

How Engaging Are You? Empirical Evidence from Malaysian Research Universities

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Mohamad Rahimi Mohamad Rosman (✉), Mohd Nasir Ismail
Universiti Teknologi MARA Kelantan, Machang, Malaysia
rahimimr@uitm.edu.my

Mohamad Noorman Masrek
Universiti Teknologi MARA Puncak Perdana, Shah Alam, Malaysia

Abstract—Digital library engagement is the extensive use of digital library features and services. Contrary to the traditional concept of usage, DL engagement evaluates the use of an information system based on multiple dimensions; affective, cognitive, and behavioural. Presently, there is scarce evidence and research on the level of DL engagement. Lack of such evidence caused under-utilization of DL resources. Therefore, the purpose of this study is to investigate the level of DL engagement in the context of Malaysian research universities. A quantitative study was conducted; an instrument was distributed to postgraduate students at five Malaysian research universities. A total of 492 responses were recorded and descriptively analyses using Statistical Package for Social Sciences version 24. Frequency, Independent sample t-test, and Analysis of Variance (ANOVA) were performed to identify significance difference and mean distribution of data among the participating universities. Results show that respondent's age and research domain showed a significant effect on DL engagement, while gender, study mode, level of study, semester, and the university did not show any significant effect on DL engagement.

Keywords—Digital Library; User Engagement; Perceived Benefits

1 Introduction

User engagement is one of the important issues faced by the library. The growth of Information and Communication Technology (ICT) has spearheaded the needs for digital information delivery. O'Brien and Toms [1] define user engagement as a state of interaction that involves cognitive, affective, and behavioural interaction with an application system that increase the belonging needs. Schaufeli, Bakker, and Salanova [2] define user engagement as a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption. In the context of the information system, user engagement is equivalent to user participation; it motivates a person to continue using the information system, as well as promoting its usage to their family, friends, colleague, etc.

In the context of the information system, Baroudi, Olson, and Ives [3] define user engagement as the combination of the concept of user participation and user involvement. Out of these two factors, user involvement is considered as an important factor affecting information system success and contributed to the improve quality of information system [3]. Barki & Hartwick [4] argue that user involvement is a mental or psychological state of users towards the use of an information system and its development process. In relation to that, Hwang & Thorn [5] suggest that user involvement is the strongest predictor of information system success.

From the perspective of e-commerce, researchers consider user engagement as part of predictors for product or brand retention. Several authors suggest that engagement leads to better customer retention, as well as a voluntary willingness to subsequent use of the product [6]. Besides, user engagement is also considered as an important factor in the selection of a software [1, 7-8].

In the context of Library and Information Science (LIS), user engagement also applies in relation to the use of the digital library (DL). Over the years, there is an increased dependency on the acquisition of DL [9]. The DL is no longer being considered as an expensive investment; it is rather treated as a compulsory need of a student [10 – 13].

However, recent research indicates that there is lack of usage of DL resources [10, 14 – 17]. Due to competition with others free-to-use information service providers, many users especially postgraduate students prefer to use non-DL resources such as Google Scholar, free electronic books, and open-access journal [10, 13 – 14, 18]. A search engine such as Google and Yahoo! are the most preferable medium to access information among the users [16]. Besides, in an interview with a senior librarian in one of the libraries in Malaysia, recent statistic shows that only 13.5 percent of users currently active in using the DL [15]; indicating that libraries are having a problem to fully utilize and maximize their investment on DL.

In the context of Malaysia, there is a scarcity of research on DL engagement, especially in relation to its level. Lack of knowledge and empirical support suggest that further study is worth to be conducted. Therefore, this study attempted to answer the following research question:

What is the level of Digital Library Engagement among postgraduate students at Malaysian research universities?

The subsequent sections are organized as follows: First, we presented the literature review on the user engagement, follow with a discussion on the variables underneath the DL engagement dimensions. Next, the methodology of the study is presented, followed by a discussion on findings. Lastly, potential future studies are discussed, and the limitations of the study are also presented.

2 Literature Review

2.1 History of DL

The digital library (DL) is a series of a collection that includes digital objects, digital documents, and digital resources in electronic or digital format. The researcher considers DL as effective communication and delivery channel to deliver the services to the users surpassing boundaries [19–20]. DL was built on a high-end information system and extends the traditional library through access to a digital collection based on high-end algorithms and real-time data [21–22]. Khan and Bhatti [23] suggest that DL combine several aspects of the library together, such as library services, library resources, as well as a new set of skill of digital librarian.

The debate on the concept of DL has spanned over the past few years. Several researchers have attempted to define DL from different content. The word ‘electronic library’, ‘library portal’, ‘virtual library’, ‘digital library’ and ‘web digital library’ have been used interchangeably among different researchers [24]. However, the term ‘digital library’ is the most prominent nowadays and have been used by many researchers, such as Masrek and Samadi [11], Asad, Masrek, Khalid, and Saima [25], Khan and Bhatti [23], Cai and Zheng [26], Yamaguchi and Richardson [27], Hamzat and Mabawonku [28], and Samadi [9].

