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RESEARCH ARTICLE

Validating a Web-based Academic Application's Quality Model at Malaysian Public Universities: A Delphi Study

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ARTICLE INFO	ABSTRACT
  *Corresponding Author: razia@unisel.edu.my	The Delphi method is an iterative, anonymous and group-based process for seeking agreement or consensus from expert panel. This approach is widely used in operation research by the researcher to representing their scientific results. In this study, the method of selecting an expert panel judgement for confirming a suggested high-quality model of academic application in higher education institutions is explored. In order to minimize bias when validating the Web-Based Integrated Student Assessment (WBISA) quality model, experts are selected based on criteria designed to verify the correctness of the panel's chosen experts. The Delphi method is a widely used and respected way to collect information from respondents who are experts in the subject matter. By using a series of questionnaires disseminated across several iterations to gather data from a panel of chosen individuals, the Delphi methodology is a good choice as a way of reaching consensus. When planning and carrying out a Delphi survey, it is important to consider the following factors: choosing the right experts, the length of time needed to conduct and complete the study, the possibility of low response rates, and unintentionally swaying the expert panel's feedback. The evaluations made by six expert panels for the WBISA application quality model made up the study's findings. Here, the expert panel acted as a final decision-maker in approving the suggested quality model by providing a critical analysis of preliminary findings. The findings suggest that the WBISA quality model, which is based on expert judgement consensus through the use of the Delphi technique, could offer valuable insights that IT development teams can utilize when developing academic applications for higher education institutions.

INTRODUCTION

According to Mohd Suradi et al. (2017), a Web-Based Integrated Student Assessment (WBISA) is an academic application used by public universities to monitor student performance not only in academic field but also in non-academic matters. The list of characteristics and sub-characteristic have been identified through literature review and preliminary study conducted at the selected universities. The preliminary study has been conducted using online survey and a face-to-face platform to know in depth about the suitable characteristics for WBISA application. This result obtained from the respondent have been analyzed using Rasch measurement model (RMM).Later, a

quality model is proposed for WBISA. However, the quality model proposed needs to be verified and validated. For this, a Delphi technique has been proposed. A Delphi technique is one of the qualitative approach which focused on expert feedback in giving the decision making (Sekayi & Kennedy, 2017).

The Delphi method or technique occurss in two different forms known as paper and pencil version or referred as "Delphi Exercise" and a "Delphi Conference" (Galanis, 2018; Jam et al., 2011; Rashid et al., 2023). Many researchers applied the Delphi technique in various applications as to get consenses from the expert panel (Kanval et al., 2024 Okoli & Pawlowski, 2004).

The paper is organized as below: First Introduction, Second is Method, Results and Discussion, Conclusion, Acknowledgement and References.

METHOD

The proposed quality model will be verification by an expert in the educational domain via the Delphi technique. According to Keeney et al. (2001), the Delphi method practices an iterative process to accomplish consensus from various experts about a specified issue. Adnan et al. (2018) stated that the Delphi technique is desired in validating the quality model because the panellists are knowledgeable with their expertise in providing reliable data. The expert panel is defined as an individual who is a subject matter expert in their domain.

Numbers of Panel

The numbers of panel are determined by panel, time requirement and complexity of the issues (Hsu & Sandford, 2007). The determination numbers of panel member will influenced validation result (Preble, 2017; Woudenberg, 1991).

According to Kezar and Maxey (2016), number of expert panels minimum 10 until 15 are required. However, other Delphi study showed that three, four and nine expert panels are sufficient. This total between four to six experts' panel will be considered for this research.

Expert Panel Selection

Expert panels in their field or domain were selected using a purposive sampling technique. Purposive sampling techniques are typically suitable for the qualitative method (Etikan et al., 2016). Adequate information can be gained through this technique where the sample is chosen from the subject matter. The expert panels selected are unknown to each other to avoid biased results. According to Jones & Hunter (1995), the expert panels should be anonymous to each other, and the judgments of individual panels are not accessible to other panels. Therefore, this could reduce the risk of an individual's judgments affecting the opinions of others. Besides that, the expert panel should have a visible interest in the research topic, in order to accomplish meaningful results and retain the failure rate as low as possible (Hoermann et al., 2012).

