

Investigating the roles of demographic profiles on usability assessment: case study on CiteGuru application

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Article Info

Article history:

Received Jan 20, 2022

Revised Aug 15, 2022

Accepted Sep 13, 2022

Keywords:

Assessment

Citation

Competency

Referencing

Usability

ABSTRACT

Postgraduate education is the highest education structure in all countries across global. In Malaysia, postgraduate education is usually pursued by several candidates, such as academicians, professionals, and motivated junior learners. As such, one of the requirements of postgraduate education is to have a publication as a mandatory graduation requirement. Thus, one of the challenging issues in the publication is to ensure the quality of the references and citation. However, the lack of mobile applications available that focus on citation management caused several problems such as succumbing to predatory journals, poor citation work, desk rejection, and inaccurate facts. Therefore, the purpose of this study is twofold: first, to investigate the roles and usability assessment of CiteGuru application as a mobile solution for improving learners' skills, ability, and knowledge on referencing and second, to investigate the roles of demographic profiles on the usability perception among the respondents. A quantitative research methodology using a survey was adopted with 23 expert panels selected based on three distinct positions—academic, industries, and librarians. Data were analysed using statistical package for social science version 26. The result indicates that i) the panel rate the usability of the application as acceptable and ii) demographic profiles (sector, education, and gender) prove insignificant on the usability assessment.

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1. INTRODUCTION

Rosman *et al.* [1] define referencing competency as the combination of three distinct factors: knowledge, skills, and ability of an individual that are particularly related to using, editing, and disseminating various types of reference standards as well as referencing software. Competency in referencing is very important and considered as among the 21st-century skills—especially related to critical thinking and problem-solving skills [2]. As such, universities were challenged to rethink their strategies and educational practices beyond the traditional approach [2]. Subsequently, Chan and Yeung [3] argue the importance of holistic competencies and the challenges to embracing such competencies in the universities.

In the academic context, postgraduate education is the highest level of education that consist of doctoral and master education. Out of the two types of education level, doctoral education is much more challenging and require specific contribution for passing the evaluation, such as the total number of publication, and innovation awards and some universities do require their postgraduate student to publish a paper in a reputable journal as part of the completion criteria [1], [4], [5]. Thus, one of the issues that usually

deterred the probability of publishing a paper among postgraduate students is the quality of the manuscript produced. As known, a good quality paper was produced out of the good quality of references, such as referring to reputable online databases, reputable journals, and peer-reviewed articles [5]. Henceforth, knowledge on referencing competency influence individual performance and enhance the probability of getting published [1]. As such, many students and academicians would fall into the trap of predatory journals as a shortcut of publishing their work, especially in the wake of Novel Coronavirus 2019 (COVID-19) [6], [7]. Succumbed to the predatory journal would jeopardize the reputation and work quality of any individual, regardless of academicians or postgraduate students [7].

Beninger *et al.* [8] define predatory journals as exploiting the norm of the scientific community by producing or publishing manuscripts without proper scientific evidence. More companies have since emerged offering fast track publication and easy publication into this kind of fraudulent journal [9]. Over the past decade, the number of predatory journals increase exponential [7]–[9]. Gill [7] lists publication fee, peer review, publication speed, failure to follow publishing standards, poor quality control, and poor verification of submission authenticity, inappropriate intellectual property protection, and falsified editorial board as the major indicators of a fraudulent journal. However, despite the revelation of the negative impact of predatory journals, some scholars simply ignored this warning; mostly due to focussing on adding a new publication, desire for quick publication turnaround, and lack of knowledge on false indexing provided by the journal and flattering email [10].