The first concerns on the needs for a comprehensive library information system were raised by Bush [29]. Bush predicted that future library system will depend on internet-networking information sharing that is accessible to a wider geographical area. The library will no longer be confined within a single geographical area. Licklider [30] further elaborates the idea of DL through few suggestions, such as the needs for a distributed information processing system, the needs to manage the interaction between human and computers, proper document management, and management of retrieval system. Swanson [31] further predicted that future library will depend on automation of catalogue, indexes and other bibliographic tools.

Later, the idea of Swanson [31] in 1964 contributed to the development of Online Public Access Catalogues (OPAC) in the mid-1970s, however, due to lack of expertise and technology to support the idea, the libraries have to wait until the next decade of 1990s for the realization of the idea [32]. However, the interest in OPAC wanes off due to the introduction of online resources [33]. DL was established as a result of the interest in online resources. One of the cornerstones of the DL growth was the Digital Library Initiative (DLI). Several research and studies were announced in collaboration between the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), and the National Aeronautics and Space Administration (NASA).

2.2 User engagement

User engagement is considered as important factors in information system researches [3]. User engagement contributed to information system quality and information system

success [1, 3]. User engagement is an extension of information system usage. Information system usage evaluates users from a single dimension, while user engagement is capable to evaluate users from multiple dimensions, such as cognitive, affective, and behavioural [1, 11]. An engaged individual usually will continue to use the information system, as well as promoting its usage to their family, friends, and colleagues [1, 11].

In the context of information system research, the concept of user engagement is based on two factors, user participation and user involvement [3, 5]. User participation measure engagement through observable behaviour during the development of the information system [5]. On the other hand, user involvement is the mental or psychological state of users toward the information system and its development process [5]. Between both factors, user involvement is the strongest predictors of information system success [5]. Hwang and Thorn [5] argue that user engagement has a moderate positive correlation with four potential impacts; system quality, user satisfaction, and organizational impact; with minimal correlation on individual impact.

Several authors have studied user engagement from various context. In the context of e-commerce, O'Brien and Toms [1] adopted the theories of Aesthetic, Play and Flow in their attempt to develop a model of user engagement. The model was tested in different kinds of setting; web searching, video games, shopping, and online learning. The researchers identify six elements that would contribute to the state of engagement; focus attention, felt involvement, aesthetic, novelty, perceived usability, and durability.

Within the domain of LIS, Masrek and Samadi [11] conducted a study to investigate DL engagement in the context of the digital library. Adopting the model of O'Brien and Toms [1], they found out that perceived usability has a significant relationship with durability. Similarly, felt involvement and focused attention also shown a significant relationship with durability. On the other hand, aesthetic and novelty proved to have a significant effect on felt involvement and focus attention. Besides, they extend the finding of O'Brien and Toms [1] by proving that focused attention has a predictive effect on both perceived usability and durability.

2.3 DL engagement

Schaufeli, Bakker, & Salanova [2] define engagement as a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption. Rather than a momentary and specific state, engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any object, event, individual, or behaviour. For the purpose of this study, DL engagement is operationalized as deep and longtime use of DL resources, features, and capabilities. Four important constructs of DL engagement are focus attention, felt involvement, aesthetic, and novelty.

Focus attention (FAT) is operationalized as the concentration of mental activity, concentrating on one stimulus only and ignoring all others. FAT relies on one's ability to fully focus on their information task based on a certain object such as the use of an information system. Madsen and Geringer [34] suggest that the ability to give focus on a certain subject, object, or activities are very crucial especially for educators; educators' main concern is on the ability of the learner to concentrate on the learning process. For example, the essence of FAT can be seen in an artist who is too involves and focus

on his/her creation such as sculpture, drawing, design, etc. He or she will be ‘in the flow’, giving their utmost attention toward the completion of their task and ignoring other external stimuli. However, these stimuli slowly waned throughout the course of the completion.

Felt involvement (FIV) is operationalized as how much fun users were having during the interaction with the DL. It also measures how the user was drawn into their information task as a result of the interaction with the DL. Celsi and Olson [35] argue that FIV is a motivational factor that capable to improve user engagement through improving one’s comprehension of their information task. On the other hand, Kappelman [36] consider FIV as a cognitive needs or psychological state that certain objects, resources, or materials may meet an individual need. Fulfilling these needs influence individual toward certain psychological states such as improve user satisfaction and better performance. Mathwick and Rigdon [37] suggest that the quality of DL engagement can be measured through (1) degree of challenge in performing information search, (2) skills that individual poses to overcome the challenge and (3) psychological belief on the control that they have over the interaction with the DL.

Novelty (NOV) is operationalized as the features of the DL interface that users find unexpected, surprising, new, and unfamiliar. NOV is considered as a favourable or unfavourable first impression that can either engage or disengage an individual towards the use of the information system. NOV is considered as an important aspect of innovation. NOV may lead to engagement (adopter) due to its unique features, newness, and freshness [38]. Besides, NOV provides psychological state that capable to sustain individual focus especially when the tools meet the needs and goals of the users [39].

