



E-LEARNING EVALUATION IN MALAYSIAN PUBLIC SECTOR FROM THE PEDAGOGICAL PERSPECTIVE: TOWARDS E-LEARNING EFFECTIVENESS

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ABSTRACT

E-learning has emerged as an attractive alternative for the delivery of teaching and learning/ training. Nevertheless, most e-learning focused more on technical issues whereby the pedagogical perspective is not given much emphasis. The lack of emphasis on pedagogical perspective will affect the quality and effectiveness of e-learning. The purpose of this paper is to evaluate the effectiveness of e-learning in the public sector from the pedagogical perspectives and to identify the evaluation criteria which contribute to the effectiveness of e-learning. This paper attempts to develop a model for evaluating e-learning in the public sector. Mixed methods was chosen as the data collection technique. Quantitative data was gathered from the questionnaires, whereas qualitative data was gathered from interviews and case study. The overall findings showed that e-Training is effective from pedagogical perspectives, whereas EPSA is moderately effective. The results also showed that eleven evaluation criteria contributes to e-learning effectiveness namely individual motivation & attitude, individual learning style, theory-objective-learning outcome & knowledge transfer, interactivity & content, structure design, interface design, multimedia design, instruction and help, learner-facilitator interaction, learner-learner interaction, and learner-content interaction. An 'E-learning Evaluation Model' was also developed which comprised of 4 dimensions namely individual, learning, content and interaction.

Keywords: *E-Learning, E-Learning Evaluation, E-Learning Effectiveness, Pedagogical Perspective*

1. INTRODUCTION

Rapid technological advancement especially in the field of Information and Communications Technology (ICT) has changed and affected the lives of people from all over the world and across all fields. The emergence of internet and multimedia technology had enabled the community to communicate at anyplace and anytime. Internet development not only brings changes in various fields, but it also dramatically revolutionizes education and training either in the public or private sector. Moreover, web development and globalization has transformed the delivery of learning and training from classroom to digital or electronic media. In addition, ICT's technological

development and internet innovation also contributed to a new form of learning which is known as e-learning [1].

E-learning is seen as a solution to meet the rising demand for training & learning. Through e-learning, more participants can be trained at an affordable cost. E-learning offers opportunity for life long learning and enables self-pace learning at anywhere and anytime. Moreover, the advent of internet technology and multimedia has enabled e-learning to provide attractive and meaningful training which will propel Malaysia into a developed nation by the year 2020.

1.1 Problem and Issue

E-learning is an alternative to conventional learning that is able to provide benefit to learner, instructor and organisation either in the public or private sector [2]-[6]. Based on its potential, many organizations choose to use e-learning as a solution to training problem and to enrich their teaching and learning delivery.

Today, e-learning is gaining popularity with its utilization spanning worldwide. Usage of e-learning expanded globally to cover business, industry and educational institution [7] where distance education and training can be acquired by millions in the community at various age categories [8]. Although e-learning increasingly find its niche in a range of organizations and educational institution, research findings [9]-[13] still showed obvious weaknesses in e-learning where it is unable to attract the trainees' or learners' interest and this resulted in an adverse effect on the implementation of e-learning. The study undertaken by Sun Microsystems revealed that only 25% of the personnel completed their online course [13]. While findings from a research carried out in Europe in the year 2002 on the quality of e-learning showed that 61% of professionals from both the public and private sector rated the overall quality of e-learning as 'unsatisfactory/weak' or 'medium' [12]. Results from the study carried out on e-learning under the mega Leonardo da Vinci programme that involved 149 e-learning projects from 24 European countries showed that e-learning system still has weaknesses [10], [11]. In addition, American Society for Training and Development (ASTD) which is one of the prominent organizations specializing in learning, job training and professional achievement also found that only 45% of the organization involved in the study managed to attract the trainee's interest [9]. Existing studies on e-learning in Malaysia are more focused on certain public or private organizations/institutions of higher learning. No comprehensive study has yet been found to evaluate e-learning in the Malaysian public sector. Thus, efforts should be made to evaluate e-learning in the Malaysian public sector in order to focus on how e-learning can attract learner interest and how learner engagement will affect the effectiveness of e-learning. Ensuring that e-learning is able to attract learner interest and effective is crucial and must be given the utmost priority.

