Age, Gender and Race Differences in the Usage of Digital Library Among Malaysian Postgraduate Students

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Abstract: - This paper describes the differences in the usage of Digital Library between race, gender and age groups among the postgraduate students at the Malaysian intensive research universities. The purpose is to determine whether differences in the usage of digital library exist between users of different characteristics and background. The study found that there were evidences of significant differences in the usage of digital library between students in different age and race categories. However, there was no evidence of a significant difference in the mean usage of digital library between male and female postgraduate students. The difference in the usage was significantly evident among students between the age of 22 and 40 years old while Malay and Chinese students differs with other races in the usage of digital library.

Key-Words: - Gender, Age, Race, Usage of Digital Library, Postgraduate students

1 Introduction

Digital library research and development started in the mid 1990s and until now researchers still continue to explore, understand and develop a better digital library for mankind use. A lot of money, energy and resources have been used to build the digital library starting from static web pages through to library 2.0 [1] and the future semantic digital library [2]. General works to build digital library were discussed in [3],[4],[5].

According to [6], digital library can be visualized as computer-based system for storing, acquiring, organizing, searching and distributing digital materials for end user access. Therefore, in this research, digital library is refers to the online databases services such as electronic journals provided in the library and access via library websites.

In line with that, digital libraries have brought many benefits and advantages to users. Among the benefits of digital library are its capabilities to have direct access and downloading of full text articles via desktop [7]. In addition to that, digital library provides a current, latest and complete information resources. There are three major advantages of digital libraries over traditional libraries. This includes easier tracking of resources stored in digital form; remote, fast and fair access of digital library collections [8]. Among other benefits of digital library are it requires less space and data can be made available to anyone and anywhere with a speed through communications network [9].

Even though digital libraries brings many benefits to the users, however success from the technical perspective alone does not determine the acceptance of the system been developed [10] and much of research needed to explore differences among users in order to accepts and use the digital library. This argument is in line with [3] who found that building a technical framework for scholarship is much easier than understanding what to build, for whom, for what purposes, and how their usage of the technologies will evolve over time. Billions of dollars has been invested by library in digitizing information, subscribing for online databases, e-journals and e-books. Therefore, it is very important and critical to investigate the individual characteristics factors such as gender, age and race differences that could influence the use of digital library so that new approaches to library services can be implemented and benefit both users and the provider of the library services.

This paper presents a study of how age, gender and race differences affect the usage of digital library. Thus, providing us with evidences to better understand the role of age, gender and race differences in utilizing the digital library.

2 Method and Design
2.1 Participants

Participants of the study are 534 postgraduate students (Masters and PhD) selected at random from four Malaysian intensive research universities. They were chosen because of their needs for the digital library services to help them access to current, timely and high quality information resources for research purposes. Students at these universities are expected to be very active in seeking information resources via digital libraries services. They are often expected to keep up with the latest information resources available in digital libraries.

2.2   Variables and Measurement

Variables of measurement are usage of digital library, gender, age and race. Usage of digital library is defined as the frequency of digital library use. Meanwhile gender is defined as sexual categories of the digital library users which are either male or female, age is measured by years and race is defined as particular users ethnicity namely, Malay, Chinese, Indian and others which include students of other ethnicity and foreign students from the Middle East.

EDA was performed to investigate the distributions of selected variables and explore patterns of responses using charts and tables. Further analyses include investigating the differences in the usage of digital library between the categories of gender, age and race groups. Based on the assumption that the test variable is normally distributed, t-test for independent samples and analysis of variance (ANOVA) were used to investigate the differences between the categories of each group.

3 Data Analysis and Results

Data from the questionnaires were edited and coded for analysis using SPSS version 16.0.

Figure 1, 2 and 3 shows three box-and-whisker plots on the usage of digital library across gender, age group and races. First box-plot in Figure 1 shows the distribution of meanscore usage of digital library across gender. The result shows the distribution of meanscore usage of digital library between male and female respondents are comparable with the exception of few respondents who used digital library more frequently.
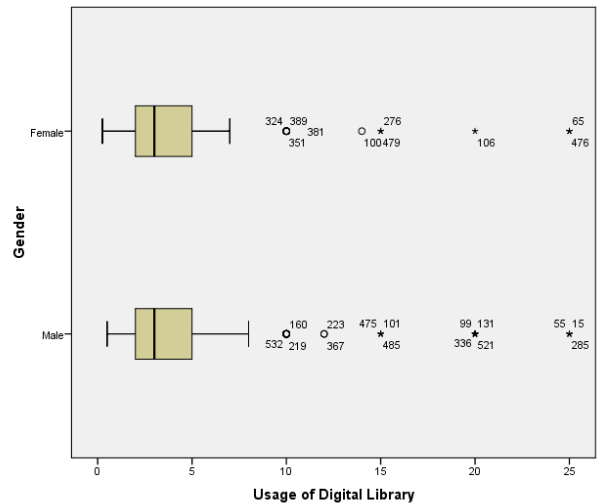