Aesthetic (AES) is operationalized as the visual beauty or the study of natural and pleasing (or aesthetic) computer-based environments. There is a crucial need for a good design of information system interface due to fierce competition among software developers [40]. Thus, a good design of DL interface influences the individual to continue using the DL, as well as promoting its usage to the others [11]. Quesenbery [41] argue that information systems should have the capability to draw individual interest and encourage engagement through active participation and interaction between users and the information system. On the other hand, Lindgaard, Fernandes, Dudek, and Brown [42] suggest that the interface of an information system is the first point of contact between the information system and users which may contribute towards favourable or unfavourable first impression.

3 Methodology

A quantitative study was conducted to investigate the level of DL engagement among postgraduate students in Malaysian research universities. An instrument was developed by adopting and adapting to previous instruments. Before actual data collection, the instrument undergoing several evaluation processes, such as pre-test and expert’s evaluation. A pilot test was conducted involving 100 respondents; however, only 85 of respondents responded. The pilot data was tested for reliability analysis and common method bias using Harman’s Single Factor Test. Then, the actual data collection

using Google Form took four weeks in November 2019. A total of 493 responses were recorded; however, one response was excluded due to empty dataset. A convenience sampling method was used for the selection of the respondents. The subsequent section will briefly explain the findings of the study.

4 Findings

The following table 1 shows the result of reliability analysis. Cronbach’s alpha coefficient was used to measure the reliability of the construct, as well as the internal consistency of latent variables. According to Nunnally [43], the acceptable value of Cronbach’s alpha should be above 0.70. Based on the result shown below, all items are above 0.70, thus indicating that the instrument has surpassed the threshold and highly reliable for the conduct of the study.

Table 1. Reliability analysis

| Construct | Cronbach’s Alpha | Number of items |
|------------------------|------------------|-----------------|
| Focus Attention (FAT) | 0.929 | 4 |
| Felt Involvement (FIV) | 0.877 | 4 |
| Aesthetic (AES) | 0.943 | 4 |
| Novelty (NOV) | 0.923 | 4 |

4.1 Demographic profiles

The following table 2 shows the distribution of respondent’s demographic profiles. A total of 492 respondents were involved during the data collection process. The data collection process took 4 weeks in November 2019. The result shows that most of the respondents are female (62.4% or n=307). Male respondents are represented by 37.6% or n=185 from the total population. In relation to the respondent’s age, the highest contributors of respondent’s age ranging from 25-30 years old with the proportion of 41.1% or n=202. Next, it was followed by 36-50 (26.6% or n=131), 31-35 (24.6% or n=121), under 25 (6.1% or n=30), and 51- 65 (1.6% or n=8). 78.9% or n=388 of respondents enrolled for a fulltime postgraduate’s degree, while 21.1% or n=104 enrolled for a part-time postgraduate’s degree. Out of 492 respondents, students enrolled for a master’s degree dominate the total population with 53.7% or n=264, compare to the student that enrolled for a doctorate (46.3% or n=228). In relation to respondent’s research domain, the population is dominated by the social sciences (35.6% or n=175), technology and engineering (26.0% or n=128), pure and applied science (13.8% or n=68), clinical and health sciences (12.2% or n=60), information and communication technology (10.4% or n=51), art and applied art (1.4% or n=7), and natural and cultural heritage (0.6% or n=3).

Table 2. Demographic profiles

| Item | Sub-item | Frequency | Percentage (%) |
|-----------------|--|-----------|----------------|
| Gender | Male | 185 | 37.6 |
| | Female | 307 | 62.4 |
| Age | Under 25 | 30 | 6.1 |
| | 25 -30 | 202 | 41.1 |
| | 31- 35 | 121 | 24.6 |
| | 36 - 50 | 131 | 26.6 |
| | 51 -65 | 8 | 1.6 |
| Mode of study | Fulltime | 388 | 78.9 |
| | Part-time | 104 | 21.1 |
| Level of study | Doctorate | 228 | 46.3 |
| | Master | 264 | 53.7 |
| Research domain | Art and Applied Arts | 7 | 1.4 |
| | Clinical and Health Sciences | 60 | 12.2 |
| | Information and Communication Technology | 51 | 10.4 |
| | Natural and Cultural Heritage | 3 | 0.6 |
| | Pure and Applied Science | 68 | 13.8 |
| | Social Sciences | 175 | 35.6 |
| | Technology and Engineering | 128 | 26.0 |

4.2 Descriptive analysis of DL engagement

The following table 3 shows the descriptive analysis of focus attention. There are four items used to measure the focus attention (FAT1, FAT2, FAT3, and FAT4). The statement with the highest overall mean score is ‘I lose track of time while using the digital library’ followed by ‘I forget about my immediate surroundings while using the digital library’. The mean score for FAT1, FAT2, FAT3, and FAT4 are 4.53, 4.86, 4.12, and 3.95. The overall mean score for focus attention is 4.363.

