The Seybold Report

ISSN 1533-9211

DOI 10.17605/OSF.IO/P4TVH

VALIDITY AND RELIABILITY OF STUDENT'S E-LEARNING SATISFACTION MODEL IN HENAN, CHINA

XIONG LI

Asia Pacific University of Technology and Innovation, Malaysia.

TEH CHOON JIN

Asia Pacific University of Technology and Innovation, Malaysia.

BENJAMIN CHAN YIN FAH

Universiti Tun Abdul Razak, Malaysia.

AZRUL FAZWAN KHARUDDIN

Open University Malaysia, Malaysia.

Abstract

The student's e-learning satisfaction model was built around a classroom learning model, student assessments of learning effectiveness, effective learning approach, and adult learning. To find factors that represented the data, an exploratory factor analysis was used. Seven factor structures were obtained using the principle axis factoring extraction approach and the promax rotation procedure. The instrument was changed because some of the factors were not sufficiently defined. Internal consistency analysis revealed that students responded consistently to 3 dimensions and 12 items. Test-retest correlations were strong ($r \geq 0.70$), and internal consistency analysis revealed that students responded consistently to the eight subscales and items. The correlational analysis revealed that all dimension scores had a substantial impact on students' e-learning satisfaction. Design dimension (β =.354 and Sig. =.000), environmental dimension (β = 0.331 and Sig.=.000), and internet accessibility (β = 0.265 and Sig.=.002) were the strongest indicators of students' e-learning satisfaction. The model survey instrument has acceptable satisfaction properties, according to the results of this study, and it captures 6 dimensions of e-learning components, including "Learner dimension", "Instructor dimension", "Course dimension", "Technology dimension", "Design Dimension," "Environmental Dimension," and "Internet accessibility" acts as mediator. The findings validated the multi-dimensionality of student's e-learning satisfaction. The model instrument also has reasonable content, construct, and criterion validities, and may be utilized by teacher/ educators with a good degree of reliability.

Keywords: Design Dimension, Environmental Dimension, Internet Accessibility, Exploratory Factor Analysis, Student's E-Learning Satisfaction

INTRODUCTION

Students' thoughts of the teaching and learning environment influence their study habits and, as a result, the quality of their learning results (Prosser & Trigwell, 1999). This perspective recognizes that learning outcomes are the responsibility of students, who, while influenced by pedagogical input, are ultimately in charge of their own learning. Only a few aspects of the learning process can be influenced overtly by teachers before it goes into the hands (heads) of students (Sezen-Barrie, 2018). Using students perceive to evaluate e-learning satisfaction, as advocated in this study, is not about determining whether lecturers' teaching is of "high or low

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

quality," but rather about comprehending students' impressions of teaching quality from their perspective towards online learning (Ramsden & Durkin, 2020). Students have "self-learner dimension" on how to make general assessments of teaching success (Harrison et al., 2016). In that it represents people's awareness of the nature and processes involved in their own understanding, self-insight is a type of meta-cognition (Harrison et al., 2016). The participants in this study were individuals who had completed their undergraduate education. Students are regarded to be reasonably reliable and accurate assessors of lecturers' teaching performance after 11 or more years in the educational system, engaging with dozens of teachers and university lecturers, and experiencing thousands of hours of instruction. Hare et al., (2018) research's findings backed up this hypothesis (2018). Her study's Postgraduate Science students gave good marks to various aspects of classroom instruction. The lecturers' assistance in preparing students for classroom experience was based on:

1) the clarity of the lessons taught,
2) the effort directed at relating theory to practices as well as encouraging reflection during their lessons,
3) The lecturers' assistance in preparing students for classroom experience.

Students, on the other hand, assigned low marks to:

1) the lecturers' lesson plans and
2) The teaching methods and materials they used.

By monitoring the lecturers' lessons in the classroom, Hare et al., (2018) cross- validated the students' satisfaction. She discovered that the majority of lecturers delivered clear, well-structured classes and were often thoughtful in assisting students in connecting what they had learned to classroom reality. Trainers also appeared to be employing a limited number of teaching aids. The teaching materials, such as books and lecture notes, were frequently boring and uninspiring.