Thus, previous similar studies on referencing competency suggested that one of the challenging issues in the publication is to ensure the quality of the references and citation. However, the lack of mobile applications available that focus on citation management caused several problems such as succumbing to predatory journals, poor citation work, desk rejection, and inaccurate facts. As a result, an application system CiteGuru was developed based on hypertext pre-processor (PHP) and my structured query language (MySQL) database to help academicians and postgraduate students to deter the influence of predatory journals and enhance the quality of manuscripts submitted to a reputable journal. Henceforth, the purpose of this study is twofold: first, to investigate the roles and usability assessment of CiteGuru application as a mobile solution for improving learners' skills, ability, and knowledge on referencing and second, to investigate the roles of demographic profiles on the usability perception among the respondents.

2. CITEGURU APPLICATION

CiteGuru is a mobile-friendly web application system that focused on the American Psychological Association (APA) 7th edition referencing standard. The development of the application system utilises the PHP programming language, alongside JavaScript, jQuery and MySQL database. The following Figure 1 shows the main interface of the CiteGuru mobile application.

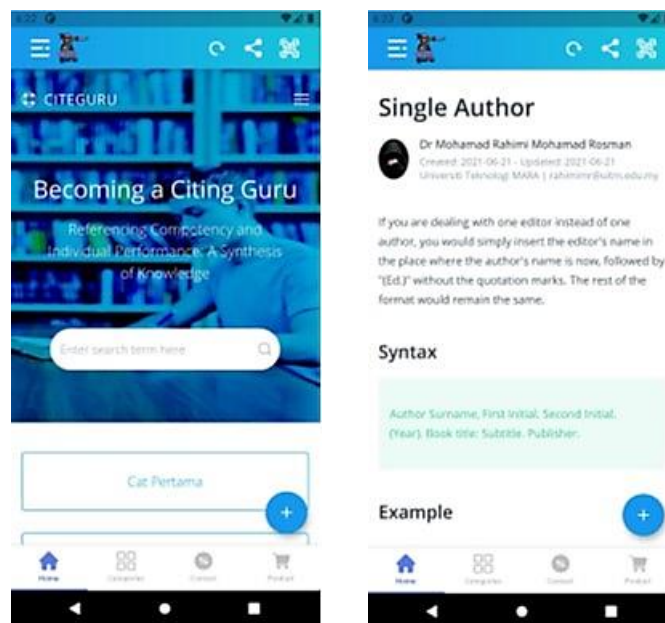


Figure 1. The interface of the CiteGuru application

CiteGuru application was targeted at university students and academicians that actively involved with the publication of refereed articles and manuscripts. Among the special features of the application are i) syntax colouring with video assistance, ii) share-it (to share the article), iii) student engagement monitoring index (SEM-x)—to monitor user engagement with the application and offer a predictive solution, and iv) APA Competency Mapping. The application can be accessed through Google Play or via Progressive Web App. Besides, the framework of CiteGuru can be expanded to various other applications such as a dictionary and knowledge-based platform.

3. METHOD

This study was conducted in quantitative nature. A research instrument was developed by adopting the system usability scale (SUS) instrument of [11], [12]. According to Bangor *et al.* [12], the SUS instrument provided an effective way to measure the usability of a variety of services and products. SUS also has been used by a variety of research projects, as well as industrial evaluations [11], [13]. Besides SUS also helps researchers to collect users' perceptive measurements on product usability more quickly and easily [12], [14].

The research instrument was developed in 2 sections. The first section collects the demographic details of the respondent while the second section collects respondents' perception of the usability of the information system. The selection of respondents is based on several criteria: i) has advanced knowledge of library information systems, ii) has working experience of more than 10 years, and iii) have conducted training on any type of information system. A total of 23 respondents was selected for the purpose of the study from various educational background and expertise.

Next, the respondents were given a short briefing via Google Meet. The purpose of the briefing session is to i) explained the purpose of the research, ii) discussed the SUS criteria that will be used for the study, and iii) introduced the features and architecture of the CiteGuru application. Data collection was then conducted via Google Form to the selected respondents and the finding is analysed using statistical package for social sciences (SPSS) version 26.

