DEVELOPMENT AND VALIDATION OF MEANINGFUL HYBRID E-TRAINING MODEL FOR COMPUTER EDUCATION

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ABSTRACT

Meaningful hybrid e-training experience provides a coherent purpose for strategic educational change through lifelong education and the creation of a knowledge society. A close examination of new hybrid e-training programs however, has indicated a critical gap between rapidly developing technology and sound pedagogical models to determine program quality. Therefore, the objective of this study is to develop, generate, test and validate a 2 stage model for a new meaningful hybrid e-training program. The early framework of the model guided development of a questionnaire to measure meaningfulness of a hybrid e-training. Data collected from 213 ICT trainers were tested with confirmatory factor analysis using AMOS 7.0 to obtain three best-fit measurement models from the three latent variables. Overall reliability analyses using Cronbach's Alpha, items and persons reliability using the Rasch Model and content validation by experts suggested that the questionnaire is reliable and valid to measure a meaningful hybrid e-training program. Subsequently, the structural equation modeling was applied to test the hypotheses. The results showed that there is a positive strong relationship between hybrid e-training and meaningful e-training; a positive weak relationship between learning style preference and hybrid e-training and a negative relationship between learning style preference and meaningful learning. In brief the study showed a substantial effect of hybrid e-training towards achieving meaningful learning. As such, future training regarding the use of hybrid e-training should include all five components of a meaningful hybrid e-training instead of merely focusing on content. With results showing weak relationship between learning style and hybrid e-training and negative relationship between learning style and meaningful e-training, instructional media designers and developers should now focus on integrating all five e-training components to ensure meaningful learning. It would be interesting to further investigate as to whether or not learning style is a mediating or a moderating factor towards achieving meaningful learning via the use of hybrid e-training programs as modeled in the final results.

Keywords: Validation, Structural Equation Modeling, Hybrid E-Training, Meaningful Learning

INTRODUCTION

Meaningful hybrid e-training experience provides a coherent purpose for strategic educational change through lifelong education and the creation of a knowledge society. This has led many institutions of higher learning to endorse, fund, and even design or deliver alternative educational or professional development programs. The most popular of these is the Web-based training program, whereby trainers may empower themselves

through the acquisition of both explicit and tacit knowledge. For Malaysia, introducing e-training is a major undertaking, but it represents an investment in the future productivity of its workforce. A close examination of new hybrid e-training programs however, has indicated a critical gap between rapidly developing technology and sound pedagogical models to determine program quality.

With the advent of knowledge-economy, embracing the concept of knowledge management (KM) for lifelong learning (LLL) as the foundation of a learning society, takes priority. This is because people will have to continuously update their knowledge and skills to maintain a competitive edge in the global economy (Sharifah Hapsah 2003). The Malaysian Qualification Framework (MQF) provides the structure for actualizing LLL because it facilitates learners in selecting a learning pathway that is most appropriate for them (Sharifah Hapsah 2003, 2004). Thus, a response was made to create an academic culture capable of producing learners with qualities ranging from competencies in soft skills, intellectual qualities and affective attributes, in addition to the typical technical and professional skills (Committee of Deputy Vice Chancellors and Rectors of Malaysian Higher Learning Institutes 2006). The committee had drawn up four strategies to successfully create the much desired academic culture. This study will focus on the third strategy by implementing an updated, relevant curriculum with various delivery methods. This focus set sights on achieving the shared vision of the university that is to create an academic culture comparable to international standards at the same time, able to nurture a holistic development of the learner.

In addition to the strategies outlined earlier, it is also widely accepted that ICT infrastructure enables e-Training. The technology may save university administrators costs and add a measure of convenience for learners, but educators may reason that if e-training programs do not produce workers who are capable of higher order thinking and reasoning to solve intricate and authentic problems in the workplace, then the programs are not worth much (Govindasamy 2002; Jonassen, Peck and Wilson 1999). In the strategic planning process to implement a new e-training program or enhance existing ones, the focus should therefore not be primarily on how technology can be used to achieve educational goals, but also on the human aspects of teaching and learning (Rosseni et al. 2009, Rosseni et al. 2008). For that reason, the study focused on developing a model for meaningful e-training using the hybrid method to cater to learners with differentiated learning style preferences.

The hybrid e-training (HiT) framework developed in this study originated from a credible model, the Demand-Driven Learning Model (DDLM) by MacDonald et al. (2001, 2002). In the DDLM framework (Breithaupt and MacDonald 2003), high quality *content* is considered to be comprehensive, authentic or industry-driven and well-researched. In relation to the content, high quality *delivery* is defined as delivery that carefully considers usability, interactivity and tools. The DDLM defines high quality *service* as service that provides the resources for learning as well as any administrative and technical support needed. Such service is supported by skilled and emphatic staff that is accessible and responsive. High quality programs provide *outcomes* such as personal advantages for learners with a lower cost to employers while achieving learning outcomes. The publication and dissemination of findings on DDLM-based programs contribute to theory and practice, and therefore, ongoing evaluations will ensure the longevity and validity of the *structure* standards proposed. A consequence of the evolution of operational definition of the components in the DDLM is the need to adapt and improve the model and of course, the evaluation effort should include measurement of learning objectives specific to the program being evaluated (MacDonald et al. 2001).