Table 3. Descriptive analysis of focus attention

| Variables | Items | Min | Max | Mean | Std Error | Std. Dev. |
|---------------------------------------|---|-----|-----|------|--------------|-----------|
| FAT1 | I forget about my immediate surroundings while using the digital library. | 1 | 7 | 4.53 | 0.074 | 1.650 |
| FAT2 | I lose track of time while using the digital library. | 1 | 7 | 4.86 | 0.078 | 1.721 |
| FAT3 | I am so involved in using the digital library that I ignore everything around me. | 1 | 7 | 4.12 | 0.079 | 1.750 |
| FAT4 | I lose track of this world around me when I am using the digital library. | 1 | 7 | 3.95 | 0.081 | 1.793 |
| The overall mean score for FAT | | | | | 4.363 | |

The following table 4 shows the descriptive analysis of felt involvement. There are four items used to measure the felt involvement (FIV1, FIV2, FIV3, and FIV4). The statement with the highest overall mean score is ‘I feel fully involved in my information task when using the digital library’, followed by ‘My information task using the digital

library was fun’. The mean score for FIV1, FIV2, FIV3, and FIV4 are 5.23, 5.33, 5.26, and 4.88. The overall mean score for felt involvement is 5.1748.

Table 4. Descriptive analysis of Felt Involvement

| Variables | Items | Min | Max | Mean | Std. Error | Std. Dev. |
|---------------------------------------|--|-----|-----|------|---------------|-----------|
| FIV1 | I am really drawn to my information task when using the digital library. | 1 | 7 | 5.23 | 0.061 | 1.344 |
| FIV2 | I feel fully involved in my information task when using the digital library. | 1 | 7 | 5.33 | 0.058 | 1.286 |
| FIV3 | My information task using the digital library was fun. | 1 | 7 | 5.26 | 0.057 | 1.254 |
| FIV4 | My attention will not be distracted while using the digital library. | 1 | 7 | 4.88 | 0.065 | 1.431 |
| The overall mean score for FIV | | | | | 5.1748 | |

The following table 5 shows the descriptive analysis of aesthetic. There are four items used to measure the aesthetic (AES1, AES2, AES3, and AES4). The statement with the highest overall mean score is ‘The digital library is attractive’, followed by ‘The digital library is visually appealing’. The mean score for AES1, AES2, AES3, and AES4 are 5.26, 5.16, 5.04, and 5.10. The overall mean score for aesthetic is 5.1408.

Table 5. Descriptive analysis of Aesthetic

| Variables | Items | Min | Max | Mean | Std. Error | Std. Dev. |
|---------------------------------------|--|-----|-----|------|---------------|-----------|
| AES1 | The digital library is attractive. | 1 | 7 | 5.26 | 0.058 | 1.290 |
| AES2 | The digital library is visually appealing. | 1 | 7 | 5.16 | 0.059 | 1.304 |
| AES3 | I like the images used in the digital library. | 1 | 7 | 5.04 | 0.060 | 1.327 |
| AES4 | The screen layout of the digital library website is visually pleasing. | 1 | 7 | 5.10 | 0.059 | 1.317 |
| The overall mean score for AES | | | | | 5.1408 | |

The following table 6 shows the descriptive analysis of novelty. There are four items used to measure the novelty (NOV1, NOV2, NOV3, and NOV4). The statement with the highest overall mean score is ‘I feel more interested with my information task when using the digital library’, followed by ‘I continue using the digital library out of curiosity’. The mean score for NOV1, NOV2, NOV3, and NOV4 are 5.33, 5.28, 5.42 and 5.28. The overall mean score for novelty is 5.3293.

Table 6. Descriptive analysis of Novelty

| Variables | Items | Min | Max | Mean | Std. Error | Std. Dev. |
|---------------------------------------|---|-----|-----|------|---------------|-----------|
| NOV1 | I continue using the digital library out of curiosity. | 1 | 7 | 5.33 | 0.059 | 1.320 |
| NOV2 | The content of the digital library incites my curiosity. | 1 | 7 | 5.28 | 0.059 | 1.313 |
| NOV3 | I feel more interested in my information task when using the digital library. | 1 | 7 | 5.42 | 0.055 | 1.216 |
| NOV4 | When I see a new feature on the digital library, I often curious to see its function. | 1 | 7 | 5.28 | 0.062 | 1.382 |
| The overall mean score for NOV | | | | | 5.3293 | |

4.3 Independent sample T-test

In an attempt to investigate the level of DL engagement among postgraduate students at Malaysian research universities, we conducted a further analysis using independent sample t-test on DL engagement against several demographics' factors, such as gender, study mode, and level of study. The subsequent table 7 shows the result of independent sample t-test between DL engagement with gender, study mode, and level of study.