Emphasis must be given to the quality, teaching and learning content, online learning material, pedagogy and technical assistance in e-learning [14]. According to [15], the success of web-based distance learning depends largely on how learner interest can be maintained. Moreover, most e-learning developer focus mainly on technical matters and subject identification on the whole whereas pedagogy and andragogy are disregarded [10], [11]. [10] and [11] suggested that more focus should be given to learner needs, using a learner-oriented approach and innovation from the aspect of pedagogy so that it can give added value to learners. [11] discovers that the success of e-learning does not rely solely on technology perfection.

[16] had stressed the importance of pedagogy as the major pre-condition for the success of e-learning. [16] also stated that there is no proper guide on how to design, develop, deliver and manage e-learning from the perspectives of pedagogy. [15] had argued that pedagogy in an online learning environment is the key variable that contribute to the quality of learning. According to [15], LMS would only be effective if it supports pedagogical principles and provides motivation as required by the learners. In addition, successful online learning must be able to attract learners' interest, deliver meaningful learning and able to motivate learners' to learn.

The view that less attention and emphasis on pedagogical aspects in e-learning by scholars, practitioners and other researchers is strengthened by e-learning experts from four continents. Discussion involving thirty three e-learning experts in 2002 held in Netherlands found that most of the current e-learning are pedagogically poor in quality, less portable or has inadequate tools [17]. As a result from the discussion, they further agreed that pedagogical quality of e-learning is the key issue that requires attention [17]. [18] further emphasized that the key and real issue in e-learning is pedagogy. [19] and [20] also had the same view whereby pedagogy is the key issue in the effectiveness of learning regardless of the media or teaching & learning delivery used.

As past researches on e-learning have shown that less emphasis was given to pedagogy, further studies need to focus on the pedagogical perspectives of e-learning in order to improve e-learning effectiveness.

1.2 E-learning Evaluation Model from the perspective of pedagogy

E-learning evaluation model from pedagogical perspectives has been designed by [21], [22] and [23]. Based on the similarities between Pedagogy Model [22] and Pedagogy Framework [23], it can be concluded that pedagogy model/framework has to be grounded on sound learning theories. Apart from that, the present Pedagogy Model/Framework involve only general evaluation criteria and have no specific criterias to facilitate the evaluation of e-learning from the pedagogical perspective. Thus, this paper proposes an e-learning evaluation model from the perspective of pedagogy (see Figure 1). This model is adapted from Pedagogy Model [22] and Pedagogy Framework [23] with some modifications. The model is based on learning theories namely behaviorism, cognitivism and constructivism. Instructional design principle is also incorporated in the model.

This paper attempts to integrate several evaluation criteria from other e-learning evaluation model which is related to the perspective of pedagogy. Four dimensions namely individual, learning, content and relationship between instructor and learner has been identified as the main evaluation criteria to evaluate e-learning from the perspective of pedagogy. The individual dimension, learning, content and relationship between instructor and learner are the independent variable in this paper and the dependent variable is e-learning effectiveness. Furthermore, this paper attempts to confirm the association of the independent variables identified such as individual, learning, content, and relationship between instructor & learner with the dependent variable.

2. METHOD

Mixed methods was chosen as the research design for this paper based on its strength which will enable deep understanding of problems, the exploration of the respondents' perception, better explanation, clarification, confirmation and verification of the relationship between variables. Mixed methods in this paper involved quantitative and qualitative data gathered from questionnaire survey, interview and case study through observation. The population framework consist of all civil servants who are involved in e-learning either at the ministry, department or government agency in the public sector of Malaysia. The sampling framework consist of civil servants who

have used e-learning either at the ministry, department or government agency in the public sector of Malaysia. The sampling method chosen for this paper is clustered sampling. Unit of analysis is individual who is the user of e-learning in the public sector of Malaysia. Two e-learning applications were evaluated namely Public Sector E-Learning (EPSA) and e-Training. EPSA was implemented in 2007 and used by all civil servants in the public sector of Malaysia. e-Training was implemented in 2000 and used by civil servants from Ministry of Human Resources Malaysia and students from few Training Institutes of the Manpower Department (ILJTM) under the Ministry of Human Resources such as Industrial Training Institute (ILP).

