module.

OLES contains 54 items arranged in nine scales. Samples of items in each scale are shown in Figure 1. Respondents are asked to rate items using a five-point scale (Almost Never; Seldom: Sometimes; Often; Almost Always). Respondents are also asked for written comments after completing the items on each scale. OLES also handles the production of charts (Figures 2 and 3). In this paper, only data on the use of the student version of OLES in two modules are reported although teacher responses can be produced to be compared to student responses using OLES.

SCALE	SAMPLE ITEMS
Computer Usage (CU) (6 items)	*I use the computer to find out information about the course.* (Item 3) *I use the computer to take part in online discussions with other students.* (6)
Teacher Support (TS) (8 items)	*If I have an inquiry, the teacher finds the time to respond.* (7) *The teacher gives me valuable feedback on my assignments.* (10)

Student Interaction & Collaboration (SIC) (6 items)	*I discuss my ideas with other students*. (18) *I can collaborate with other students in the class*. (19)
Personal Relevance (PR) (5 items)	*I am able to pursue topics that interest me.* (22) *I link class work to my life outside of this class*. (24)
Authentic Learning (AL) (5 items)	*I work on assignments that deal with real-world information.* (28) *I apply real world experience to the topic of study*. (30)
Student Autonomy (SA) (5 items)	*I work during times I find convenient*. (32) *I play an important role in my own learning*. (34)
Equity (EQ) (7 items)	*I get the same amount of help from the teacher as do other students*. (37) *I receive the same encouragement from the teacher as other students do*. (39)
Enjoyment (EN) (6 items)	*Online learning is exciting*. (44) *I would enjoy my education if more of my classes were online*. (47)
Asynchronicity (AS) 6 items)	*I access the discussion forum at places convenient to me.* (49) *The process of writing and posting messages helps me to think.* (52)

Figure 1: OLES scales and sample items.

OLES was adapted from the *What is Happening in this Classroom* (WIHIC) learning environment instrument (Fraser et al. 1996), which has been shown to have high reliability and validity in educational settings and has been validated in a number of different languages and contexts. Two scales were also used from the *Distance Education Learning Environments Survey* (DELES), which also has high reliability and validity (Jegede *et al.* 1995; Walker 2002). OLES has been designed to suit the nature and characteristics of e-learning environments with items (n=54) grouped in nine scales - seven from the WIHIC and two from DELES - as shown in Figure 1. Internal consistency reliability and factor structure were provided by the administration of OLES to 324 students (Trinidad et al. 2005). To examine whether the items in a scale assess the same construct, the internal consistency reliability was calculated. For both forms of OLES, the internal consistency (Cronbach alpha reliability) estimates ranged from 0.86 to 0.96 for the 'actual' version and from 0.89 to 0.96 for the 'preferred' version (Trinidad et al. 2005).

CASE STUDY MODULES

OLES was administered to full time students in the core module *Educational Studies 1* in the Postgraduate Diploma of Education (PGDE) secondary at the University of Hong Kong, and to full time students in the fourth year elective module *Using Computers in Teaching* at Curtin University of Technology, Western Australia. Both modules combined face-to-face and online learning, an approach often described as 'adjunct' or 'mixed-mode' (Hiltz 1990) and more recently as 'blended' learning (JISC 2004). The OLES was administered online at, or soon after the final class in the semester.

Educational Studies 1 introduced PDGE students to concepts and issues in classroom learning and student development. For each topic, students were provided with printed materials (developed by a team of writers) outlining background information, tasks to be completed and suggested readings. Each student was required to write an initial response to the tasks before each weekly class, and post this on an online forum *Knowledge Forum*. After discussing the task, each group of students was required to present (in some way) the outcomes of their group discussions. Tutors in the module were free to decide the way in which this would be done for the tutorial group for which they had responsibility.

Since initial responses to tasks were available on *Knowledge Forum*, the tutor was able to peruse responses before each face-to-face class and plan the interventions (if necessary) which would be made in the initial stages of the small group discussions. For instance, where understandings of concepts or issues appeared to be incomplete, the tutor planned questions which would require students to clarify their understandings before they discussed the task in groups. During the group discussions, students used a notebook computer (with access to a wireless network) to draft their responses. When these were finalised, each group posted their final response to the online forum.