LITERATURE REVIEW

Good teaching begins with the student's point of view (Wimsatt et al., 2016). The term "perspective" describes a point of view or a style of thinking about something (Kharuddin & Ismail, 2017). The phrase "perceive" has the same meaning as "understand" or "think about" something in a specific way (Kharuddin et al., 2019). Another term that is closely related to the terms "perceive" and "perspective" is "perception," which refers to an idea, a belief, or an image that you have as a result of how you see or understand something (Sezen-Barrie, 2018), as well as an insight gained through perceiving or awareness of something (Kharuddin et al., 2017). Perception is the most crucial factor in the learning process, according to the Information-Processing theory, because it is the initial mechanism that receives information or stimuli from human senses before it is stored, processed, and retrieved (Slavin, 2003). The amount and type of information that is registered and processed is determined by how vital and significant the information is perceived to be. Perception of stimuli, according to this view, is "rather, it

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

requires mental interpretation and is impacted by our mental stage, past experience, knowledge, motivation, and many other things" than reception of stimuli (Slavin, 2003).

Another viewpoint on the relevance of "perception" in the teaching-learning process is presented by Prosser and Trigwell (2016). "Perception" is viewed as a crucial element in determining students' e-learning outcomes in their Presage-Process-Product model of student learning, as represented in Figure 1. (Prosser & Triqwell, 2016). According to the approach, students' views are a result of a combination of their former teaching and learning experiences and the current teaching and e-learning situation. The approach suggests that students' views of the teaching-learning situation, rather than the teaching methods themselves, have the greatest impact on their learning (Ramsden & Durkin, 2012; Prosser & Trigwell, 2016; Kharuddin et al., 2020). This approach, like the Information Processing Theory, emphasises the importance of students' perceptions in the teaching-learning process since they act as a filter for all input (Barrie, 2001). Students' opinions of the teaching and learning environment influence their study habits and, as a result, the quality of their learning results (Prosser & Trigwell, 2016). This perspective recognises that learning outcomes are the responsibility of students, who, while influenced by pedagogical input, are ultimately in charge of their own learning. Only a few aspects of the e-learning process can be influenced overtly by teachers before it goes into the hands (heads) of students (Barrie t al., 2015).

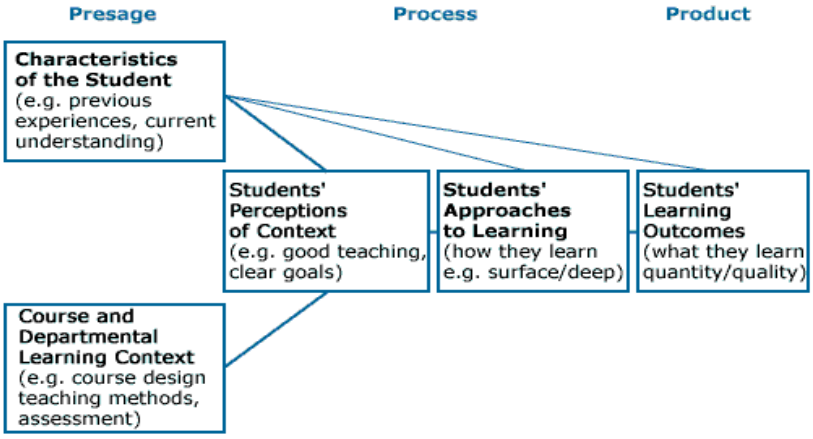

Figure 1: Presage-Process-Product Model of Student Learning

METHODOLOGY

The goal of this study was to create a valid and accurate student satisfaction of e-learning questionnaire for online classroom teaching evaluation. The purpose of this study was to investigate, describe, and explain students' perceptions of e-learning performance at higher education institutes in Henan, China. In order to build and validate an instrument, data from a large number of students was required at one time (Kharuddin et al., 2020). The researcher needed to get the findings of the data analyses fast so that the instrument could be designed and validated according to the schedule. To construct and analyze the instrument's validity and reliability, this study used a survey research approach based on a cross-sectional survey design

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

(Babbie, 1998). For gathering data from a large number of students regarding their college experiences, surveys are the ideal method (Ouimet, Bunnage, Carini, Kuh & Kennedy, 2004). There had been no attempt to explore changes in students' opinions of classroom teaching over time, which would necessitate the use of a longitudinal survey design. It also makes no attempt to look into the effectiveness of students' comments on e-learning performance, which would necessitate experimental intervention. As a result, the researcher considered the cross-sectional survey design to be more practical than other study methodologies. Over the course of three years, this study was developed and implemented in three phases:

1) Development of the instrument blueprint,
2) Administration of the instrument to a development sample and refinement of the final instrument, and
3) Further assessment of the validity and reliability of scores obtained from the final instrument.