Questionnaires comprising of online questionnaire and manually distributed questionnaire form were sent to all EPSA users and e-Training users from 11 Industrial Training Institute (ILP). A total of 616 usable questionnaires were received. In addition, a total of 29 respondents from 4 different groups were face-to-face interviewed involving 6 pedagogy/e-learning experts, 4 subject matter experts, 4 developers and 15 learners. Case study through observation was also carried out by the researcher on two departments which conducted training via e-learning namely National Institute of Public Administration (INTAN) and Industrial Training Institute (ILP), Manpower Department, Ministry of Human Resources Malaysia.

2.1 Measurement

The measurement of variables in this paper was operationalised using Lazarsfeld's Scheme for Measuring Concept [24] which is occasionally known as "*descending the ladder of abstraction*". There are four stages of Lazarsfeld's Scheme for Measuring Concept namely initial imagery of concepts, concepts specification or specification of dimensions, selection of indicators and construction or formation of indices. In stage 1, the researcher identified 4 concepts or dimensions which were partly adapted from the work of [22] and [23] namely individual/learner, learning, content and relationship between instructor and learner. Clear definition of each concept or dimension was determined in stage 2. Besides that, construct for each concept or dimension was also identified and defined. In stage 3, appropriate indicator was selected for each concept or dimension by determining the best indicator based on the

synthesis of other researcher's indicator. In stage 4, the indices for each construct was developed using 5-point Likert scales with 1=strongly disagree and 5=strongly agree. As a result, 12 items/variables were identified to measure the evaluation criteria of individual/learner dimension which was adapted from [25]-29]. On top of that, 16 items/variables were used to measure the evaluation criteria of learning dimension and 53 items/variables were used to measure the evaluation criteria of relationship between instructor and learner. These measurements were adapted from [30], [25], [28], [31] and [29]. However, the researcher did not find any indicator for the dependent variable e-learning effectiveness from the perspective of pedagogy. Thus the indicator for e-learning effectiveness was developed by the researcher based on the concept of pedagogy explained by [32], [34], [23] and [29]. Once all construct were measured, the questionnaire was designed and sent to 2 pedagogical experts for face and content validation.

2.2 Instruments

The instrument used to collect data involved structured schedule of interview and case study, online questionnaire and survey questionnaire forms which were manually administered and distributed to the respondents. Questionnaire survey was used to collect quantitative data, whereas structured schedule of interview and case study were used to collect qualitative data. The questions in the online questionnaire and survey questionnaire form are similar.

Before the questionnaire is sent to the respondent, the researcher has conducted a pilot study in two phases. In the first phase, the researcher has interviewed ten respondents to know whether the questionnaire designed/constructed can be understood by the respondents. The questionnaire was modified based on the feedback obtained from the first phase pilot study. The second phase of the pilot study involved 80 respondents from several ministries, departments or agencies. 68 usable questionnaires were received. The purpose of the second phase of the pilot study is to test the reliability and validity of the research instrument. Data collected from the second phase of the pilot study were analysed using a statistical software known as Statistical Package for Social Science (SPSS) for Windows (version 16.0).

Data analysis for this paper comprises of quantitative and qualitative analysis. The

quantitative analysis involved few analyses such as factor analysis, reliability, demographic, descriptive, correlation, hypothesis testing and regression analysis. The qualitative analysis also involved few analysis such as open-ended question analysis, interview analysis, observation analysis, evaluation criteria analysis and e-learning effectiveness analysis. A parallel triangulation approach was used to integrate the result of quantitative and qualitative analysis.

3. RESULTS

Quantitative data collected from the survey questionnaire and analyzed using the Statistical Package for Social Science (SPSS). Analysis includes an assessment of validity and reliability, analysis of demographic profile, descriptive, correlation, hypothesis testing and regression. Qualitative data gathered from interviews and case study were analyzed using content analysis.

3.1 Reliability Analysis

Reliability analysis was carried out to test the reliability of all the construct/variables (see Table 1). Table 1 showed that all construct has cronbach alpha value above 0.8. Thus the result of reliability analysis showed that all constructs were accurate and consistent.

