Factors Influencing Effective Professional Development Using the Hybrid E-Training Method


Faculty of Education, Faculty of Economy and Business, Faculty of Social Science and Humanities, Faculty of Information Science & Technology, Center for General Studies, Universiti Kebangsaan Malaysia 43600 Bangi, Selangor, Malaysia

Abstract: This study was designed to determine the factors influencing the success of e-learning courses conducted at a public university in Malaysia. A detailed analysis of 213 responses was conducted with a confirmatory factor analysis using AMOS version 7.0 and obtained the best-fit measurement model for a hybrid method used in professional development courses as a lifelong-learning programme. Overall reliability analysis using Cronbach’s alpha, item and person reliability analysis using a Rasch Model and content validation by experts suggested that the questionnaire is reliable and valid to measure the success of a hybrid e-learning programme. The results show five factors influencing the effectiveness of the hybrid e-training method to deliver teaching and learning materials. The factors are content, delivery, service, outcome and structure.

Key words: Confirmatory factor analysis · Hybrid E-learning · Structural equation modeling · Influencing factors

INTRODUCTION

The Malaysian government has ventured into various initiatives and programmes to optimise the use of technology in Malaysian society. These initiatives are aimed towards the transformation of Malaysia into a ‘knowledge society’. The Ministry of Higher Education, through its National E-Learning Committee, has also initiated many initiatives towards the integration of technological innovation into conventional teaching practice. In this study, innovation of this sort will subsequently be referred to as hybrid e-learning.

The implementation of hybrid e-learning programmes has its own success and sustainability factors that are important for stakeholders. Thus, it is important to study the factors that influence the development of hybrid e-learning that is acceptable to students and academic staff. From the analysis of Imran and Gregor [1], it was reported that Malaysian technology-related project success and sustainability were influenced by the environment and by the management of the ICT service provider involved, in order to set policy and administrative approach (Table 1). In line with that, this study will propose five other influencing factors as contributing to the success of a hybrid e-learning programme. The research question was formulated as follows: ‘Is the measurement scale for hybrid e-training (HIT) construct-valid?’

Table 1 shows the support from the government and top management with regard to various e-learning implementations. In this study, we were interested in examining factors influencing e-learning initiatives conducted at one public university in Malaysia, findings which should be generalizable to other institution of higher learning as well.

The variables however, cannot be directly observed. Various terms are used to refer to unobserved variables, such as latent variables/factors or unobserved variables. We attempted to gain information about the latent variables in this study through a look at the observable variables, that is, module content, delivery method, learning outcome, course structure and service provided.

Corresponding Author: Rosni Din, Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.
Table 1: Multi-level influences on ICT adoption in developing countries

<table>
<thead>
<tr>
<th>Influences on ICT Adoption</th>
<th>Countries</th>
<th>Specific Influences and Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>World</td>
<td>Lack of economic environment conducive to investment is a problem [1]</td>
</tr>
<tr>
<td>Political Situation</td>
<td>World</td>
<td>A climate of civil liberties conducive to research and expansion of communication is needed [1]</td>
</tr>
<tr>
<td>Political Situation</td>
<td>Malaysia</td>
<td>Political stability is important [1]</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Many Countries</td>
<td>Lack of infrastructure is a primary problem. Many developing Asian countries lag behind developed countries within and outside Asia [3, 1]</td>
</tr>
<tr>
<td>ICT policy/strategy</td>
<td>Malaysia</td>
<td>Step-by-step approach could be a model for developing countries with agricultural and natural resources [1]</td>
</tr>
<tr>
<td></td>
<td>World</td>
<td>Policies need to be (i) long term; (ii) aimed at building capacity; (iii) adaptive to changing context; and (iv) synergistic with other on-going national programmes [1]</td>
</tr>
<tr>
<td></td>
<td>Many</td>
<td>Need to facilitate the development of local cultural content [3]</td>
</tr>
<tr>
<td>Administration practice/reform</td>
<td>Asia</td>
<td>There is a close relationship between e-government and administrative reform [1]</td>
</tr>
<tr>
<td>Administration practice/reform</td>
<td>World</td>
<td>The administrative-reform process must be continued [1]</td>
</tr>
<tr>
<td>Bureaucracy</td>
<td>Developing Countries</td>
<td>Established bureaucracies often pose insurmountable obstacles for introduction and sustained use of up-to-date ICT [1]</td>
</tr>
<tr>
<td>E-government strategy</td>
<td>World</td>
<td>Governments need to take the lead in establishing, reforming and regulating ICT structures [2]</td>
</tr>
<tr>
<td>Penetration of ICT Tools</td>
<td>Malaysia</td>
<td>Support from top management is a success factor [4]</td>
</tr>
<tr>
<td>Education</td>
<td>World</td>
<td>A core set of basic tools (personal computers, mobile/handheld devices, hybrid devices) must be affordable to the majority of the population [3]</td>
</tr>
</tbody>
</table>

