E-Learning Technology Effectiveness in Teaching and Learning: Analyzing the Reliability and Validity of Instruments

To cite this article: Nik Alif Amri Nik Hashim et al 2020 IOP Conf. Ser.: Mater. Sci. Eng. 993 012096
E-Learning Technology Effectiveness in Teaching and Learning: Analyzing the Reliability and Validity of Instruments

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ABSTRACT: Over the years, the introduction of e-learning technology has been familiar among academicians, students, and even non-academicians in higher education institutions. E-learning is one of the learning tools in the education sector that greatly influences education, which emerged as a new modern education paradigm and has successfully evolved around the world. However, limited attention has been paid to research on e-learning relative to the factors influencing the effectiveness of e-learning tools in the teaching and learning process. Therefore, using a quantitative approach, this study aims to review the reliability and validity of the applied instruments in assessing the factors influencing the effectiveness of e-learning tools in the teaching and learning of entrepreneurship students’ courses through a pilot study. Data involving 150 samples from the questionnaires were analyzed using IBM SPSS version 24, while evaluations from experts were employed to check for content and face validity and reliability as well as the normality of data. Based on the results, the normality of the data as well as the reliability of the measuring instruments in this study are proven. As such, the measuring instruments proposed in this study warrant further research.

Keywords: Technology; E-Learning; Effectiveness; Teaching & Learning; Higher Education.

1. INTRODUCTION
Over the years, the introduction of e-learning has been popular among academicians and students. It is a phrase defined as the use of various categories of computer and electronic media, a few of which the Internet and communication tools are employed for training in certain topics. Additionally, e-learning refers to a specific course delivered through the internet to a location other than the classroom where the lecturers teach. E-learning interactively allows students to communicate with their lecturers or among themselves inside or outside the classroom (Aziz et al, 2019; Clark, & Mayer, 2016).

There are various terms have been used to explain e-learning, such as the learning that goes online, by the internet, through distance education, computerized electronic learning, and internet learning (Al-Rahmi et al., 2018; Masoumi & Lindström, 2012). Briefly, e-learning uses telecommunication technology to disseminate information for training and educational purposes. The term “e-learning” is rapidly changing in terms of its purpose as opposed to its content and approaches. Hence, e-learning, such as open distance learning, has become a household name. The same also goes for Web-Based Training (WBT), Computer Based Training (CBT), technology-based learning, and
online learning (Arkorful & Abaidoo, 2014).

Even though technologies have grown faster in this new era of globalization (Hashim, Ramlee, Yusoff, Nawi, Awang, Zainuddin, Abdullah, Ahmad, Rahim, & Fatt, 2019; Hashim, Safri, Yusoff, Omar, Velayuthan, Hashim, Aziz, Awang, Ahmad, & Fatt, 2019; Hashim, Zulkifli, Aziz, Nawi, Awang, Muhammad, & Yusoff, 2020), there are students and teachers who still do not know about e-learning as a modern way for teaching as well as a learning method (Goh et al., 2017; Lumadi, 2013). This shows that some students remain incognizant of e-learning effectiveness in the sense that they may find e-learning ineffective because they were unable to interact face-to-face as they need to use modern tools in learning sessions (Diemer, Fernandez & Streepey, 2012). Numerous different variables have been introduced and applied by some researchers and marketers to understand the usefulness of e-learning tools in students’ teaching and learning. Therefore, this study attempts to examine the reliability and validity of the measurement scale proposed in this study as well as the extent to which the instruments affirm the effectiveness of e-learning tools in teaching and learning among students through a pilot study. Accordingly, the key priorities for ensuring that problems do not occur and disrupt the main research project are the reliability and validity of the instruments.

2. RESEARCH METHODOLOGY
2.1 Instrumentation and Measurement of Variables
The instrument used to collect the required data in this study includes questionnaires. The questionnaires were used to interpret the abstract information needed into a set of specific responses that can be measured. The elements in the questionnaires were drawn up in line with the objectives and questions addressed in this study. The questionnaires were divided into three parts, namely Part A, Part B, and Part C. Part A covers the students’ demographic information, whereas Part B includes questions on the independent variables, which are the motivational factors. Finally, Part C covers the items of the dependent variable, which is the effectiveness of e-learning. All of the items included in the questionnaire would be measured using a five-point Likert Scale. Each scale has a minimum point (1) and a maximum point (5). While a point near “1” indicates a very strong attitude against the statement, the point near “5”, however, indicates a very strong attitude towards the statement. As such, the scale is interpreted from 1 = “very strongly disagree” to 5 = “very strongly agree”.

Table 1: Research Instrumentation

| Section | Variable                      | No. of Items | Source                                      |
|---------|-------------------------------|--------------|---------------------------------------------|
| A       | Demographic                   | 4            | -                                           |
| B       | ICT Skills                    | 6            | Aziz, et al. (2019)                        |
|         |                               |              | Jethro, Grace, & Thomas (2012)             |
|         | Time Management               | 5            | Aziz, et al. (2019)                        |
|         | Resources                     | 5            | Aziz, et al. (2019)                        |
|         | Learning Techniques           | 5            | Aziz, et al. (2019)                        |
|         |                               |              | Ismail et al., (2013)                      |
| C       | Effectiveness of E-learning Tools | 5          | Aziz, et al. (2019)                        |
|         |                               |              | Venkataraman & Sivakumar (2015)            |
2.2 Data Distribution
This study employed a quantitative approach whereby questionnaires were used to conduct the pilot study. The data from the questionnaires were collected via self-administered questionnaire distribution and a normality test was performed to avoid statistical errors that may yield invalid output. Skewness and kurtosis tests were also conducted and the values showed positive scores; hence, the data were slightly skewed to the right and had leptokurtic distributions opposed to a normal distribution (Std. Error), with skewness and kurtosis values of 0.406 and 0.787, respectively. Additionally, the numbers were both within a ±1.96 limit; thus, the distribution of all construct combinations is normal and this suggests that the departure from normality is not too extreme.