Table 1 Reliability test and construct

| Construct / Factor | No.of variables | Cronbach Alpha value |
|---|-----------------|----------------------|
| F1 – Content and Interactivity | 20 | 0.963 |
| F2 – Theory-objective-learning outcome & knowledge transfer | 17 | 0.953 |
| F3 – Response and Learner-Instructor Interaction | 11 | 0.953 |
| F4 – Structure Design | 11 | 0.949 |
| F5 – Individual Motivation and Attitude | 7 | 0.880 |
| F6 – Interface Design | 7 | 0.924 |
| F7 – Multimedia Design | 5 | 0.896 |
| F8 – Instruction and Help | 10 | 0.924 |
| F9 – Individual Learning Style | 4 | 0.851 |
| DV –E-learning Effectiveness | 5 | 0.924 |
| Total | 92 | |

3.2 Demographic Analysis

Demographic profile is divided into three groups namely personal, professional and usage characteristics. Personal characteristics of respondents are gender, race, age and educational attainment. Whereas the professional characteristics of respondents include grade, service group, the scheme of service and years of service in the civil service. Besides that usage characteristic include e-learning usage and accessing e-learning.

Table 2a Respondents' Demographic - Personal Characteristic

| Characteristic | EPISA (n=350) | | e-Training (n=266) | | No. of respondent |
|----------------------------|---------------|------|--------------------|------|-------------------|
| | freq | % | freq | % | |
| Gender | | | | | |
| Male | 147 | 42.0 | 169 | 63.5 | 316 |
| Female | 203 | 58.0 | 98 | 36.5 | 300 |
| Race | | | | | |
| Malay | 317 | 90.6 | 229 | 86.1 | 546 |
| Chinese | 10 | 2.9 | 5 | 1.9 | 15 |
| Indian | 12 | 3.4 | 10 | 3.8 | 22 |
| Others | 11 | 3.1 | 22 | 8.3 | 33 |
| Age (years) | | | | | |
| Below 20 | 1 | 0.3 | 99 | 37.2 | 100 |
| 20-30 | 197 | 56.3 | 118 | 44.4 | 315 |
| 31-40 | 99 | 28.3 | 39 | 14.7 | 138 |
| 41-50 | 35 | 10.0 | 10 | 3.8 | 45 |
| 50 above | 18 | 5.1 | 0 | 0 | 18 |
| Highest Level of Education | | | | | |
| MCE/SPM Certificate | 55 | 15.8 | 73 | 27.3 | 128 |
| Diploma | 12 | 3.4 | 101 | 37.8 | 113 |
| Bachelor Degree | 48 | 13.8 | 69 | 25.8 | 117 |
| Masters | 189 | 54.2 | 16 | 6.0 | 205 |
| PhD | 34 | 9.7 | 6 | 2.2 | 40 |
| Professional qualification | 7 | 2.0 | 0 | 0 | 7 |
| Others | 2 | 0.6 | 0 | 0 | 2 |
| Others | 2 | 0.6 | 2 | 0.7 | 4 |

The respondents' demographic characteristic (see Table 2a, 2b and 2c) showed that majority respondent are Malays, age ranged between 20 to 30 years old, had basic IT skills and working experience less than 5 years. Majority of EPISA respondents are in position grade of 41 to 47 which is in the 'Management and Professional' group and in the service scheme of 'Administrative & Diplomatic'. These findings showed that most of EPISA respondents are professionals who need additional learning or training in order to improve their work performance. Most of e-Training

respondents are in grades 27 to 40 which is in the 'Support' group and in the service scheme of 'Engineering'. Majority of EPSAs' and e-Trainings' respondent have been using e-learning for less than a year and access e-learning a few times in a year.