Using Computers in Teaching was structured around 'rich assessment tasks' (Trinidad & Albon 2002) in which students completed group and individual tasks to construct their own knowledge using a social constructivist format. Learning activities consisted of 12 presentations by the lecturers-in-charge, with opportunities for students to discuss specific tasks, followed by the posting of ideas and recommendations to the WebCT discussion forum. At each weekly session presentations were made by small groups of students on how technology might be used in education. Students were encouraged to construct their own knowledge by reflecting in their Weblogs on concepts, issues and concerns related to using ICT in education.

RESULTS

Students' responses on OLES, and qualitative data such as online interviews, messages in discussion forums, and reflective comments (where available) for the two case study modules are presented in the following sections.

Educational Studies 1

The responses of students in the module who completed OLES (n=14) are shown in Table 1 and Figure 2. The 'actual' average item means for each OLES scale (Table 1) range from reasonably low (CU = 3.27) to moderately high (SIC = 4.17). However, the 'actual' and 'preferred' charts are very similar, indicating that the 'actual' experience of students in this module closely matched their 'preferred' learning environment. Only the average item means for 'actual' and 'preferred' scores on the Personal Relevance (PR) scale (Figure 1) differ discernibly (but not significantly, as shown in Table 1).

Table 1: Average Item Mean, Average Item Standard Deviation and Difference (Effect Size and MANOVA Results) between Students' Actual and Preferred Scores on the OLES for the *Educational Studies 1* module

OLES Scale	Average Item Mean[a]		Average Item Standard Deviation		Difference	
	Actual	Preferred	Actual	Preferred	Effect Size	*F*
Computer Usage (CU)	3.27	3.48	0.80	0.91	0.25	0.39
Teacher Support (TS)	3.47	3.71	1.05	1.10	0.22	0.33
Student Interaction & Collaboration (SIC)	4.17	4.20	0.69	0.71	0.04	0.02
Personal Relevance (PR)	3.40	3.87	0.79	0.71	0.63	2.74
Authentic Learning (AL)	3.40	3.69	1.09	1.05	0.27	0.50
Student Autonomy (SA)	3.91	4.13	0.82	0.58	0.31	0.64
Equity (EQ)	4.02	4.09	0.75	0.69	0.10	0.07
Enjoyment (EN)	3.30	3.50	0.97	0.87	0.22	0.34
Asynchronicity (AS)	3.96	4.12	0.73	0.71	0.22	0.32

*p<0.01 N=14 students. Average item mean=Scale mean divided by the number of items in that scale.

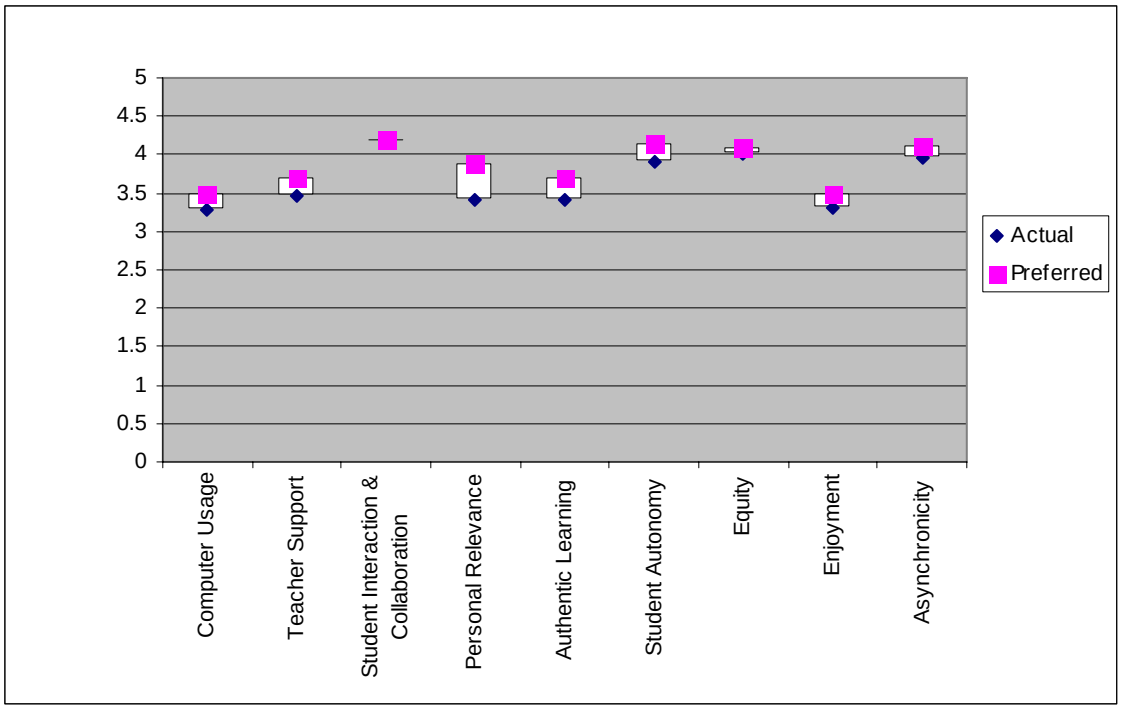

Figure 2: Graphical Representation of Students' Actual and Preferred Scores for *Educational Studies 1* module