2.3 Data Analysis
Data analysis was conducted over the weekend in Kelantan. To answer the pilot test questions, a total of 150 entrepreneurship students’ courses were acquired and IBM SPSS version 24 was used to analyze the data by calculating the Cronbach’s alpha values. Table 4 shows the details of Cronbach’s alpha score for each variable.

3. CONCEPTUAL FRAMEWORK

![Conceptual Framework](image)

4. RESEARCH FINDINGS
4.1 Demographic Profile
Table 2 presents the respondents’ demographic profile. Based on the table, there are about 39.3% female respondents and 60.7% male respondents. The majority of the respondents are Malay, representing 44% of the total population, while the least group includes other races with 2.7%. Most of the respondents are also single (92%), while 8% of the respondents are married. The major age range of the respondents is 20-25 years old with 81.3% and followed by the age group of 26-30 years old with 13.3%, while those over the age of 36 are the lowest, representing 1.3% of the population.
Table 2: Demographic Profile

| Variable | Frequency | Percentage (%) |
|----------|-----------|----------------|
| **Gender** | | |
| Male | 91 | 60.7 |
| Female | 59 | 39.3 |
| **Race** | | |
| Malay | 66 | 44 |
| Chinese | 22 | 14.7 |
| Indian | 12 | 8 |
| Sabahan | 25 | 16.7 |
| Sarawakian | 21 | 14 |
| Others | 4 | 2.7 |
| **Status** | | |
| Single | 138 | 92 |
| Married | 12 | 8 |
| **Age** | | |
| 20-25 years old | 122 | 81.3 |
| 26-30 years old | 20 | 13.3 |
| 31-35 years old | 6 | 4 |
| 36 years old and above | 2 | 1.3 |
| **Total** | 150 | 100% |

4.2 Reliability and Validity

Prior to the actual process of data collection, reliability and validity tests were initially carried out in this study. To improve reliability, the researcher had applied four criteria. Firstly, all constructs were configured, and subsequently, the measurement levels were improved. Next, several indicators were used, and finally, pilot studies were conducted. Following Hair, Celsi, Money, Samouel, and Page’s (2015) rule of thumb (see Table3), a reliability value below 0.6 is deemed poor, while 0.70 is considered good, and a value that is more than 0.8 is deemed very good. Correspondingly, the items with the values fewer than 0.70 were removed from the questionnaires.

Table 3: Reliability of Instrument

| Coefficient Range Value | Association Strength |
|-------------------------|----------------------|
| Below 0.6               | Poor                 |
| 0.6 to 0.7              | Moderate             |
| 0.7 to 0.8              | Good                 |
| 0.8 to 0.9              | Very Good            |
| 0.9 and above           | Excellent            |

Hair *et al.* (2015)
To ensure that the scales’ validity content is used, the researcher has taken some required precautions. As such, the researcher sought assistance from the academician and experts in some universities to review the validity content. Table 4 shows the results of the pilot study. As can be seen in the data, all of the measures yielded a high-reliability standard as follows: Skills of ICT (0.881), Time Management (0.856), Resources (0.892), Learning Techniques (0.890), and Effectiveness of E-learning Tools Among Students (0.841), which portrayed an excellent internal consistency. In fact, an instrument is believed to portray an average liability if it yields a coefficient value of 0.60 and above (Sekaran & Bougie, 2017). Therefore, the questionnaires are applicable for the actual future research as the questions can be considered official.

### Table 4: Internal Reliability of Each Questionnaire Section

| Variable                                      | Number of Items | Cronbach’s Alpha Coefficient | Strength of Association |
|-----------------------------------------------|-----------------|------------------------------|-------------------------|
| Skills of ICT                                 | 6               | 0.881                        | Very Good               |
| Time Management                               | 5               | 0.856                        | Very Good               |
| Resources                                     | 5               | 0.892                        | Very Good               |
| Learning Techniques                           | 5               | 0.890                        | Very Good               |
| Effectiveness of E-learning Tools among Students | 5               | 0.841                        | Very Good               |

5. CONCLUSION

The pilot study was primarily conducted to establish the reliability and validity of the measuring instruments relative to the factors influencing the effectiveness of e-learning tools in the teaching and learning of entrepreneurship students’ courses in Kelantan. A pre-test was conducted by gathering and assessing experts’ opinions of the content validity and face validity of the questionnaires. Based on the findings of the pilot study, all of the items are deemed reliable as they yielded Cronbach’s alpha above the value of 0.7, which means that there is no need for deleting any item. Furthermore, the values of skewness and kurtosis have proven the normality of the data, hence reassuring the feasibility of the research protocol. Overall, the questionnaires are deemed valid following the reliability and validity of their measures upon examination. The actual study, which is further anticipated to gather the data from more than 400 entrepreneurship students’ courses, would give a glimpse of the e-learning tools’ effectiveness in teaching and learning among students in Kelantan. Besides contributing to the body of knowledge irrelevant areas, the findings of this study would also allow for the commencement of standard future research.

ACKNOWLEDGEMENT

We would like to thank the authors from the Faculty of Hospitality, Tourism & Wellness and Faculty of Entrepreneurship and Business, Universiti Malaysia Kelantan for their time and commitment to this study.
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