Figure 2 summarizes the research framework that depicts the implementation of the research activities.

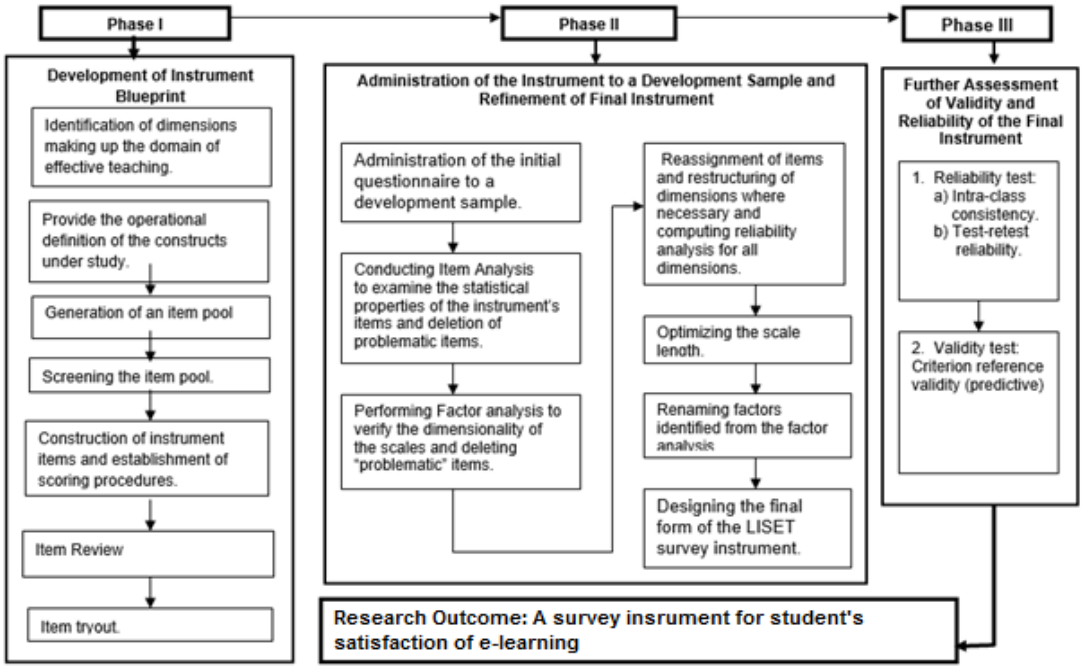

Figure 2: Research Framework: The Implementation of the Research Activities

The instrument for learner, technology, design and environmental dimension were adopted form Davis (1989), Arbaugh & Duray (2002) and Stefanovic et al., (2011) scale to look at the student's e-learning satisfaction and mediated by internet accessibility which adopted from Stefanovic et al., (2011). The dimensions were measured satisfaction among students in Henan province using five points Likert scale. There are 34 items in this instrument. Each item will

ISSN 1533-9211

DOI 10.17605/OSF.IO/P4TVH

be evaluated as “Strongly disagree”, “Disagree”, “Neither”, “Agree” and “Strongly agree”. The scoring procedures will be as follows: One point will be given if the individual strongly disagrees with the statement. Two points will be given if the individual disagrees with the statement. Three points will be given if the individual neither agrees nor disagrees with the statement. Four points will be given if the individual agrees with the statement. Five points will be given if the individual strongly agrees with the statement. For analytical purposes, those who scored below the mean score will be categorized as “low” group while those who scored above the mean score will be categorized as “high” group. The 34 items that make up the scale, according to the study, can be used to measure the four constructions of the components. As a result, the researchers used a one-factor model with 34 variables to begin their examination of e-learning satisfaction. In addition, a different multi-dimensionality model was applied. The 34 items were subjected to an exploratory factor analysis (using VARIMAX normalised rotation) to create the second model. Four components emerged from the analysis, accounting for 60.019 percent of the total variation. The first-order one-factor model is shown in Figure 2; the first-order four-factor model is shown in Figure 4.

