

TEH01064

**Assessing Students' Perceptions of Synchronous
Internet-Based Learning Environments**

George P.L. Teh

National Institute of Education

Nanyang Technological University

Singapore 637616

Abstract

The use of the Internet in higher education is increasing at an exponential rate. However, little research had been done on the efficacy of using the Internet in the educational milieu. As well, research on students' perceptions of psychosocial aspects of Internet-based online learning environment has been negligible. This paper reports a study of students' perceptions of their Internet-based learning environment in Singapore. Specifically, it focuses on the cross-validation of an Internet Classroom Environment Inventory (ICEI), which assesses students' perceptions of synchronous Internet-based learning environment. The ICEI assesses students' perceptions of the levels of gender equity, investigation, innovation and resource adequacy. The synchronous Internet-based learning is in real time mode, online and takes the form of web-based mediated conferencing and telecomputing approaches. Student data were collected from 256 postgraduate diploma-in-education students in 12 classes in a tertiary institution in Singapore. This study once again provided cross-validation support for the use of the ICEI in Singapore. Each scale displayed satisfactory internal consistency reliability, discriminant validity, and differentiated between the perceptions of students in different synchronous Internet-based learning environments.

Descriptors: ICT, learning environments, Social Studies, Internet-based learning

Paper Submitted to the AARE 2001 Conference at Fremantle, Australia,

from 2nd to 6th December 2001.

INTRODUCTION

The increasing utilization of resources available via the Internet is attracting people worldwide. The classroom is being virtually extended through information located at various sites on the World Wide Web (WWW). Indeed the WWW has attracted the attention of educationalists around the world as a potential teaching medium. Despite all the interest, little research has been undertaken on students' perceptions of their Internet-based learning environments (Newby, M. & Fisher, D., 2000; Teh, G.P.L. & Fraser, B., 1999; Awalt, M., 1998). This paper reports a study of students' perceptions of synchronous Internet-based learning environments in Singapore. Specifically, it focuses on the cross-validation of an Internet Classroom Environment Inventory (ICEI), which assesses students' perceptions of synchronous Internet-based learning environment. This study was undertaken in the context of the Singapore Masterplan for IT in Education (Ministry of Education, Singapore, 1997). The Masterplan is a blueprint for the integration of information technology in education as a strategy to meet the challenges of the 21st century.

METHOD

Instructional Mode

To integrate Internet activities into the tutorial sessions, the online sessions took the form of web-based synchronous and asynchronous discussion forums, online chat and using the web as an electronic reserve shelf (Kuechler, M., 1997).

Typically, an Internet-based synchronous chat and asynchronous discussion forum has the following features:

- a. It provides a time-of-convenience and place-of-convenience opportunity for student-student contact and student-instructor contact via *MS Hotmail* or *MS Outlook Electronic Mail* system;
- b. It provides a common space for sharing opinions, solutions, and pointers to sites on the Web;
- c. Ideas, questions, and individual discoveries are not restricted to the one-hour or two-hour contact time of the standard tutorial session;
- d. It is built by participation. Beginning as an empty page, the forums develop as students/tutors submit questions, provide answers/solutions, present opinions, share pointers to other resources, and post whole documents for others to download. Groups of students work together to create shared libraries of information.

The electronic reserve shelf is constructed using *MS Frontage* and *Yahoo Chat*. The electronic reserve shelf has the following features:

- a. Although it mirrors the traditional reserve shelf or the folder for a particular class, the tutor can put anything on this shelf electronically: class assignments, guidelines for term papers, important journal articles, class handouts, additional readings, sample work by students, etc;
- b. Using Web searches allows students to go beyond traditional library research, and to become more engaged in primary data collection;
- c. "Web guides" on the electronic reserve shelf will point students in the right direction, keep their research or online interaction on track, and prevent an information overload.

The advantages of this form of instructional delivery are as follows:

- i. Guest experts from afar can be called upon to assist in the discussions.
- ii. Inclusion of literary citations in hypertext can be done quickly.
- iii. World-wide sharing of sessions can be encouraged.
- iv. It fosters teamwork and cooperative effort.

Sample

The sample consisted of 256 postgraduate diploma-in-education students in 12 classes in a tertiary institution in Singapore. Intact classes were used to keep disruption of the tertiary curriculum to a minimum. These students read modules in the social sciences including, *inter alia*, Social Studies, ICT in Social Studies, and Maps and Graphing Skills.

Instrument

Student's perceptions of their Internet-based learning environment were measured using the Internet Classroom Environment Inventory (ICEI) in its entirety. This instrument has been validated in Singapore (Teh & Fraser, 1999). As in the original form, the ICEI used in this study has four Likert-type scales. The response alternatives for each item are *Almost Never, Seldom, Sometimes, Often and Very Often*. The ICEI instrument contained the four scales of Gender Equity, Investigation, Innovation and Resource Adequacy. Each scale was selected because of its relevance to the unique environment of online educational telecomputing classes.

Eight items are contained in the final version of each scale. Typical items contained in the ICEI are "The teacher pays more attention to boys' questions than to girls' questions" (Gender Equity), "Students carry out investigations to answer questions coming from class discussions" (Investigation), "New and different ways of teaching are used in this class" (Innovation), and "There are enough computer programs available for our lessons" (Resource Adequacy). The scoring direction is reversed for almost half of the 32 items in the ICEI.