4. RESULTS AND DISCUSSION

The following subsection shows the result of the study: i) We explained the demographic profiles of the respondents; ii) The descriptive assessment of usability components was highlighted. Since the SUS instrument is mixed between positive and negative statements, reverse coding was performed on the negative statements; iii) We tested the demographic profiles (sector, education, and gender) on the usability assessment using analysis of variances (ANOVA) and independent sample T-Test; and iv) Usability assessment was assessed using the SUS scoring based on the work of [11], [12].

4.1. Demographic profiles

Table 1 shows the demographic profiles of the respondents. A total of 23 expert's respondents were selected for the purpose of the study. Most of the respondents are female (N=15 or 65.2%) while males are represented by 8 respondents or 34.8% of the total sampling. In relation to sectors, more than half of the respondents work as a librarian (N=14 or 60.9%), followed by academician (N=8 or 34.8%), and industry-related (N=1 or 4.3%). The majority of respondents have a working experience of more than 10 years (N=22 or 95.7%), while one respondent has a working experience of more than 20 years. In regards to the educational background, more than half of the respondents (N=18 or 78.3%), followed by bachelor's degree (N=4 or 17.4%) and doctoral (N=1 or 4.3%).

4.2. Descriptive

The following Table 2 shows the descriptive analysis of the study. Based on the mean value, the highest statement as rated by respondents are 'I thought the system was easy to use', followed by 'I would imagine that most people would learn to use this system very quickly', and 'I felt very confident using the system'. To interpret the data, the positive statements are grouped as USA1, USA3, USA5, USA7, and USA9. The overall mean of 4.33 indicates a tendency towards a positive response among the respondents. In regard to the negative statement, the combined mean value of USA2, USA4, USA6, USA8, and USA10 is 1.74, indicating a tendency towards negative responses; thus, justifying the assumption of the usability assessment for the application.

4.3. ANOVA and independent sample T-Test

Next, a one-way ANOVA was conducted between the demographic profiles (sectors, education, and gender) towards the usability assessment data. Table 3 shows the result of ANOVA conducted using SPSS version 26. The result indicating: i) There is no significant different between three level of sectors

[$F(2, 20) = 0.899, p = 0.423$] and ii) There is no significant different between three level of education [$F(2, 20) = 1.772, p = 0.196$].

Table 1. Demographic

Item	Sub-Item	Total	%
Gender	Male	8	34.8
	Female	15	65.2
Sector	Librarian	14	60.9
	Academician	8	34.8
	Industry	1	4.3
Working Experience	10 to 20 years	22	95.7
	More than 20 years	1	4.3
Education	PhD	1	4.3
	Master	18	78.3
	Degree	4	17.4

Table 2. Descriptive

Item	Item	Mean	Std. Dev.	Mod
USA1	I think that I would like to use this system frequently	4.22	0.74	4
USA2	I found the system unnecessarily complex	1.91	0.90	2
USA3	I thought the system was easy to use	4.52	0.51	5
USA4	I think that I would need the support of a technical person to be able to use this system	1.70	0.88	2
USA5	I found the various functions in this system were well-integrated	4.26	0.62	4
USA6	I thought there was too much inconsistency in this system	1.87	0.81	2
USA7	I would imagine that most people would learn to use this system very quickly	4.35	0.65	4
USA8	I found the system very cumbersome to use	1.57	0.59	2
USA9	I felt very confident using the system	4.30	0.63	4
USA10	I needed to learn a lot of things before I could get going with this system	1.65	0.98	1

Table 3. ANOVA

Independent	Dependent		Sum of squares	df	Mean square	F	Sig.
Sector	Usability	Between groups	0.357	2	0.179	0.899	0.423
		Within groups	3.972	20	0.199		
		Total	4.330	22			
Education		Between groups	0.652	2	0.326	1.772	0.196
		Within groups	3.678	20	0.184		
		Total	4.330	22			

An independent sample T-Test was conducted between gender and usability. The following Table 4 shows the independent sample T-Test between gender (male and female) and usability. The test was conducted to compare the influence of gender on the usability perception among the selected respondents. The result show that there are no significant differences in the score between male ($M=3.08, SD=0.36$) and female ($M=3.27, SD=0.49$) conditions; $t(18.73) = -1.014, p=0.323$. The test result suggests that different kind of genders does not influence or change the usability result of the study.