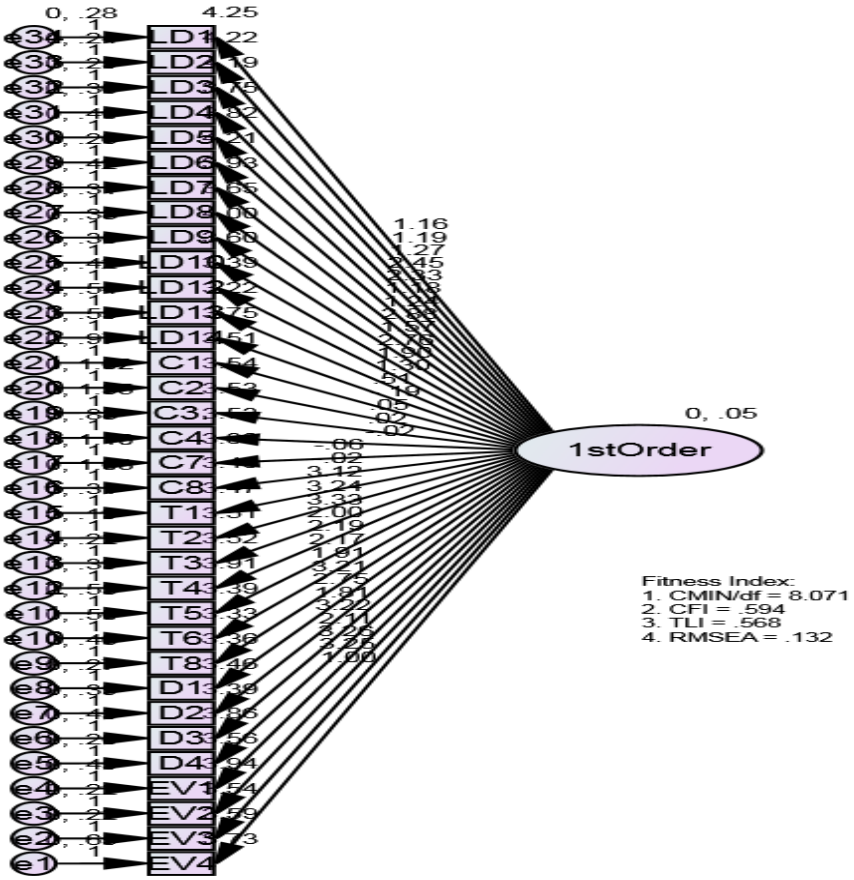

Figure 3: First Order One-factor Model

ISSN 1533-9211

DOI 10.17605/OSF.IO/P4TVH

The initial model fit indices were $x^2 = 4253.593$, $x^2/df = 8.071$, df = 527, RMSEA = 0.132, TLI = 0.568 and CFI = 0.594. These indicated that the original model needed to be re-specified to fit better with the sample data.