An independent sample t-test was performed on the demographic profiles to determine significant differences between the levels of DL engagement among the respondents. Independent sample t-test is capable to compare means for two variables. The purpose of this test is to determine the existence of statistical evidence that proves the population means are significantly different.

The first test is performed to compare DL engagement in gender (male and female) conditions. The result of the analysis shows that there is no significant different in the scores for male (mean = 5.0250, std. dev. = 1.02174) and female (mean = 4.9882, std. dev. = 1.04529); conditions; $t(490) = 0.382, p = 0.703$. Next, a second test is conducted to compare DL engagement in the mode of study (full-time and part-time) conditions. Result show that there is no significant difference in the scores for fulltime (mean = 4.9781, std. dev. = 1.03852) and part-time (mean = 5.0913, std. dev. = 1.02468); conditions; $t(490) = -0.990, p = 0.322$. The next test is performed to compare DL engagement in the level of study (doctorate and master) conditions. Similarly, there is no significant difference in the scores for doctorate (mean = 5.0036, std. dev. = 1.06923) and master (mean = 5.0007, std. dev. = 1.00772); conditions; $t(490) = -0.094, p = 0.925$.

Table 7. Independent Sample T-Test between DL engagement with gender, study mode, and level of study

| | | Descriptive | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | Result | |
|---------------|----------------|-------------|--------|---|-------|------------------------------|--------|-----|--------|-----------------|
| | | | Mean | Std. Dev. | F | Sig. | t | df | | Sig. (2-tailed) |
| DL Engagement | Gender | Male | 5.0250 | 1.02174 | 0.199 | 0.655 | 0.382 | 490 | 0.703 | Not Sig. |
| | | Female | 4.9882 | 1.04529 | | | | | | |
| | Study Mode | Fulltime | 4.9781 | 1.03852 | 0.012 | 0.915 | -0.990 | 490 | 0.322 | Not Sig. |
| | | Part-time | 5.0913 | 1.02468 | | | | | | |
| | Level of Study | Doctorate | 5.0036 | 1.06923 | 0.365 | 0.546 | 0.030 | 490 | 0.976 | Not Sig. |
| | | Master | 5.0007 | 1.007072 | | | | | | |

4.4 One-Way Analysis of Variance (ANOVA)

One-way analysis of variance (ANOVA) is a statistical technique to examine the existence of statistically different means between two or more independent and unrelated groups. However, the ANOVA test is rarely seen or conducted for less than a minimum of three groups. For the purpose of this study, a test of one-way analysis of variance (ANOVA) was conducted on DL engagement with four demographic factors. The factors are age, semester, research domain, and universities. The following table 8 shows the result of ANOVA test on DL engagement.

First, a one-way Analysis of Variance (ANOVA) test was conducted on DL engagement for five conditions (under 25, 25-30, 31-35, 36-50, and 51-65). The result of the test indicating that there was a significant effect of respondent's age on DL engagement at the $p < 0.05$ level for the five conditions (under 25, 25-30, 31-35, 36-50, and 51-65) [$F(4, 487) = 2.801, p = 0.025$].

Next, another test was conducted to compare the effect of respondents' semester on DL engagement for eight conditions (semester 1, semester 2, semester 3, semester 4, semester 5, semester 6, semester 7, and semester 8 and above). The finding shows that there is no significant effect of respondent's semester on DL engagement at the $p < 0.05$ level for the eight conditions (semester 1, semester 2, semester 3, semester 4, semester 5, semester 6, semester 7, and semester 8 and above) [$F(7, 484) = 0.560, p = 0.789$].

The third test was conducted to compare the effect of respondents' research domain on DL engagement for the seven conditions. There was a significant effect of respondent's research domain on DL engagement at the $p < 0.05$ level for the seven conditions (art and applied arts, clinical and health sciences, information and communication technology, natural and cultural heritage, pure and applied science, social sciences, and technology and engineering conditions) [$F(6, 485) = 3.196, p = 0.004$].

The fourth test was conducted to compare the effect of respondents' university on DL engagement for five conditions (Universiti Malaya, Universiti Putra Malaysia, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia, and Universiti Teknologi Malaysia). The finding shows that there is no significant effect of respondent's university

on DL engagement at the $p < 0.05$ level for the five conditions (Universiti Malaya, Universiti Putra Malaysia, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia, and Universiti Teknologi Malaysia) [$F(4, 487) = 0.582, p = 0.676$].