Two important criteria in selecting the purposive sample of this study were:

a) At least 5 years of working experience in developing software.

b) 5 years of experience in the involvement in web-based academic applications.

Sampling

The sampling strategy used in this research is purposive sampling. Purposive sampling can be used to get heterogeneous samples since the expert panels come from various IHL and have experience in developing web-based educational application. The following criteria are used in select the sample choice:

i. The expert panels have high level knowledge due to their experience involvement in web-based educational application
ii. The expert panels are associated with IHL which have background for higher learning institution
iii. The expert panels were willing to participate and committed to give good support with the study topics
iv. The sample size of six is appropriate (Young & Temple, 2015)
v. Respondents are always anonymous to each other, but not ever anonymous to the researcher. This gives the researchers more opportunity to follow up for explanations and further qualitative data.

Delphi Technique Implementation

Basically, Delphi technique consists of several rounds. Traditional Delphi approach will have three rounds whereas modified Delphi technique consists of two rounds. There are three round for Delphi technique based on previous study (Franklin & Hart, 2007; Preble, 2017). The modified Delphi process Murry and Hammons (1995) consisting of three-step process was used to reach consensus of all quality characteristics. The Delphi method has three major phases as demonstrated in Fig.1.
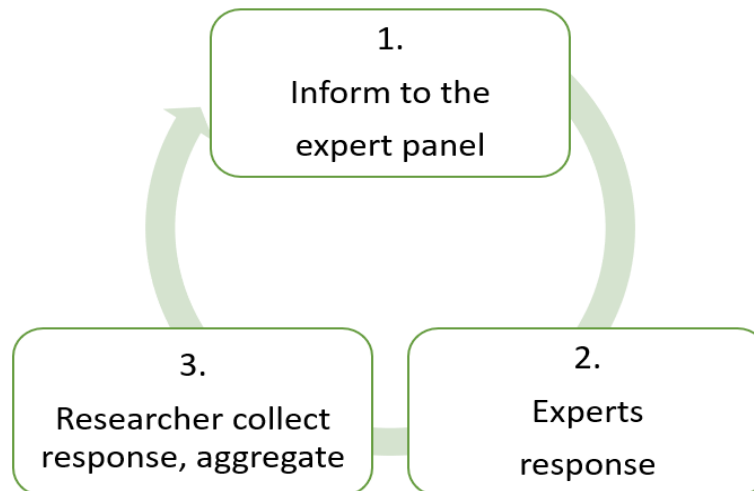

Figure 1: Three rounds of Delphi Method

The modified Delphi process reduced from 3 rounds to 2 rounds using open ended question. However, this study will be occupied three rounds for validating quality model using Delphi technique.

Fig. 2 showed the steps in applying Delphi technique. In early steps, preliminary preparation of interview question has been prepared. The pilot study will be conducted before the questionnaire is distributed to the expert panel. The purpose of pilot study is to ensure the content validity of the questionnaire. The experts' panel are asked whether they agreed the quality characteristic and sub-characteristic for WBISA quality model. As an additional, open ended question are also include in the questionnaire to enable the expert's panel to give justification for the answer they provide.
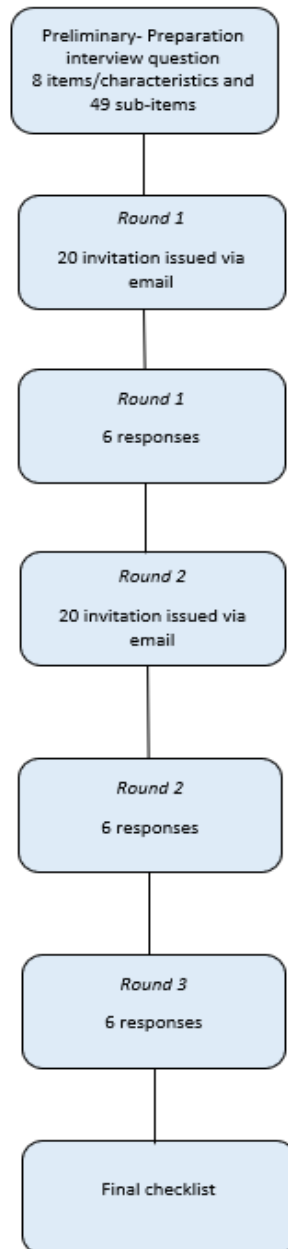
Figure 2: Summary Delphi implementation