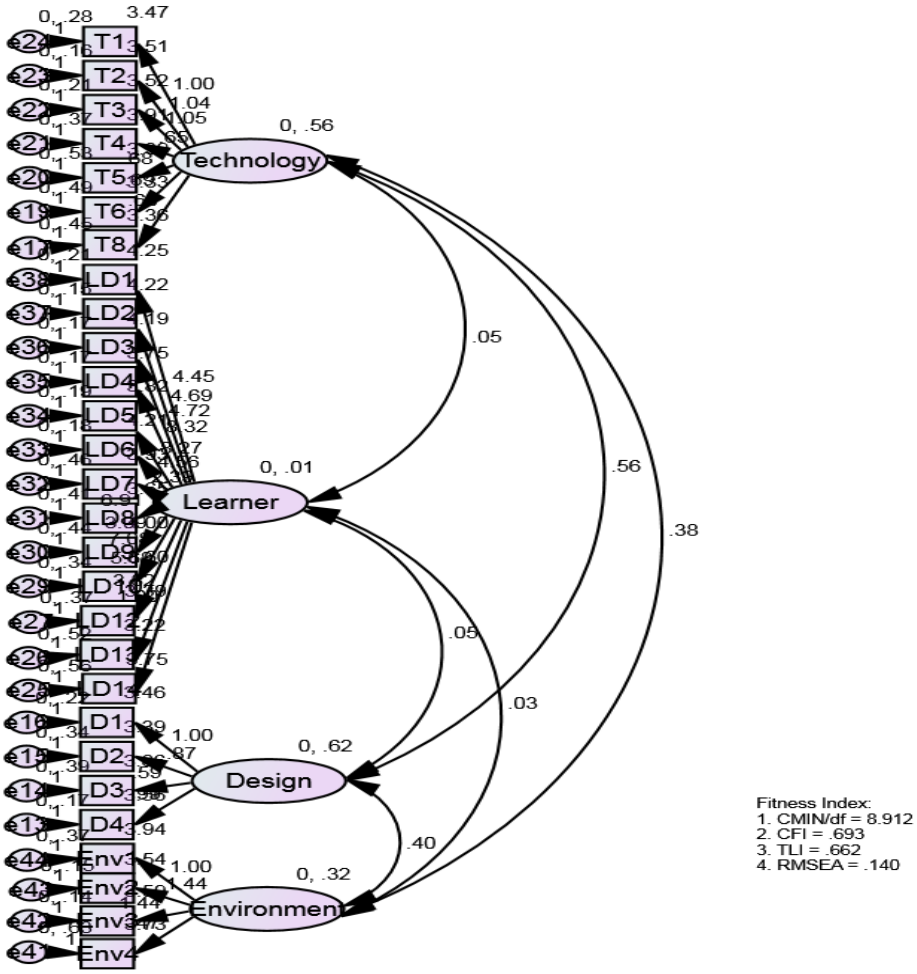

Figure 4: First order 4-factor model

Thus, the original model (first-order one factor model) was formulated into first-order 4-factor model based on exploratory factor analysis. The model fit of the four-factor model were $x^2 = 3065.715$, $x^2/df = 8.912$, df = 344, RMSEA = 0.140, TLI = 0.662 and CFI = 0.693.

ISSN 1533-9211

DOI 10.17605/OSF.IO/P4TVH

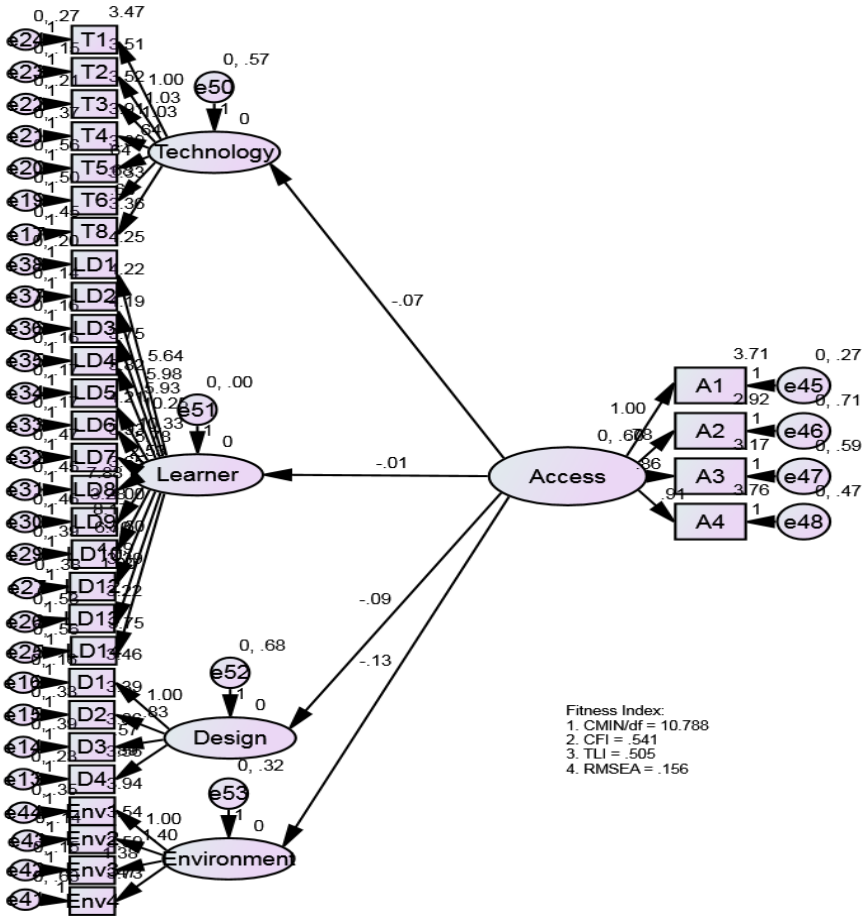

Figure 5: Second Order Factor

Following the above steps, ten items were eliminated in total. The modified second- order confirmatory factor analysis model fit indices are: $x^2 = 4962.696$, $x^2/df = 10.788$, df = 460, RMSEA = 0.156, TLI = 0.505 and CFI = 0.541. The re-specified model fits the sample data better.

All items loaded significantly on their designated first-order constructs, which in turn all loaded onto the designated second order factors with no evidence of cross-loading. Factor and item loadings all surpassed 0.66 across the measurement model, and all t- values were more than 9.35, indicating convergent validity among the measures. In addition, the average variance extracted (AVE) of each construct value ranges between 50 and 61 percent, demonstrating discriminant validity. All of the measurements are likewise quite reliable, with composite reliabilities ranging from 0.80 to 0.92.