Table 2b Respondents' Demographic - Professional Characteristic

| Characteristic | EPISA (n=350) | | e-Training (n=107) | | No. of respondent |
|-----------------------------|---------------|------|--------------------|------|-------------------|
| | freq | % | freq | % | |
| Position Grade | | | | | |
| Grade 1-16 | | | | | |
| Grade 17-26 | 14 | 4.0 | 6 | 5.6 | 20 |
| Grade 27-40 | 69 | 19.7 | 28 | 26.2 | 97 |
| Grade 41-47 | 36 | 10.3 | 49 | 45.8 | 85 |
| Grade 48-53 | 194 | 55.4 | 22 | 20.6 | 216 |
| Grade 54-55 | 27 | 7.7 | 2 | 1.9 | 29 |
| Special Grade/ JUSA | 7 | 2.0 | 0 | 0 | 7 |
| | 3 | 0.9 | 0 | 0 | 3 |
| Service Group | | | | | |
| Highest Management | 3 | 0.9 | 2 | 1.9 | 5 |
| Management & Professional | 229 | 65.4 | 27 | 25.2 | 256 |
| Support | 118 | 33.7 | 78 | 72.9 | 200 |
| Others | 0 | 0 | 0 | 0 | 0 |
| Service Scheme | | | | | |
| Transport | 1 | 0.3 | 0 | 0 | 1 |
| Science Education | 1 | 0.3 | 0 | 0 | 1 |
| Economy | 3 | 0.9 | 7 | 6.5 | 10 |
| Information Science | 0 | 0 | 0 | 0 | 0 |
| Agriculture | 78 | 22.3 | 6 | 5.6 | 84 |
| Engineering | 0 | 0 | 0 | 0 | 0 |
| Security & Fire Brigade | 5 | 1.4 | 87 | 81.3 | 92 |
| Law | 5 | 1.4 | 0 | 0 | 5 |
| Administrative & Diplomatic | 0 | 0 | 0 | 0 | 0 |
| Administration & Support | 157 | 44.9 | 0 | 0 | 157 |
| Research & Development | 76 | 21.7 | 6 | 5.6 | 82 |
| Social | 2 | 0.6 | 0 | 0 | 2 |
| Medical & Health | 2 | 0.3 | 0 | 0 | 2 |
| Finance | 2 | 0.6 | 0 | 0 | 2 |
| Police | 17 | 4.9 | 1 | 0.9 | 18 |
| Army | 1 | 0.3 | 0 | 0 | 1 |
| | 0 | 0 | 0 | 0 | 0 |



Table 2c Respondents' Demographic – usage
Characteristic

| Characteristic | EPSA (n=350) | | e-Training (n=266) | | No.of respondent |
|-----------------------------|-----------------|------|-----------------------|------|---------------------|
| | freq | % | freq | % | |
| E-learning usage | | | | | |
| Less than 1 year | 299 | 85.4 | 210 | 78.7 | 509 |
| 1-3 years | 41 | 11.7 | 43 | 16.1 | 84 |
| More than 3 years | 10 | 2.9 | 14 | 5.2 | 23 |
| Accessing e-learning | | | | | |
| Never | | | | | |
| Few times a year | 0 | 0 | 0 | 0 | 0 |
| Few times a month | 228 | 65.1 | 161 | 60.5 | 389 |
| Few times a week | 104 | 29.7 | 61 | 22.6 | 164 |
| Everyday | 16 | 4.6 | 40 | 15.0 | 56 |
| | 2 | 0.6 | 5 | 1.9 | 7 |

3.3 Hypothesis testing

Nine hypotheses were formulated to determine the relationship between the identified evaluation criteria (independent variables) with e-learning effectiveness (dependent variable) as listed below:

- H1a: There is significant relationship between Learners' Motivation & Attitude with e-learning effectiveness.
- H1b: There is significant relationship between Learners' Learning Style with e-learning effectiveness.
- H2: There is significant relationship between Theory-objective-learning outcome & knowledge transfer with e-learning effectiveness.
- H3a: There is significant relationship between Content & Interactivity with e-learning effectiveness.
- H3b: There is significant relationship between Structure Design with e-learning effectiveness.
- H3c: There is significant relationship between Interface Design with e-learning effectiveness.
- H3d: There is significant relationship between Multimedia Design with e-learning effectiveness.

H3e: There is significant relationship between Instruction and Help with e-learning effectiveness.

H4: There is significant relationship between Learner-Instructor Response & Interaction with e-learning effectiveness.