The development of the ICEI took cognisance of Moos's three general dimensions as they apply to all human environments (Moos, 1974). These three general dimensions are *Relationship Dimensions* (the nature and intensity of personal relationships within the environment), *Personal Development Dimensions* (the basic directions along which personal growth and self-enhancement tend to occur) and *System Maintenance and System Change Dimensions* (the extent to which the environment is orderly, clear in expectations, maintains control and is responsive to change). Table 1 shows that the four scales in the ICEI provide reasonable coverage of the three different basic types of dimensions proposed by Moos.

Table 1 : Descriptive Information for ICEI Scales

Scale Name	Description	Moos's Description
<i>Gender Equity</i>	Extent to which boys and girls are treated equally by the teacher.	Relationship
<i>Investigation</i>	Extent to which the skills and processes of inquiry are used in problem solving and investigation.	Personal Development

<i>Innovation</i>		Extent to which the teacher plans new and varying activities and techniques and encourages students to think creatively.		System Maintenance
<i>Resource Adequacy</i>		Extent to which the computer hardware and software are adequate.		System Maintenance

Procedure

The ICEI instrument was administered at the close of the 12-week tutorial sessions over four semesters. 12 intact postgraduate diploma-in-education groups in the tertiary institution were asked to respond to the ICEI in terms of their Internet-based learning environments. Approximately 30 minutes were required for administration.

RESULTS AND DISCUSSION

Item analyses were based on the data collected from the sample of 12 intact classes of tertiary social science students (N = 256). These items analyses were carried out to identify items whose removal would enhance each scale's internal consistency and discriminant validity. In particular, internal consistency was enhanced by removing any item with a low item-remainder correlation (i.e. correlation between an item score and the total for the remaining items in that scale), and discriminant validity was enhanced by removing any item whose correlation with its *a priori* assigned scale was lower than its correlation with any other scale in the ICEI. The application of item analysis procedures to the ICEI did not lead to the deletion of any of the 32 items.

Next, internal consistency (alpha reliability) and discriminant validity (mean correlation of a scale with the other scales) statistics were generated. These are reported in Table 2. Table 2 shows the statistics obtained with the 256 students for each of the ICEI scale's internal consistency (alpha reliability) and discriminant validity (correlations between scales). These indices were calculated using the individual as the unit of statistical analysis. Data in Table 2 generally show that, for this sample, the ICEI scales displayed adequate internal consistency reliability (with alpha coefficients ranging from 0.68 to 0.83) and discriminant validity (with mean correlations ranging from 0.10 to 0.29).

Table 2 also provides information about each scale's ability to differentiate between the perceptions of students in different classrooms. These results were obtained by performing a one-way ANOVA for each scale, with class membership as the main effect and using the individual as the unit of analysis. Results of these analyses reported in Table 2 indicate that each of the four scales differentiated significantly ($p < 0.01$) between the perceptions of students in different classrooms. The η^2 statistics, which represents the proportion of variance in environment scores accounted for by class membership, ranged from 0.26 to 0.40 for the various scales.

Table 2 : Internal Consistency Reliability (Alpha Coefficient), Discriminant Validity
(Scale Intercorrelations), and ANOVA Results (*F* and *Eta*²) for Class
Membership Differences for Each Scale in the ICEI

Scale	No. of Items	Alpha Reliability	Scale Intercorrelations				ANOVA Results	
			GE	IV	IN	RA	<i>F</i>	<i>Eta</i> ²
Gender Equity (GE)	8	0.83		0.10	0.21	0.16	8.11**	0.26
Investigation (IV)	8	0.79			0.29	0.19	11.47**	0.40
Innovation (IN)	8	0.68				0.27	11.02**	0.34
Resource Adequacy (RA)	8	0.71					9.83**	0.31

** $p < 0.01$ *Eta*² statistics represent the proportion of variance in environment
scores accounted for by class membership

CONCLUSION

The study's focus on the learning environment associated with the use of Internet-based learning in the social sciences in Singapore is distinctive because, first, the use of Internet-based learning in the social sciences has been sparse relative to other disciplines, second, research on Internet-based learning in the social sciences in Singapore hitherto has been non-existent and third, only a very small amount of classroom environment research has previously been undertaken in Singapore. In addition, the present research extended learning environment work in a new direction by again cross-validating the ICEI instrument for assessing student perceptions of Internet-based learning classroom environments.

REFERENCES

1. Awalt, M. (1998). *The Internet Classroom*.

(<http://sunsite.unc.edu/horizon/mono/CD/TECH-HTML>).
2. Kuechler, M. (1997). The Electronic Reserve Shelf: Using the World Wide Web as a teaching resource.

(http://sunsite.unc.edu/horizon/mono/CD/Social_Sciences/Kuechler.htm).
3. Newby, M. & Fisher, D. (2000). A model of the relationship between university computer laboratory environment and student outcomes. *Learning Environments Research*, 3: 51-66.
4. Ministry of Education, Singapore (1997). *Masterplan for IT in Education*.
(<http://www.moe.edu.sg/new/it/intra4.html>)
5. Moos, R.H. (1974). *The Social Scales: An Overview*. Palo Alto, CA: Consulting Psychologists Press.
6. Teh, G.P.L. & Fraser, B.J. (1999). Assessing geography student perceptions of web-based learning environments in Singapore. In: J.A. Kesby, J.M. Stanley, K.F. McLean, L.J. Olive (eds.), *Geodiversity: Readings in Australian geography at the end of the 20th century*. Canberra, Australia: Institute of Australian Geographers Inc.