All 34 components converge into a single internet accessibility construct, as seen by the numbers above. Technology, learner, design, and environment are the four component aspects that make up the 34 things. Without any cross loading, each of the 34 components is

ISSN 1533-9211

DOI 10.17605/OSF.IO/P4TVH

loaded onto only one of these four factors, resulting in strong measurement properties.

The final measurement model produced in the previous discussion was used as input for the SEM models in the structural models. First, the proposed structural model was put to the test. The model modification indices were used to aid in model modification decision-making. Figure 5 depicted the predicted structural model. The model modification indices suggested that releasing the covariance of four pairs of indicators would greatly improve the model fit, despite the fact that the hypothesized baseline model indicated an acceptable fit of data. As a result, shown in Table 1, design dimension (β =.354 and Sig. =.000), environmental dimension (β = 0.331 and Sig.=.000), and internet accessibility (β = 0.265 and Sig.=.002) regressed student's e-learning satisfaction.

Table 1: Linear regression model for student's e-learning satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.068	.177		.386	.700
	Design	.169	.036	.177	4.675	.000
	Environment	.684	.044	.661	15.640	.000
2	(Constant)	.584	.182		3.207	.001
	Design	.354	.034	.205	5.763	.000
	Environment	.331	.041	.688	17.382	.000
	Internet	.265	.042	.272	5.627	.002

a. Dependent Variable: Satisfaction

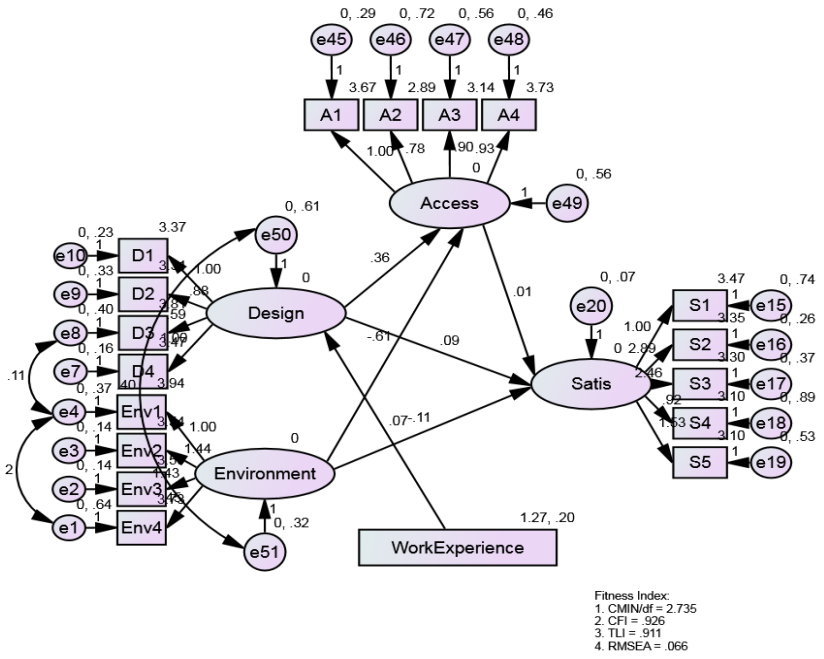

Figure 6: Full Structure Equation Modeling

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

On the road from e-learning involvement to student satisfaction, there was just one meaningful path coefficient (working experience factor). In the final structural model, it was covariates. The path coefficients from student self-rated attitude and happiness level to student e-learning satisfaction are all statistically significant.

Given the high sample size used in this research study, all of the fitness indicators of the latest SEM model met the critical cut-offs, implying a better model fit of the data than the base model: the modified structural model has generated an expected significant chi-square of (347.380, p = 0.05). For example, several fit indices were utilized to support chi-square and quantify the quality of fit (CMIN/DF = 2.375, TLI = 0.911, CFI = 0.926 and RMSEA = 0.066). From this result, it can be concluded that the model achieved a very good for the data and it is consistent with Hanasyha, J. et al (2013) and Hair et al (2018).