Figure 1: Usage of Digital Library Across gender

Comparing across the age groups in second box-and-whisker plot, median usage of digital library are comparable for these age groups (between 41 and 51 years old; 22 and 30 years old). Those between 31 and 40 years old were found to have used digital library more frequently compared to other age categories. About 50% of respondents in this group have accessed digital library for about four times on average, in a week.
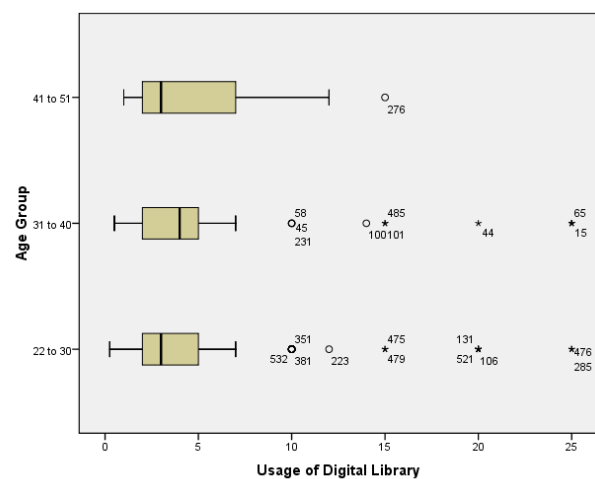

Figure 2: Usage of Digital Library Across age group

The third box-and-whisker plot in Figure 3 show the usage of digital library among the categories of race. Range of median usage across the races were between 3 and 4 times per week with a small percentage of respondents used it for more than 10 times resulting in an extreme skewed distribution.
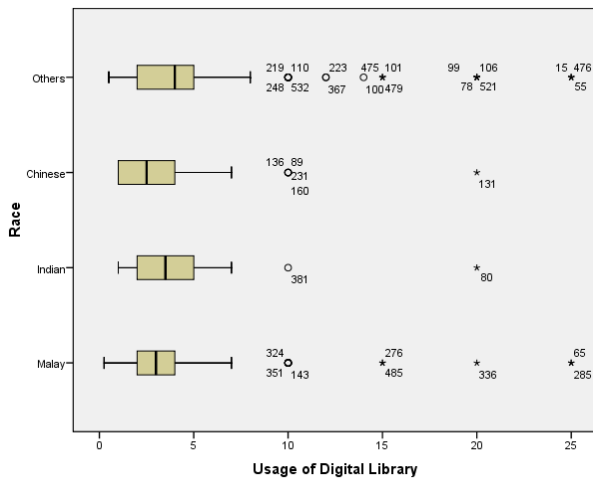
Figure 3: Usage of Digital Library Across race

3.1 Test of Group Differences for Usage of Digital Library

Table 1: Test of group difference using T-test				
Groups	Mean	Levene's Test for Equality of Variances	T-stat	Prob.
Male	4.64	0.116	1.576	0.116
Female	3.81			

*Significant at α = 0.05 level

Levene's test for equality of variances in Table 1 show that the variances between the gender group are assumed equal (p = 0.116). With variances assumed equal, t-test for the equality of means show no evidence of a significant difference in the mean score usage of digital library between male and female group. This is indicated by a p-value of 0.116.

For the mean usage of digital library between age groups and race, there is evidence of a significant difference in the usage of digital library between the categories of age and race (p = 0.012 and 0.001, respectively).

3.2 Post Hoc Multiple Comparison Test
Since at least one mean is different from the others, therefore Post Hoc Multiple Comparison test is conducted to determine the pairwise differences between the group means.

The post hoc results in Table 3 shows that there are significant differences in mean usage of digital library between students in the age group of between 22 and 30 years old and between 31 and 40 years old (p= 0.008).

Table 2: Test of group differences using ANOVA

Groups		Mean	Levene's Test for Equality of Variances	F-stat	Prob.
Age	22- 30	3.79	.002	4.464	.012*
	31-40	5.64			
	41-55	4.52			
Race	Malay	3.58	.003	5.444	0.001*
	Indian	4.11			
	Chinese	3.24			
	Others	5.78			

* Significant at α = 0.05 level

Table 3: Post Hoc Multiple Comparison Test for Age Group

(I) (Years) Age Group	(J) Age Group	Mean Difference (I-J)	Std. Error	Sig.
22 to 30	31 to 40	-1.853*	.622	.008
	41 to 51	-.727	1.202	.817

*The mean difference is significant at the 0.05 level.

The post hoc results in Table 4 shows that there are significant differences in mean usage of digital library between Malay and Other races (p=0.002) and between Chinese and Other races (p= 0.010).

Table 4:Post Hoc Multiple Comparison Table for Race

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.
Malay	Indian	-.528	1.070	.961
	Chinese	.346	.771	.970
	Others	-2.195*	.598	.002
Indian	Malay	.528	1.070	.961
	Chinese	.874	1.204	.887
	Others	-1.667	1.101	.430
Chinese	Malay	-.346	.771	.970
	Indian	-.874	1.204	.887
	Others	-2.541*	.814	.010
Others	Malay	2.195*	.598	.002
	Indian	1.667	1.101	.430
	Chinese	2.541*	.814	.010

*. The mean difference is significant at the 0.05 level.

4 Conclusion

There is no evidence of a significant difference in meanscore usage of digital library between male and female group. This statement is contrast with [11] who founds male is more satisfied than female in using the digital library. Female user found it is harder for them to learn to operate and explore the digital library than male users [11].

However there are evidences of significant differences between age and race group. The difference is significant between students whose age between 22 and 30 years old and between 31 and 40 years old. This finding is consistent with [11] who found higher level of expertise of user the lower the degree of satisfaction is. In this study context, younger user whose age between 22 and 30 years old have higher level of expertise than older users, yet stated lesser visit the digital library.

In term of race, there is a significant difference between Malay and Chinese students with other races in the usage of digital library. This finding congruent with [12] who found racial differences is significant in library anxiety among college students.

One possible solution to solve these age and race differences issues is by adopting adaptive features [13] of digital library. Further research on adaptive digital library should be conducted and implemented in order to minimise the differences among users.

5 References

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