Table 2: Contents of the HiT measure

<table>
<thead>
<tr>
<th>Factors</th>
<th>Item ID</th>
<th>$a$ Overall-Current Study</th>
<th>$a$ Overall [8]</th>
<th>$a$ Total Item [7]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>C01-C09</td>
<td>.93 (9 items)</td>
<td>.88 (9 items)</td>
<td>.88 (8 items)</td>
</tr>
<tr>
<td>Delivery</td>
<td>C10-C18</td>
<td>.92 (9 items)</td>
<td>.91 (10 items)</td>
<td>.92 (9 items)</td>
</tr>
<tr>
<td>Service</td>
<td>C19-C25</td>
<td>.89 (7 items)</td>
<td>.92 (12 items)</td>
<td>.93 (8 items)</td>
</tr>
<tr>
<td>Outcome</td>
<td>C26-C37</td>
<td>.93 (12 items)</td>
<td>.94 (15 items)</td>
<td>.88 (9 items)</td>
</tr>
<tr>
<td>Structure</td>
<td>C38-C61</td>
<td>.97 (24 items)</td>
<td>.96 (23 items)</td>
<td>.96 (23 items)</td>
</tr>
<tr>
<td>Total Items</td>
<td>61 items</td>
<td>69 items</td>
<td>57 items</td>
<td></td>
</tr>
</tbody>
</table>

These variables are themes emerging from an earlier study. Through the literature review, we analysed similar themes to those of the current study by comparing and mapping various components of several e-learning models. Ultimately, we chose to adapt an inventory from the demand-driven learning model (DDLM) [2]. DDLM was designed for adult learners and features five key constructs (structure, content, delivery, service and outcomes). The 57-item DDLM inventory was then modified and adapted based on document and interaction analyses done in the prior study, mainly to fit the Asian culture of Malaysia and the local culture of UKM. The purpose of the present study is to determine the factors that influence the success of hybrid e-learning at UKM and in Malaysia generally.

**MATERIALS AND METHODS**

A survey questionnaire named the Hybrid e-Training Instrument (HiT), version 5.2, was used as the major instrument in this study, to empirically test the hypothesised relationships. The HiT questionnaire contains three sections (Section A, B and C) but for the purpose of this paper, discussions will be focus on two sections (Section A and Section C). Section A contains demographic items such as respondent academic qualifications, gender, ethnicity, age, teaching experience, country of origin and study programme. Section C contains items for measuring hybrid e-training (HiT). HiT was adopted from the DDLM measurement tool [6, 7]. The first version of the adapted HiT measure consisted of 61 items to measure the usefulness of a hybrid e-training course on a five-point Likert-type scale (see below).

The first step was to establish the content validity of the instrument and to test the reliability and internal consistency of the HiT model. The instrument was reviewed for technical, language and instructional design, in terms of (i) pedagogical/learning strategy, (ii) theories applied in the design and delivery of the course, (iii) cosmetic design of instructional media and (iv) course functionality. The HiT measure consists of 61 items that form five constructs: content (nine items), delivery (nine items), service (seven items), outcome (twelve items) and structure (twenty four items). The respondents rated each aspect of the course on a 1-5 scale, where 1 equals ‘strongly disagree’ and 5 equals ‘strongly agree’.
Respondents chose N/A if the item was not appropriate or not applicable to the course. Table 2 shows the results of content validation, as compared to two previous studies by other researchers.

RESULTS AND DISCUSSION

Based on previous studies [6, 7], the present paper hypothesised that an effective hybrid e-training course should consist of effective content, delivery, service provided, structure and outcome. Data were collected from 213 ICT trainers and trainees who attended an 8-week hybrid e-training course on computer use in education. The data was analysed and tested for confirmatory-factor analysis using AMOS version 7.0 [18] as was used in previous related research [8, 9, 10].

The hypothesised model was found to be contaminated (RMSEA > .10 and normed chi-square ($\chi^2/n$) > 5); as such, the model was revised. The overall fit of the revised measurement model is summarised in Figure 1. The revised model was achieved after examining the modification indices in order to correlate the measurement errors of the content and delivery factors. The decision to correlate both errors was made only after seeing that the outcome of the e-training depended on the content itself, so that the desired outcome of a blogging project, for example, could only be achieved if the content of the blog was covered by the content of the course. Naturally, if these two indicators were related, it was highly likely that the measurement errors should be correlated. Note that although various media and content were made available using the HiT system, the contents still needed to be specified in the course handbook and some minimal guidance or links needed to be provided as scaffolding.

Too much or no information might lead learners to confusion and they might get lost in the abundance of information or amidst the lack of guidance.