During the first round of Delphi process, twenty expert panels are invited to participate in the research through invitation email send to them. However, only six panels are willing to participate. Expert panels are given a list of quality characteristic of WBISA for them to review. The questionnaire is distributed in Word file via email platform. The expert panels send individual feedback by completed the file and then the researcher will do compilation and aggregate the response form expert panels. A dateline is given for the expert panels to give response. If all the expert panels tend to agree the quality characteristic given, then the consensus is considered high.

Then, in the second round of Delphi process, six panels are willing to participate. The expert panel were asked to consider the quality characteristic shortlisted in Round 1 as possible characteristics. The questionnaire is distributed in Word file. The expert panels completed the file and then the

researcher will do compilation and aggregate the response form to expert panels either they agree or disagree with the quality characteristic listed.

Then, in the third round of Delphi process, six panels are willing to participate. The expert panel were asked to consider the quality characteristic shortlisted in Round 2 as possible characteristics. The questionnaire which consists the of new and the removed characteristic is distributed in Word file. The expert panels completed the file and then the researcher will do compilation and aggregate the response from expert panels based on the quality characteristic listed.

Finally, the consensus is obtained from the expert panels based on the agreed quality characteristics for WBISA application.

RESULTS AND DISCUSSIONS

The following Table 1 illustrates the expert panel selection and the code assigned. There were six panels from different institutions. They are IT officers and have experience in developing educational WBA. Each of them was assigned a unique code such as E1, E2, E3, E4, E5 and E6. The word E1 refers to the first expert panel. The E1 is assigned to an expert panel regardless of which institution they are working in.

Table 1. Expert Panel Selection

Expert Panel	Total	Code
IT Lecturer (WEB based application), Computing Department FCVAC Universiti Selangor	1	E1
Senior IT Officer, Information Technology Centre (CIT), Universiti Kebangsaan Malaysia	1	E2
IT Officer, Information Technology Centre (CIT), Universiti Kebangsaan Malaysia	1	E3
IS Officer, Information Technology Division, International Islamic University Malaysia	1	E4
Senior IT Technical, Centre for Information, Communication and Technology (CICT), Universiti Selangor	1	E5
IT Technical, Centre for Information, Communication and Technology (CICT) Universiti Teknikal Malaysia, Melaka	1	E6

about demography of expert panels collected are the position, experienced in developing web application and experienced in developing web-based academic application. Table 2 shows the demographics of the six panels.

Table 2: Expert Panel Selection

Position	Institution	Total
Senior IT Officer	UKM, UNISEL	2
IT Officer /Web-based Programmer	UKM, UNISEL	2
IS Officer	UIA	1
IT Technical Officer	UTeM	1

Table 3: Expert Panel Experience

Experience in Web Development	Total
6 – 9 years	1
10 – 15 years	3
More than 15 years	2

Table 4: Expert Panel in Developing Web-based academic applications

Experience in Web-based Academic Application	Total
6 – 9 years	1
10 – 15 years	3
More than 15 years	2

Section 2.4 above describes the demographic of the expert panels, which consists of panel position, working experience in web-based projects and involvement in developing web-based academic applications. Details of the panels are as above (Table 2 - Expert Panel Position, Table 3 - Expert Panel Experience in Web development and Table 4 - Experience in developing web-based academic application). Most of the expert panels have more than 10 years of experience in developing web-based academic applications, whereas only one expert panel has six years of experience.