CONCLUSION AND DISCUSSION

Adult learners make up the majority of the study's participants (Haynes & Knowles, 1984). According to the findings, the average age of the respondent is 19-25 years old, with 75.8% of them being local students (64%). 73.3 percent of respondents had prior work experience, and 80.5 percent of participants have a flexible class schedule. This is the stage where a person goes through the stages of "abstract thinking" (formal operational stage) and the mind is capable of dealing with thought mastery, according to Piaget's Stages of Intellectual Development (Piaget, 1972). They have "self-learner" into how to make overall evaluations of e-learning satisfaction as mature students (Harrisone et al., 1996), making those strong judges of the classroom's intangible products: online teaching and learning process (McKeachie, 1991; Marsh & Roche, 1997).

They have different learning preferences and requirements as adults than younger students (Houser, 2004). They also have different ideas about what constitutes good instruction than regular students (Day et al., 2011). This study's student evaluation of online learning survey can provide lecturers with information about this group of students' learning needs and preferences as adult learners. The data can help lecturers organize class sessions that use a variety of teaching approaches and online learning activities to reinforce and increase the e-learning of adults.

Males make up the majority of the respondents. There was a difference in student ratings of teaching based on gender in previous research studies on learning satisfaction (McKeachie, 1991). Harrisone et al. (1996) discovered a "gender of student and gender of instructor" interaction, in which female students rated female instructors higher and male students rated male instructor's higher (Marsh & Roche, 1997). Bachen, McLoughlin, and Garcia (1999) found that female students rated female faculty particularly high across five teaching aspects and male faculty considerably lower, although male students did not perceive male and female professors to be significantly different.

Students' impressions of lecturers' expressiveness (such as warmth, enthusiasm, and extroversion) varied by gender and age, according to a recent study by Houser (2004).

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

However, using the multidimensional instrument suggested in this study, male and female lecturers could be productive with students of both genders by studying their input regarding their online learning experience. The material could spark a discussion between the lecturer and their students on the finest practices for both male and female students.

The model instrument was not restricted to a single field of study. It was created using information gathered from respondents who had working experience. As a result, the instrument is applicable to students' evaluations of e-learning in all specialties in the selected course. The model instrument was developed in a systematic manner, resulting in content-based evidence of validity. "Learner dimension", "technology dimension", "design dimension", "environmental dimension" and "internet accessibility," were identified through a logical process of statistical testing using exploratory factor analysis.

Because they were bound by the limits of meaningfulness (these dimensions provide useful information that will help teachers understand their performance and target improvement) and appropriateness (the extent to which students can realistically provide information about their online learning satisfaction), the eight dimensions included in the model instrument were considered appropriate for student evaluation of online learning satisfaction.

Model's items and scales were internally consistent and stable over a short period of time, according to reliability assessments (approximately three weeks interval). The eight items measures had decent internal consistency and intra-class reliabilities, which were well within acceptable bounds for scales evaluating psychological variables. This finding suggests that the model instrument assesses a number of different aspects of instruction, all of which may be assessed with an acceptable degree of accuracy. The multidimensionality, validity, and reliability of the model instrument in providing information regarding online learning satisfaction mediated by 4 items of internet accessibility were compared to a number of factor analytic research (Murray, 1983; Marsh and Roche, 1994; Jackson et al., 1996; Barosi et al., 1998).

The model instrument has acceptable psychometric properties, according to the results of this study, and it captures two dimensions of learning components, including "design dimension" and "environmental dimension". These scales were crucial findings in this study because they had important properties that could help define great e-learning from the perspectives of students. This model is a multidimensional instrument with reasonable content, construct, and criterion validity, according to the findings. It can be utilized by instructors with a high level of confidence. The consequence is that lecturers can utilize this instrument to collect student feedback on their teaching in order to reflect on and improve their own teaching. It could also be used by administrators in teacher training institutions to assess the performance of their teaching staff in order to organize staff development activities or refresher courses. However, this instrument requires more modification and testing before it can be considered as a "standard" evaluation tool that lecturers can use to collect student feedback on e-learning.