The magnitude of the factor loadings in the final revised model was substantially significant, with comparative fit index (CFI) = .993 and Taylor-Lewis index (TLI) = .975, although the root-mean-square error of approximation (RMSEA), at .10, was just barely acceptable [11, 12, 13]. The results indicated that the parameters were free of offending estimates, ranging as they did from .77 to .95. The CFI and TLI fit indicators exceeded the threshold of .90, indicating a good fit. The RMSEA indicates that the model was acceptable at 0.1 and, finally, the normed chi-square met the required threshold of 5, where a value between 1 and 3 indicates a high goodness-of-fit value. The overall result indicates that the test failed to reject the hypothesised model even though the p-value of .024 is slightly smaller [11] than the cut-off point (i.e. $p > .05$). Thus, the procedures established that the model in Figure 1 is a validated confirmatory measurement model. The research question (RQ1) will therefore be answered in the following paragraphs.

Based on previous studies [6, 7], the present paper hypothesised that an effective hybrid e-training course should consist of effective content, delivery, service provided, structure and outcome. Data were collected from 213 ICT trainers and trainees who attended an 8-week hybrid e-training course on computer use in education. The data was analysed and tested for confirmatory-factor analysis using AMOS version 7.0 [18] as was used in previous related research [8, 9, 10].

The hypothesised model was found to be contaminated (RMSEA > .10 and normed chi-square ($\chi^2/n$) > 5); as such, the model was revised. The overall fit of the

![Fig. 1: The final revised confirmatory factor analysis measurement model for HiTs](image-url)
RQ1: Is the measurement scale for hybrid e-training (HiT) construct-valid?

RQ1.1: Can learners’ acceptance or rejection of hybrid e-training be explained by the following five factors: content, delivery, service, outcome and structure?
Yes. As shown in Figure 1, the five factors loaded significantly on the HiT construct. This means that a measurement model for a hybrid e-training system can be explained by the five factors.

RQ1.2: Does each indicator have a nonzero loading on the hypothesised (targeted) factor?
Yes. As shown in Figure 1, the five factors were verified, as shown by the factor loadings of .79 for content, .77 for delivery, .89 for structure, .82 for service and .95 for outcome.

RQ1.3: Does each indicator have a zero loading on the other (non-targeted) factors?
Yes. There was only one construct involved in the HiT measurement model. Hence, all indicators with nonzero loadings were targeted only to the HiT construct.

RQ1.4: Are the error terms uncorrelated?
Only two sets of error measurement (e4-e5 and e5-e1), as shown in Figure 1, are correlated, as explained earlier. The rest of the error terms are uncorrelated.

To support the investigation of the above sub-questions (RQs 1.1-1.4), the following hypotheses were tested, as discussed in the previous subsections. The results of the test for each hypothesis are as follows.

H1: Acceptance of the hybrid e-training system is explained by five factors: content, delivery, service, outcome and structure of HiT.

Fail to reject.

H2: Each indicator has a nonzero loading on the hypothesised (targeted) factor.

Fail to reject.

H3: Each indicator has a zero loading on the other (non-targeted) factors.

Fail to reject.

H4: The error terms were uncorrelated.

Partially rejected; 3 of 5 measurements of error were correlated and justified.

CONCLUSION

This study contributes to the discovery of five factors influencing what makes an effective hybrid e-training course. These factors are content, delivery, service, structure and outcome. To a certain extent, this finding is in line with the belief that good preparation of
trainers is the most crucial factor in producing efficacious training [14, 15] when implementing a new technology for teaching and learning. As Kimmel and Kilbridge [14] suggest, teachers can be trained in a way that enhances their sense of self-efficacy through specifically designed in-service training aimed at improving their performance in meeting learner needs; in this case, it was demonstrated that hybrid e-training helped trainers cater to the needs of various learners with different learning-style preferences, particularly the minority group that prefers tactile and kinesthetic learning. The findings from a qualitative study [16, 17] conducted on UKM trainees and trainers in ICT using a hybrid e-training system named e-Bincang [16] revealed that some auditory and visual students were reluctant to participate in computer-mediated communication because they were doing well without the new technology. However, a student who exhibited visual and auditory learning styles thought otherwise [17].

- I am more of an introverted student. The online method has helped me develop self-confidence. I always think before I speak but seldom find the courage to speak out my thoughts. Through e-Bincang, I was able to do so without prejudice. I am now more at ease when I have to team up with others. I found a thrill in reporting my search results to the team. The substantive peer comment received has helped me think more deeply and made me realise that although I have always thought of myself as a thinker, there is more to it than what came out from just my own thinking. I always thought that my ideas are rather substantial but I failed to share them with others because I do not have the confidence to speak out my thoughts. Surprisingly, when my thoughts are combined with others through the online discussions, I stumble upon much superior ideas, which makes me realise the power of 'synergy'. True enough, two heads are better than one. I have discovered a different perspective about learning and about myself.

ACKNOWLEDGEMENTS

We would like to express our sincere thanks to Centre for Research & Innovation, Universiti Kebangsaan Malaysia (Project No: UKM-GUP-TMK-08-03-308) and the Malaysian government for the financial support of the research work.

REFERENCES