During first round, the panels were asked to give feedbacks on the characteristics and sub-characteristic of the proposed quality model. In summary, all panels agreed with the proposed list of characteristics of web-based academic application based on frequency as listed below in Table 5.

Table 5: List of characteristics and frequency

NO	CHARACTERISTICS	TOTAL	FREQUENCY
1	Usability	5	83%
2	Reliability	6	100%
3	Efficiency	6	100%
4	Functionality	6	100%
5	Supportability	6	100%
6	Availability	6	100%
7	Security	6	100%
8	Integrity	6	100%

For second round, the panels are shared the result from round 1. Based on the consensus from all the panels , the panels agreed with the results. Later they are given the proposed quality model diagram to show the relationship between each characteristic and their characteristic.

Finally, in the third round, the panels are shared the new characteristic and sub-characteristic proposed and the removed charactersitics and sub-characteristics to be eliminated from the diagram. Based on all consensus from the panels, the final quality characteristics are produced as below.
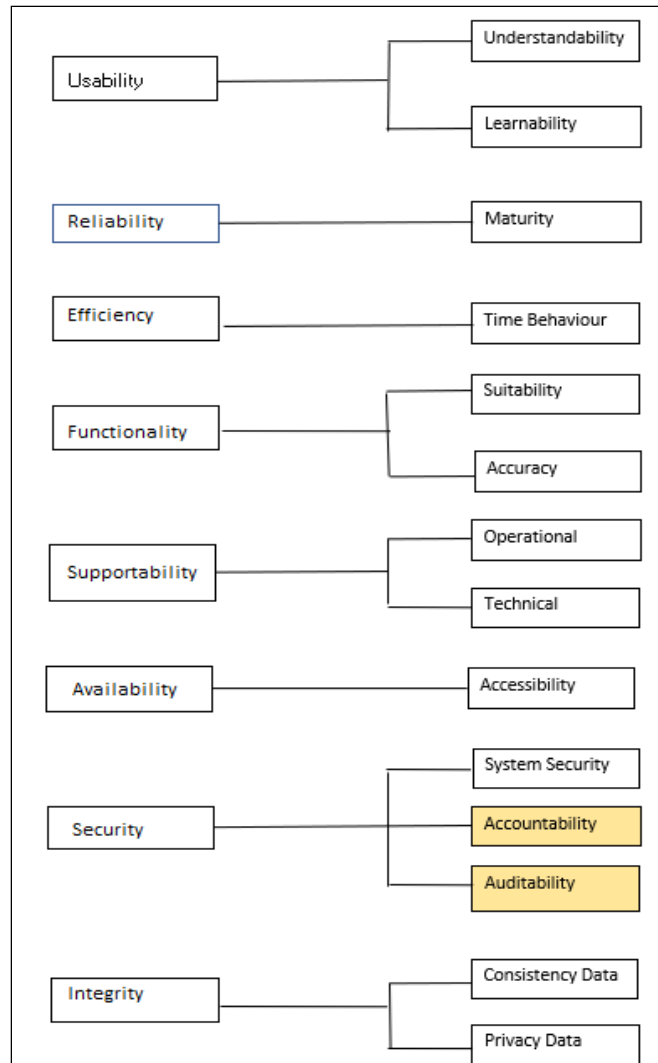
Figure 3: A Quality Model after Refinement

Finally, a list of quality model of WBISA application is proposed based on panel expert consesnsus.

CONCLUSION

This paper discussed a process in validating a quality model for WBISA application in Malaysian public institutions. A Delphi technique is applied in seeking expert panel feedback in validating a proposed quality model of WBISA application in public institutions.

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