Pearson Correlation coefficient for the above evaluation criteria (see Table 3) were above 0.5 except for the Learners' Learning Style which has Pearson Correlation coefficient of 0.482. Results of correlation showed that there were high correlation between evaluation criteria (independent variables) namely Learners' Motivation & Attitude, Learners' Learning Style, objective-learning Theory outcome & knowledge transfer, Content & Interactivity, Structure Design, Multimedia Design, Instruction and Help, and Learner-Instructor Response & Interaction with e-learning effectiveness (dependent variables). Besides that, there was moderate correlation between Learners' Learning Style with e-learning effectiveness. Furthermore, significant value for all independent variables were 0.000 which was smaller than p-value at significance level of 0.01 (two-sided). This showed that there were significant relationship between all evaluation criteria (independent variables) and e-learning effectiveness (dependent variables).

Table 3 Correlation Analysis between independent variable and dependent variable

| Correlation between independent variable & dependent variable | Pearson correlation coefficient | Significance value (2-tailed) |
|---|---------------------------------|-------------------------------|
| Individual Learning Style | .482(**) | .000 |
| Individual Motivation and Attitude | .507(**) | .000 |
| Theory-objective-learning outcome & knowledge transfer | .615(**) | .000 |
| Content and Interactivity | .743(**) | .000 |
| Structure Design | .648(**) | .000 |
| Interface Design | .560(**) | .000 |
| Multimedia Design | .572 (**) | .000 |
| Instruction and Help | .673 (**) | .000 |

** Correlation is significant at the 0.01 level (2-tailed).

Results of regression analysis showed that only four of the nine evaluation criteria were the best predictor for e-learning effectiveness namely Content & Interactivity, Learner-Instructor Response & Interaction, Theory-objective-learning outcome & knowledge transfer and Multimedia Design. The R Square value for regression model

which comprise of the four evaluation criteria was 61.6%. Thus 62% of e-learning effectiveness variance is explained by regression model which comprises of the above four evaluation criteria.

3.4 Public Sector e-learning effectiveness

Quantitative results from descriptive analysis showed that the percentage of e-learning effectiveness of EPSA and *e-Training* were 75%. Qualitative results from open-ended questions on questionnaire showed that the percentage of e-learning effectiveness of EPSA and *e-Training* were 80%. Qualitative results from observation analysis showed that the percentage of e-learning effectiveness of EPSA was 75% and *e-Training* was 90%. The qualitative results from evaluation criteria showed that the percentage of e-learning effectiveness of EPSA was 75% and *e-Training* was 100%.

An average percentage of e-learning effectiveness of EPSA and *e-Training* were calculated from the above analysis. As a result, the overall percentage of e-learning effectiveness of EPSA was 77% and *e-Training* was 87%.

3.5 Criteria which contributes to e-learning effectiveness

Quantitative results from hypothesis testing analysis showed that there were nine evaluation criteria which contributes to e-learning effectiveness namely Learners' Motivation & Attitude (individual dimension), Learners' Learning Style (individual dimension), Theory-objective-learning outcome & knowledge transfer (learning dimension), Content & Interactivity (content dimension), Structure Design (content dimension), Interface Design (content dimension), Multimedia Design (content dimension), Instruction and Help (content dimension), and Learner-Instructor Response & Interaction (content dimension). Qualitative results from the evaluation criteria analysis which integrates the findings from interview and observation also showed that majority of pedagogical/e-learning experts, subject matter experts, e-learning system developers, learner agree that all construct of the evaluation criteria for each dimension contributes to e-learning effectiveness.

3.6 Model for e-learning evaluation in the public sector

Result of quantitative data analysis showed that a model for evaluating e-learning effectiveness in the public sector from pedagogical perspectives comprise of nine criteria from four dimensions as listed below:

- i. Individual dimension with two evaluation criteria namely Learners' Motivation & Attitude, and Learners' Learning Style,
- ii. Learning dimension with an evaluation criteria of Theory-objective-learning outcome & knowledge transfer,
- iii. Content dimension with five evaluation criteria namely Content & Interactivity, Structure Design, Interface Design, Multimedia Design, Instruction & Help, and
- iv. Learner-Instructor dimension with an evaluation criteria of Response & Interaction.

Result of qualitative data analysis showed that a model for evaluating e-learning effectiveness in the public sector from pedagogical perspectives comprise of four dimensions and evaluation criteria as listed below:

- i. Individual dimension with evaluation criteria namely motivation, attitude, previous knowledge and computer literacy,
- ii. Learning dimension with evaluation criteria namely learning theory, learning objectives, learning outcome and transfer of knowledge,
- iii. Content dimension with evaluation criteria namely interface design, structure design, instruction and help, interactivity, gaining learners' interest, up-to-date, complete, useful, relevant, accurate, meet requirement, multi media, related to work and presentation, and
- iv. Interaction dimension with evaluation criteria namely roles, cooperation, support, interaction and face-to-face discussion.