The effect sizes (reported in Table 1) were calculated to estimate the magnitude of the differences between students' scores on the 'actual' and 'preferred' forms of OLES. MANOVA for repeated measures was used to investigate whether differences between 'actual' and 'preferred' scores on the nine OLES scales were significantly different. The results (Table 1) were not statistically significant at the 0.05 level. Studies have found that learners prefer a learning environment more favourable than the one perceived to be present (Fraser 1998) but, in this case the charts of the 'actual' and 'perceived' environments were very similar, indicating students' satisfaction with the learning environment experienced.

In this module, students were expected to use *Knowledge Forum* to post initial (individual) statements about set tasks and, following small group discussions in class to post their final (group) reports. Forum messages were analysed for examples of 'academic discourse' using criteria developed by Jones et al (2000) as a guide when reading transcripts. Illustrative examples from a transcript (25pp) of messages of initial statements and final reports from one forum included:

- provides/seeks clarification
  [In the case study] Mr. Wong was not specific with what he means by 'reward those who listen' - how?
- adds new dimension/question
  Apart from analysing Task 2, our group also discussed the advantages and pitfalls of the school banding system. Opinions were as follows . . .
- provides evidence of prior reading
  Biggs' chapter on motivation in our textbook raises the point that punishment 'is in fact a very unreliable weapon'.
- acknowledges others' contributions

I think Michelle has raised a good point that we have to understand . . .

- consideration of different views
  We have different points of view about this question. One of us said that she would not approach other teachers to get more information about this class because she doesn't want to have preconceived ideas that would knowingly or otherwise affect her behaviour towards them.
- supporting ideas with reference to research/readings
  In case study 4 . . . the teacher employs social and extrinsic motivation strategies. According to Biggs and Watkins (1993), social motivation works when . . .

Quantitative and qualitative data available for *Educational Studies 1* indicate that blended learning (the combination of traditional and e-learning practices) was successful in providing a learning environment in this component of this initial teacher education programme.

Using Computers in Teaching

The responses of students in the module who completed OLES (n=16) are shown in Table 2 and Figure 3. The 'actual' and 'preferred' scores for most scales are generally high. The differences in scores are quite small ranging from a mean score of 3.42 to 4.43 for 'actual' and 3.86 to 4.74 for 'preferred'. Statistical analysis revealed significant differences for the Teacher Support (TS) and Authentic Learning (AL) scales.

Table 2: Average Item Mean, Average Item Standard Deviation and Difference (Effect Size and MANOVA Results) between Students' Actual and Preferred Scores on the OLES for *Using Computers in Teaching* module

OLES Scale	Average Item Mean[a]		Average Item Standard Deviation		Difference	
	Actual	Preferred	Actual	Preferred	Effect Size	*F*
Computer Usage (CU)	3.42	4.00	0.67	1.00	0.68	0.99
Teacher Support (TS)	4.16	4.74	0.67	0.28	1.17	10.30*
Student Interaction & Collaboration (SIC)	3.96	3.87	1.03	1.01	0.28	0.65
Personal Relevance (PR)	3.89	4.31	0.72	0.54	0.66	3.59
Authentic Learning (AL)	3.94	4.41	0.66	0.54	0.78	5.01*
Student Autonomy (SA)	4.28	4.64	0.59	0.49	0.66	3.58
Equity (EQ)	4.43	4.65	0.55	0.44	0.44	1.62
Enjoyment (EN)	3.61	3.86	0.82	0.79	0.31	0.77
Asynchronicity (AS)	3.93	4.23	0.60	0.62	0.49	1.97

*$p<0.01$ N=16 students. Average item mean=Scale mean divided by the number of items in that scale.