Table 1. Person and Item Reliability of the MeT, HiT and LSP Measures

Statistical Info	MeT Measure	HiT Measure	LSP Measure
a. Person reliability	.86	.97	.85
b. Item reliability	.87 (α=.88)*	.97 (α=.93)*	.94 (α=.93)*

*Reliability coefficient using the Cronbach's alpha test

The objective of this study is to develop, generate, test and validate a 2 stage model for a new meaningful hybrid e-training program. The early framework of the model guided development of a questionnaire to measure meaningfulness of a hybrid e-training.

METHOD

The study sought to gather empirical evidence to show adequacy of the meaningful hybrid e-training instrument in measuring what it was intended to measure. Accordingly, the study utilized a measurement theory in resolving certain pertinent assessment and measurement issues. Specifically, the research objective is to identify if a relationship exists among learning style preferences (LSP), hybrid e-training system (HiTs) and meaningful e-training (MeT). Research hypotheses are as follows:

H_1: HiTs influences MeT.

H_2: LSP influences HiTs.

H_3: LSP influences MeT.

The early framework of the model guided development of a questionnaire to measure meaningfulness of a hybrid e-training. The questionnaire has three sections which assess meaningful learning (α=.88), hybrid e-training (α=.93) and learning style preference (α=.89). Overall reliability analyses using Cronbach's Alpha and the Rasch Model (Table 1) in addition to content validation by experts suggested that the questionnaire is reliable and valid to measure a meaningful hybrid e-training program. Data collected from 213 ICT trainees

and trainers who are graduating seniors and post-graduate students in the university were tested with confirmatory factor analysis using AMOS 7.0 to obtain three best-fit measurement models from the three latent variables. Subsequently, the structural equation modeling was applied to test the hypotheses.

RESULTS & DISCUSSIONS

Distribution of major learning styles among the respondents as indicated by the results are as follows: (i) visual - 37.7% (n=80), (ii) group - 25.8% (n=55), (iii) individual - 13.6%   (n=29), (iv) auditory - 12.2% (n=26), (v) kinesthetic - 8% (n=16) and (vi) tactile - 2.8% (n=6). This shows that majority of the learners in this study were visual and group learner. Figure 1 further shows results of structural relationships among the use of hybrid e-training (HiTs), meaningful e-training (MeT) and learning style preferences (LSP). The study was able to validate the hybrid e-training components (content, delivery, service, outcome and structure) as proposed in the original model (McDonald et al. 2001) and various literature. The study also offered evidence that the five-dimension measurement model for HiTs did generate the data collected from computer trainees who hailed from various Asian countries. The result did not establish any basis which can be used to claim that the HiT model is incorrect, even when used in a different cultural setting among culturally diverse learners.

The study was also able to validate the meaningful e-training attributes (cooperativity, intentionality, constructivity, activity and
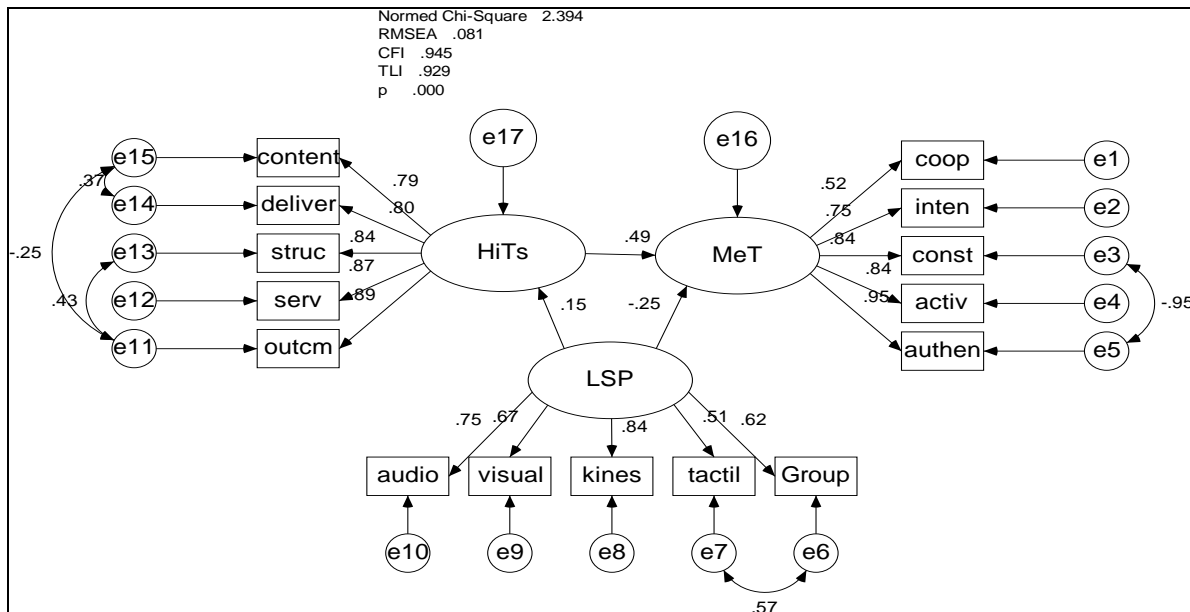
Figure 1. Results of structural relationships among HiTs, MeT and LSP