Table 8. One-way analysis of Variance Test (ANOVA) between DL engagement and age, semester, research domain and university.

| Sources / Factor | Dependent Variable | | df | Levene's Test for Equality of Variances | | F-value | P-value | Result* |
|------------------|--------------------|----------------|-----|---|-------|---------|---------|----------|
| | | | | F | Sig. | | | |
| Age | DL Engagement | Between Groups | 4 | 0.189 | 0.944 | 2.801 | 0.025 | Sig. |
| | | Within Groups | 487 | | | | | |
| Semester | | Between Groups | 7 | 1.881 | 0.071 | 0.560 | 0.789 | Not Sig. |
| | | Within Groups | 484 | | | | | |
| Research Domain | | Between Groups | 6 | 1.747 | 0.108 | 3.196 | 0.004 | Sig. |
| | | Within Groups | 485 | | | | | |
| University | | Between Groups | 4 | 3.326 | 0.011 | 0.582 | 0.676 | Not Sig. |
| | | Within Groups | 487 | | | | | |

5 Discussions

Four variables underlying the dimensions of DL engagement were observed in order to investigate the level of DL engagement among postgraduate students at Malaysian research universities. The variables are FAT, FIV, AES, and NOV. In order to measure the level of user engagement, a descriptive analysis was conducted and reported in the previous section. Based on the overall mean score of 5.0020, it can be concluded that the current level of DL engagement among postgraduate student at Malaysian research universities is very good.

Focus attention is one of the crucial components of the affective domain. It helps the postgraduate student to concentrate on their information task. For example, the work of postgraduate students usually involves a difficult and tedious assignment that requires them to work for a long period. On the other hand, this workload cross path with their individual commitment, such as family and work life. It is a perfect recipe for a disaster. Thus, engagement with DL may help them to filter unnecessary information and improve their focus and work-life balance.

On behalf of felt involvement, the overall mean score of FIV indicating that respondents agreed that the use of DL was fun. The respondents are able to understand and recognize the significance of using DL in their information task. Our finding shows that satisfying user's need leads to better user engagement towards a certain object, such as an information system. FIV guide the work of the postgraduate students through boosting their commitment towards using DL resources, rather than using non-DL resources. Even though open access resources are easy and free to use, however, it has some drawbacks such as susceptible to poor quality of the publication, inaccurate, and sometimes misleading data.

In the context of aesthetic, most respondents agreed that the design of the user interface has some influence on the level of user engagement with the DL. A further analysis based on independent sample t-test and ANOVA shows that the respondent's research domain and age produce a significant difference in the level of DL engagement among postgraduate students. It is not surprising due to the different level of respondent's age that enroll for the postgraduate education. Young learners usually prefer more on design while experience learner is keener towards a user-friendly interface.

In relation to novelty, the majority of the respondents agreed that they are more interested to perform their information task using the DL rather than other techniques. Completing information task using DL enables quicker access to information, relying on reliable information, and reduce time to look for a relevant information. In the context of the library management, focusing on the novelty of the product may be beneficial for the long run of the library digital services.

6 Conclusion

In a nutshell, the purpose of this study is to investigate the level of DL engagement among postgraduate students at Malaysian research universities. Four variables underlying DL engagement (focus attention, felt involvement, aesthetic, and novelty) was adopted from the previous study of Masrek et. al [44], O'Brien & Toms [1], and Masrek and Samadi [11]. The proposed dimension of DL engagement was tested based on independent sample t-test and one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS) version 24.

Therefore, the contributions of the study are as follows. First, the study provides a descriptive explanation of DL engagement in the context of Malaysian research universities. Second, the study provides empirical evidence on the significant difference between seven demographic factors on DL engagement. Third, this study provides an insight into the current level of DL engagement in the context of Malaysian postgraduate students at Malaysian research universities. Fourth, this study added some insightful information to the body of knowledge in the context of DL engagement.

However, this study is not without limitation. First, we only include four variables underlying the concept of DL engagement. Future study may extend the dimension of DL engagement by including other variables such as perceived usability and endurability. Second, the population of respondents only includes postgraduate students from five of Malaysian research universities. Future study can involve undergraduate or postgraduate students from different context such as public universities, private universities, or academic centres. Moreover, the instrument can be further expanded to measure the level of DL engagement among library users at public or private libraries.

7 References

- [1] O'Brien HL, Toms EG., "The development and evaluation of a survey to measure user engagement", *Journal of the Association for Information Science and Technology*, Vol. 61, No. 1, pp 50-69. 2010