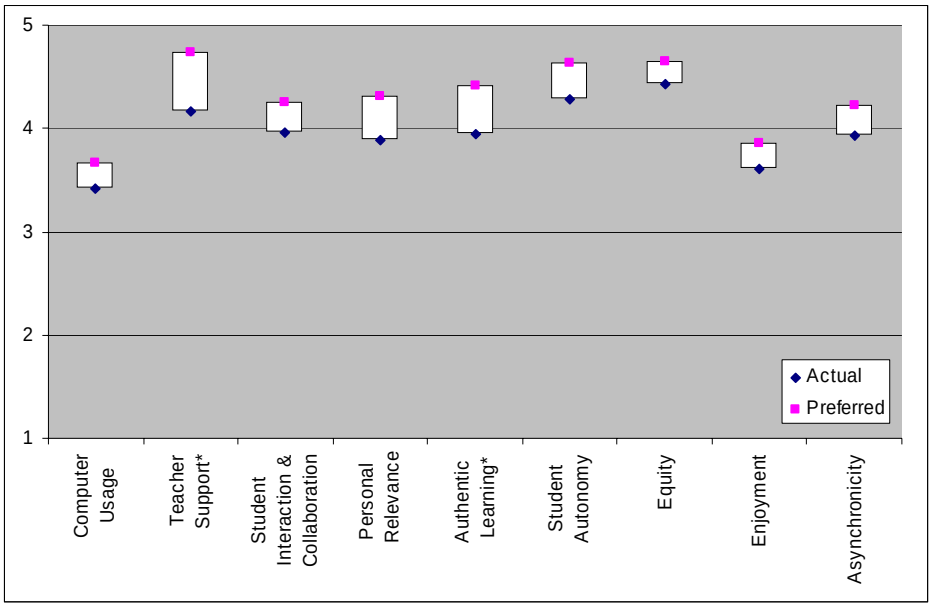

Figure 3: Graphical Representation of Students' Actual and Preferred Scores for *Using Computers in Teaching* module

Reflections by the lecturer-in-charge on the module revealed that this student cohort had not all chosen this module as an elective rather that they had been forced into the elective. Therefore some students had different perceptions of what the module *Computers in Teaching* would be like as it was the last module they had to complete before they completed their teaching practicum. Some of the students had the perception that *Computers in Teaching* would be an easy module. Qualitative data supported the differences found. While students strongly supported the 'hands-on' nature of the module with comments like:

> *I have really enjoyed the practical and hands-on focus of the class. Having the opportunity to use technology to submit and access course resources [online] really consolidated the learning.*
>
> *…came at a valuable and applicable time to consolidate how I will use technology next year when teaching and [I] enjoyed the computer lab environment as it facilitated easy taking of notes [using WebCT online].*

There were two main areas that the lecturer was aware of that needed to be improved. These were providing the students with more detailed documentation of the assignments tasks expected from the students and providing more support for less technologically able students.

> *Assessment descriptions were somewhat brief. Perhaps seeing some examples of assignments done would be helpful to know expectations.*
>
> *The assignment descriptions were very vague to understand the content required, although open-ended and original.*

The lecturer was surprised that these students had progressed to the fourth year of their program and were not as technically literate as expected. These students had completed two other compulsory technology modules previously in their program. The lecturer agreed that perceptions between the students and lecturer had been quite different and that changes would be made like those suggested by these students as ways of helping less technologically able students cope within the module.

Initially I found the assignment direction vague, but this was partly due to my lack of 'technology experience'. Maybe a quick overview of technology terms would be helpful for us beginners.

The amount of content each week, particularly at the beginning of the semester was overwhelming. Felt we did not have time to process the information before launching into the tasks.

CONCLUSIONS

This paper reports on the use of the web-based instrument Online Learning Environment Survey (OLES) as a tool to evaluate e-learning for two teacher education modules. OLES can gather data on students' and lecturers' 'preferred' and 'actual' online learning experiences. By highlighting differences in 'actual' and 'preferred' scores a lecturer can identify aspects of a module that should be reviewed to enhance the e-learning environment for students. Preferences of the lecturer and the students for working in an e-learning environment can be very different. One possible explanation for this is different levels in experience of working online. This difference in preference is a reminder that activities should be planned with ongoing guidance to build on students' confidence in working in e-learning environments. We cannot assume students know how to work effectively in e-learning environments. It is important for educators to have knowledge of learning theories and models of best practice to design and implement e-learning environments, but they also require information (feedback) to inform them about how specific attempts to do so to match the preferred learning environment of the students. It can be seen from the discussion about the two modules in this paper that using OLES provides a practical strategy for the meaningful presentation of data. Further, when we are looking at improving learning outcomes such data can be used to inform discussions about changes to the design of actual e-learning environments so that these can be modified to match the preferred learning environment of the students.

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