Results of quantitative and qualitative data analysis were integrated or triangulated by comparing both model. Both model contain almost the same evaluation criteria and construct for three dimensions namely individual, learning and content. Thus after integrating the result of quantitative and qualitative analysis, an appropriate model for evaluating e-learning effectiveness in the

public sector from pedagogical perspectives can be developed. The model comprise of eleven criteria from four dimension as listed below:

- i. Individual dimension with two evaluation criteria namely Learners' Motivation & Attitude, and Learners' Learning Style,
- ii. Learning dimension with an evaluation criteria of Theory-objective-learning outcome & knowledge transfer,
- iii. Content dimension with five evaluation criteria namely Content & Interactivity, Structure Design, Interface Design, Multimedia Design, Instruction & Help, and
- iv. Interaction dimension with three evaluation criteria namely interaction Learner-Instructor, Learner-Learner, and Learner-Content.

4. DISCUSSION

4.1 Public sector e-learning effectiveness

Findings from the integration or triangulation of quantitative and qualitative data analysis showed that EPSA is moderately effective and e-Training is effective from the perspective of pedagogy. As a summary, e-learning in the public sector is found to be effective from pedagogical perspective.

4.2 Criteria which contributes to e-learning effectiveness

Findings from the integration or triangulation of quantitative and qualitative data analysis showed that there were eleven evaluation criteria from four dimensions which contribute to e-learning effectiveness namely Learners' Motivation & Attitude, Learners' Learning Style, Theory-objective-learning outcome & knowledge transfer, Content & Interactivity, Structure Design, Interface Design, Multimedia Design, Instruction & Help, Learner-Instructor, Learner-Learner, and Learner-Content. These findings were in line with the findings of [7], [28], [31], [33], [29] and interaction concept by [35], [36], [37] and [23].

4.3 Model for e-learning evaluation in the public sector

The proposed model for e-learning evaluation from pedagogical perspectives introduces the evaluation criteria from four dimensions namely

individual/learner, learning, content and interaction. These evaluation criteria were found to be empirically significant which contributes to e-learning effectiveness. Furthermore, all the pedagogy/e-learning experts, subject matter experts and e-learning systems developers agreed that all the criteria contributed to e-learning effectiveness. The dimensions of the evaluation criteria were based on the model introduced by [23], [36] and [37].

5. CONCLUSION

E-learning evaluation is important and need to be given emphasis. This paper attempts to evaluate e-learning in the public sector of Malaysia from pedagogical perspectives. Evaluation is carried out to see whether e-learning meets the learning objectives and the learning outcomes, and whether learning occurs in e-learning.

This paper also attempts to identify the evaluation criteria which contributes to e-learning effectiveness. The identified criteria has significant relationship with e-learning effectiveness. Previous research on e-learning effectiveness from pedagogical perspectives is found to be less comprehensive because the identified evaluation criteria do not contain construct or variable for each criteria. This paper attempts to introduce construct or variables for each criteria which was synthesize from other e-learning evaluation models which is related to pedagogical perspectives. The identified construct or variable was empirically tested and agreed by pedagogy/e-learning experts, subject matter experts and e-learning systems developers. This is the strength of the research. This research also contribute to theoretical and practical contribution. The key theoretical contribution is the development of e-learning evaluation model. This model complements the works of [22] who introduces Pedagogy Model and [23] who introduces Pedagogy Framework of e-learning. The key practical contribution is to provide the top and middle management of the public sector with the appropriate instrument to evaluate e-learning such as questionnaire survey, interview schedule and observation checklist.

This study has a few constraint. The main constraint was the data collection was done once. It is suggested that future study can be conducted through quasi-experiment where data can be collected before and after implementation of e-learning. With quasi-experiment, e-learning

effectiveness construct can be compared to see whether learners' knowledge level increased after using e-learning. Furthermore, it is also suggested that structured equation modelling technique be used to validate the propose model.

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