- [2] Schaufeli WB, Bakker AB, Salanova M., "The measurement of work engagement with a short questionnaire: A cross-national study", *Educational and psychological measurement*, Vol. 66, No. 4, pp 701-716, 2006 <https://doi.org/10.1177/0013164405282471>
- [3] Baroudi JJ, Olson MH, Ives B., "An empirical study of the impact of user involvement on system usage and information satisfaction", *Communications of the ACM*, Vol. 29, No. 3, pp 232-238, 1986 <https://doi.org/10.1145/5666.5669>
- [4] Barki H, Hartwick J., "Measuring User Participation, User Involvement, and User Attitude", *MIS Quarterly*, Vol. 18, No. 1, pp 59-82, 1994 <https://doi.org/10.2307/249610>
- [5] Hwang MI, Thorn RG., "The effect of user engagement on system success: a meta-analytical integration of research findings", *Information & Management*, Vol. 35, No. 4, pp 229-236, 1999 [https://doi.org/10.1016/s0378-7206\(98\)00092-5](https://doi.org/10.1016/s0378-7206(98)00092-5)
- [6] Frutos SM, Giones F, Miralles F, editors. "Social Media engagement as an e-commerce driver, a consumer behavior perspective", 2014 9th Iberian Conference on Information Systems and Technologies (CISTI), 2014, IEEE. <https://doi.org/10.1109/cisti.2014.6877033>
- [7] Ashraf AR, Thongpapanl NT, Spyropoulou S., "The connection and disconnection between e-commerce businesses and their customers: exploring the role of engagement, perceived usefulness, and perceived ease-of-use", *Electronic Commerce Research and Applications*, Vol. 20, pp 69-86, 2016 <https://doi.org/10.1016/j.elerap.2016.10.001>
- [8] Busalim AH, Hussin ARC, Iahad NA., "Factors influencing customer engagement in social commerce websites: A systematic literature review", *Journal of theoretical and applied electronic commerce research*, Vol. 4, No. 2, 2019 <https://doi.org/10.4067/s0718-18762019000200102>
- [9] Samadi I., "Determinants and Impacts of Digital Library Usage: A Survey Among Selected Iranian Universities", Shah Alam: Universiti Teknologi MARA Puncak Perdana, 2016.
- [10] Chiong CP, Kiing SM, Ler YP, Lim QJ, Wong YJ., "Behavioural Intention of Undergraduates to Adopt Digital Library: An Investigation into Private Universities in Malaysia", Malaysia: UTAR, 2016.
- [11] Masrek MN, Samadi I., "User engagement in academic web digital library", *International Journal of Civil Engineering and Technology*. Vol. 8, No. 9, pp 789-799, 2017
- [12] Rahman ALA, Jamaludin A, Mahmud Z., "Intention to use digital library based on modified UTAUT model: Perspectives of Malaysian postgraduate students", *International Journal of Information and Communication Engineering*, Vol. 5, No. 3, 2011
- [13] Sahak MD, Masrek MN., "Library Usage of Medical Students: A Comparative Analysis of First Year and Third Year Students in Universiti Putra Malaysia", *Procedia-Social and Behavioral Sciences*, Vol. 129, pp 127-132, 2014 <https://doi.org/10.1016/j.sbspro.2014.03.657>
- [14] Matusiak KK., "Perceptions of usability and usefulness of digital libraries", *International journal of humanities and arts computing*, Vol. 6, No. 1-2, pp 133-147, 2012 <https://doi.org/10.3366/ijhac.2012.0044>
- [15] Sidek Z., "Senior Assistant Director, u-Pustaka", Personal Communication ed, 2018.
- [16] Tella A, Orim F, Ibrahim DM, Memudu SA., "The use of electronic resources by academic staff at The University of Ilorin, Nigeria", *Education and Information Technologies*, Vol. 23, No. 1, pp 9-27, 2018 <https://doi.org/10.1007/s10639-017-9577-2>
- [17] Uzuegbu CP, Chukwu O, Ibegwam A., "Creating universal resource locator links on library computers desktop: A panacea for students' underutilization of subscribed electronic databases in academic institutions in Nigeria", *Annals of Library and Information Studies (ALIS)*, Vol. 59, No. 2, pp 97-105, 2012