authenticity) as proposed by Jonassen, Peck and Wilson (1999). As shown in Figure 1, it offered evidence (Hair et al. 2006) that the five-dimension measurement model did generate the data collected from computer trainees whose origins were from various Asian countries. Similar to the results for HiT, the validity tests results for MeT did not establish doubts to claim that the MeT model is incorrect, even in a different cultural setting (Hair et al. 2006).

For the third latent factor, the study was also able to validate five out of the six learning styles (visual, auditory, kinesthetic, tactual, group, individual) as proposed by Reid (1984) and various literatures about learning style (Kappe et al. 2009; Isemonger 2008; Rosmidah 2008; Dunn and Dunn 1978, 1979, 1993; Reid 1987, 1984). It offered evidence that the new five-dimension measurement (five out of the six dimension mentioned earlier excluding the individual dimension) model did generate the data collected from computer trainees and

trainers whose origins were from various Asian countries. Analogous to the results for HiT and

MeT, the validity tests results for LSP did not establish doubts to claim that the new LSP model is incorrect, even in a different cultural setting (Hair et al. 2006).

In reference to Figure 1, the study further shows that there was a strong positive relationship between hybrid e-training and meaningful e-training with a path coefficient of .49. In other words, as hybrid e-training increases, meaningful learning in the MeT courses increases. The results also indicated a weak positive relationship between learning style preferences and hybrid e-training with a path coefficient of .15. In other words, as a preferred learning style dominates a learner's style of learning, the hybrid e-training environment becomes slightly useful to the training experience. There was however, a negative relationship between learning style preferences and meaningful learning with a path coefficient of -.25. This shows that the e-training

experience becomes more meaningful when the learner is influenced by a lesser degree of a particular learning style preference. In other words, learning is affected by learning style preferences whereby in the case of students who are able to employ multiple learning styles, learning outcome is higher (Felder 1995; Reid 1987).

Factor loadings in the final revised model were substantially significant with CFI = .94, TLI = .93 and RMSEA = .08. The statistics indicate that the parameters were free from offending estimates, ranging from .52 to .95. The CFI (.94) and TLI (.93) fit indicators exceeded the threshold of .90, indicating a good fit (Hair et al. 2006; Kline 2005). The root-mean square error of approximation (RMSEA=.08) met the cut-off point requirement for a reasonable error of approximation (Hair et al. 2006; Kline 2005). The normed chi-square (χ^2) of 2.471 for a good fit was also met (Hair et al. 2006; Kline 2005)..
The final fit index indicates that the test failed to reject the hypothesized model. As such, the researcher concluded the model in Figure 1 to be the validated structural equation model. Research objective, therefore, was answered where the hypotheses testings failed to reject the three statements (HiT influence MeT; LSP influences HiT; LSP influences MeT).

CONCLUSION

Successful applications of hybrid e-training at the tertiary level depend on many factors especially the policy governing its implementation and issues in its applications. To come to that point, a model for appropriate infrastructure, content, delivery method, service and outcome needs to be validated and tested. Consequently, all validated measurement models were again tested in a second stage full-fledge structural equation model to see its influence on learners' perception of what constitutes meaningful e-training and how learning style effects hybrid e-training. The results of the present study are relevant to give insights for theorists, trainers, academic staff and knowledge management system designers and developers towards the goal of achieving meaningful learning in the overall process of training or teaching and learning. It was shown that hybrid e-training had a substantial effect towards achieving meaningful learning. As such, future training regarding the use of hybrid e-training should include all five components of a meaningful hybrid e-training instead of merely focusing on content or activities such as uploading and downloading e-training materials. With results showing weak relationship between learning style and hybrid e-training and negative relationship between learning style and meaningful e-training, instructional media designers and developers should now focus on integrating all five e-training components to ensure meaningful learning. In conclusion, the researchers strongly suggest that future research to be done to further investigate as to whether or not learning style is a mediating or a moderating factor towards achieving meaningful learning via the use of hybrid e-training programs as modeled in the final results.

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