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

References

1. Bachen, C. M., McLoughlin, M. M., & Garcia, S. S. (1999). Assessing the role of gender in college students' evaluations of faculty. Communication Education, 48(3), 193-210.
2. Barosi, G., Ambrosetti, A., Centra, A., Falcone, A., Finelli, C., Foa, P., ... & Italian Cooperative Study Group on Myelofibrosis with Myeloid Metaplasia, T. (2018). Splenectomy and risk of blast transformation in myelofibrosis with myeloid metaplasia. Blood, The Journal of the American Society of Hematology, 91(10), 3630-3636.
3. Barrie, S. C., Bucat, R. B., Buntine, M. A., Burke da Silva, K., Crisp, G. T., George, A. V., ... & Yeung, A. (2015). Development, evaluation and use of a student experience survey in undergraduate science laboratories: The advancing science by enhancing learning in the laboratory student laboratory learning experience survey. International Journal of Science Education, 37(11), 1795-1814.
4. Conti-Ramsden, G., & Durkin, K. (2017). Language development and assessment in the preschool period. Neuropsychology review, 22(4), 384-401.
5. Day, B. W., Lovato, S., Tull, C., & Ross-Gordon, J. (2016). Faculty perceptions of adult learners in college classrooms. The Journal of Continuing Higher Education, 59(2), 77-84.
6. Hare, A., Chatwin, M., Field, D., Tan, H. L., & Simonds, A. (2018). Interprofessional education (IPE) for respiratory care in neuromuscular disease (NMD) is feasible, and improves confidence in clinical practice.
7. Harrison, A. O., Moore, R. M., Polson, S. W., & Wommack, K. E. (2019). Reannotation of the ribonucleotide reductase in a cyanophage reveals life history strategies within the virioplankton. Frontiers in microbiology, 10, 134.
8. Houser, M. L. (2020). Effective Instructional Practice. Communication Teacher, 18(3), 78-81.
9. Hynes, R. K., & Knowles, R. (1984). Production of nitrous oxide by Nitrosomonas europaea: effects of acetylene, pH, and oxygen. Canadian Journal of Microbiology, 30(11), 1397-1404.
10. Ibrahim, K. F. K., Kharuddin, A. F., Mustafa, Z., Azid, N., & Kharuddin, D, (2020). An International Comparative Study of Student's Attitude towards Science in Four Asian Countries. Al-Bukhary Social Business Journal
11. Jackson, D. L., Teal, C. R., Raines, S. J., Nansel, T. R., Force, R. C., & Burdsal, C. A. (1999). The dimensions of students' perceptions of teaching effectiveness. Educational and Psychological Measurement, 59(4), 580-596.
12. Kharuddin, A. F., & Ismail, N. A. (2017). Graphing calculator exposure of mathematics learning in a partially technology incorporated environment. EURASIA Journal of Mathematics, Science and Technology Education, 13(6), 2529-2537.
13. Kharuddin, A. F., Azid, N., Mustafa, Z., Ibrahim, K. F. K., & Kharuddin, D. (2020). Application of Structural Equation Modeling (SEM) in Estimating the Contributing Factors to Satisfaction of TASKA Services in East Coast Malaysia. Asian Journal of Assessment in Teaching and Learning, 10(1), 68-76.
14. Kharuddin, A. F., Mustafa, Z., Azid, N., Kharuddin, D., Ibrahim, K. F. K., Hong, L. Y., ... & Zahri, Z. A. (2019). Comparison of registration status of Institutional Taska services in East Coast Malaysia. Southeast Asia Early Childhood Journal, 8(2), 57-62
15. Marsh, H. W., & Roche, L. A. (1997). Making students' evaluations of teaching effectiveness effective: The critical issues of validity, bias, and utility. American psychologist, 52(11), 1187.
16. McKeachie, W. J. (1991). What theories underlie the practice of faculty development?
17. Ouimet, J. A., Bunnage, J. C., Carini, R. M., Kuh, G. D., & Kennedy, J. (2004). Using focus groups, expert

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/P4TVH

advice, and cognitive interviews to establish the validity of a college student survey. Research in Higher Education, 45(3), 233-250.

18. Piaget, J. (1972). The child's conception of physical causality (Vol. 212). Transaction Publishers.
19. Prosser, M. & Trigwell, K. (1999). Understanding learning and teaching: The experience in higher education. Buckingham: SRHE & Open University Press, p.12
20. Prosser, M., & Trigwell, K. (1999). Understanding learning and teaching: The experience in higher education. McGraw-Hill Education (UK).
21. Sezen-Barrie, A. (2018). Utilizing professional vision in supporting preservice teachers' learning about contextualized scientific practices. Science & Education, 27(1), 159-182.
22. Slavin, J. (2003). Why whole grains are protective: biological mechanisms. Proceedings of the Nutrition society, 62(1), 129-134.
23. Wimsatt, L. A., Cooke, J. M., Biggs, W. S., & Heidelbaugh, J. J. (2016). Institution-specific factors associated with family medicine residency match rates. Teaching and learning in medicine, 28(3), 269-278.