- [18] Bagudu AA, Sadiq H., "Students' Perception of Digital Library Services: A Case Study of International Islamic University, Malaysia", *Library Philosophy and Practice* (e-journal). 2013.
- [19] Xu F, Du JT., "Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities", *Computers in Human Behavior*, Vol. 83, pp 64-72, 2018 <https://doi.org/10.1016/j.chb.2018.01.029>
- [20] Lynch CA., "The integrity of digital information: mechanics and definitional issues", *Journal of the American Society for Information Science* (1986-1998), Vol. 45, No. 10, pp 737, 1994 [https://doi.org/10.1002/\(sici\)1097-4571\(199412\)45:10<737::aid-asi4>3.0.co;2-8](https://doi.org/10.1002/(sici)1097-4571(199412)45:10<737::aid-asi4>3.0.co;2-8)
- [21] Fox EA., "Overview of digital library components and developments", *Computer Science Technical Reports*. 2002.
- [22] "Encyclopedia of computer science", 4 ed. USA: Wiley, 2000, pp 2034.
- [23] Khan SA, Bhatti R., "Digital competencies for developing and managing digital libraries: an investigation from university librarians in Pakistan", *The Electronic Library*, Vol. 35, No. 3, pp 573-597, 2017 <https://doi.org/10.1108/el-06-2016-0133>
- [24] Masrek MN, Gaskin JE., "Assessing users satisfaction with web digital library: the case of Universiti Teknologi MARA", *The International Journal of Information and Learning Technology*, Vol. 33, No. 1, pp 36-56, 2016 <https://doi.org/10.1108/ijilt-06-2015-0019>
- [25] Asad K, Masrek MN, Khalid M, Saima Q., "Factors influencing the adoption of digital reference services among the university librarians in Pakistan", *The Electronic Library*, Vol. 35, No. 6, pp 1225-1246, 2017 <https://doi.org/10.1108/el-05-2016-0112>
- [26] Cai H, Zheng D., "Digital Library use Intention Research: An Explanation based on Theory of Reasoned Action and Technology Acceptance Model", *DEStech Transactions on Computer Science and Engineering*. 2017 (csae). <https://doi.org/10.12783/dtscse/csae2017/17491>
- [27] Yamaguchi M, Richardson J., "Demonstrating academic library impact to faculty: a case study", *Digital Library Perspectives*, Vol. 34, No. 2, 2018 <https://doi.org/10.1108/dlp-09-2017-0034>
- [28] Hamzat SA, Mabawonku I., "Influence of Performance Expectancy and Facilitating Conditions on use of Digital Library by Engineering Lecturers in universities in South-west, Nigeria", *Library Philosophy and Practice*, 2018, pp 1-16.
- [29] Bush V., "As we may think", *Atlantic Monthly*, 1945.
- [30] Licklider JCR, "Libraries of the Future", 1965.
- [31] Swanson DR., "Dialogues with a catalog", *The library quarterly*, Vol. 34, No. 1, pp 113-125, 1964
- [32] Su S-F., "Dialogue with an opac: how visionary was Swanson in 1964?", *The library quarterly*, Vol. 64, No. 2, pp130-161, 1994 <https://doi.org/10.1086/602674>
- [33] Large A, Beheshti J., "OPACs: a research review", *Library & information science research*, Vol. 19, No. 2, pp 111-133, 1997 [https://doi.org/10.1016/s0740-8188\(97\)90039-6](https://doi.org/10.1016/s0740-8188(97)90039-6)
- [34] Madsen CK, Geringer JM., "A focus of attention model for meaningful listening", *Bulletin of the Council for Research in Music Education*, 2000, pp 103-108.
- [35] Celsi RL, Olson JC., "The role of involvement in attention and comprehension processes", *Journal of consumer research*, Vol. 15, No. 2, pp 210-224, 1988
- [36] Kappelman LA., "Measuring user involvement: a diffusion of innovation perspective", *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, Vol. 26, No. 2-3, pp 65-86, 1995 <https://doi.org/10.1145/217278.217286>
- [37] Mathwick C, Rigdon E., "Play, flow, and the online search experience", *Journal of consumer research*, Vol. 31, No. 2, pp 324-332, 2004 <https://doi.org/10.1086/422111>

- [38] Wells JD, Campbell DE, Valacich JS, Featherman M., "The effect of perceived novelty on the adoption of information technology innovations: a risk/reward perspective", *Decision Sciences*, Vol. 41, No. 4, pp 813-843, 2010 <https://doi.org/10.1111/j.1540-5915.2010.00292.x>
- [39] Pace S., "A grounded theory of the flow experiences of Web users", *International journal of human-computer studies*, Vol. 60, No. 3, pp 327-363, 2004 <https://doi.org/10.1016/j.ijhcs.2003.08.005>
- [40] Cheng F-F, Wu C-S, Leiner B., "The influence of user interface design on consumer perceptions: A cross-cultural comparison", *Computers in Human Behavior*, 2018. <https://doi.org/10.1016/j.chb.2018.08.015>
- [41] Quesenbery W., "Dimensions of usability: Defining the conversation, driving the process. In: Albers M, Mazur B, editors. *Content and complexity: Information design in technical communications*", Mahwah, NJ: Lawrence Erlbaum, 2003, pp. 81-102.
- [42] Lindgaard G, Fernandes G, Dudek C, Brown J., "Attention web designers: You have 50 milliseconds to make a good first impression!", *Behaviour & information technology*, Vol. 25, No. 2, pp 115-126, 2006 <https://doi.org/10.1080/01449290500330448>
- [43] Nunnally JC., "Psychometric theory", 2nd ed: McGraw-Hill Education, 1978.
- [44] Masrek MN, Razali MH, Ramli I, Andromeda T., "User engagement and satisfaction: The case of web digital library", *International Journal of Engineering and Technology (UAE)*, Vol. 7, No. 4, pp 19-24, 2018. <https://doi.org/10.14419/ijet.v7i4.15.21364>

8 Authors

Mohamad Rahimi Mohamad Rosman is a senior lecturer at the Department of Information System Management, Faculty of Information Management, Universiti Teknologi MARA Kelantan Branch, MALAYSIA. His research interest includes information system management, system development methodologies, and digital library engagement. Email: rahimimr@uitm.edu.my

Mohd Nasir Ismail is an Associate Professor at the Department of Information System Management, Faculty of Information Management, Universiti Teknologi MARA Kelantan Branch, MALAYSIA. His research interest includes information system management, instructional design, and knowledge management

Mohamad Noorman Masrek is a Professor of Information System, Faculty of Information Management, Universiti Teknologi MARA Shah Alam, MALAYSIA. His research interest includes information system development, system development methodologies, Intranet and Internet technologies.

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