Table 4. Independent sample T-Test

Variable		F	Sig.	df	Sig. (2-tailed)
Gender	Equal variances assumed	1.431	0.245	21	0.368
	Equal variances not assumed			18.734	0.323

4.4. SUS scoring

According to Brooke [11], the SUS score is range from 0 to 100. The items are not meaningful by itself; meaning that the positive pole and negative pole must be reported altogether. The SUS scoring is calculated: i) items 1,3,5,7,9 will minus 1 from the scale position, ii) items 2,4,6,8, and 10 is calculated by 5 minus the scale position, iii) All items will be added to get a total score, and iv) the total score will be multiplied by 2.5 to obtain the total usability score. The following Table 5 shows the result of usability assessment based on three usability acceptance rates: i) Acceptable (70% to 100%), ii) Marginal Acceptance (50% to 69%), and iii) Not Acceptable (0% to 49%). The result from Table 5 shows that most of the experts rate the application usability assessment as Acceptable ($N=22$ or 95.6%) and Marginally Accepted ($N=1$ or 4.34%). No expert rates the application as not acceptable, thus confirming the usability of the application. The following Table 6 shows the distribution of SUS scores among 23 experts selected for the

study. More than half of the experts gave marks more than 70% for the usability assessment of the application. The highest marks given is 100% (N=4), while the lowest marks given is 60% (or N=1).

Table 5. Acceptable ranges

Scale	Total	%
Acceptable (70-100)	22	95.6
Marginal (50-69)	1	4.34
Not Acceptable (0-49)	0	0

Table 6. Acceptable ranges

#	SUS Score	%	Usability Indicator
1	33	82.5	Acceptable
2	31	77.5	Acceptable
3	38	95	Acceptable
4	30	75	Acceptable
5	40	100	Acceptable
6	31	77.5	Acceptable
7	36	90	Acceptable
8	31	77.5	Acceptable
9	30	75	Acceptable
10	29	72.5	Acceptable
11	40	100	Acceptable
12	30	75	Acceptable
13	40	100	Acceptable
14	29	72.5	Acceptable
15	34	85	Acceptable
16	31	77.5	Acceptable
17	34	85	Acceptable
18	30	75	Acceptable
19	33	82.5	Acceptable
20	35	87.5	Acceptable
21	29	72.5	Acceptable
22	40	100	Acceptable
23	24	60	Marginally

4.5. Discussion on results

Demographic profiles have long become a debate among the scholars. Several researchers found a positive correlation and significant differences between demographic profiles with the antecedent and dependent variables [15]–[21]. For example, Matovic *et al.* [18] found that female respondents are more satisfied with their basic salary and work-related benefits. Besides, age also plays an important role as motivational impacts especially to women over the age of 45. On the other hand, the work of Rosman *et al.* [5] found out that different fields of study contributed toward a different level of user engagement with the digital library—in which social science recorded a high level of user engagement while science and technology recorded a low to moderate level of engagement. However, in the context of usability assessment, much focus is given to the assessment of the product rather than the effect of demographic profiles on the usability assessment. The result of our study extends the previous similar works by assessing the effect of demographic profiles on the usability assessment. Our study shows that different demographic profiles (sector, education, and gender) do not have a significant difference over the usability assessment. This can be attributed to the profiling of the respondents—in which most respondents have experience over than 10 years in the related fields of library and information science (LIS), as mentioned by several previous research [22]–[24]. Besides, most of the respondents have previous knowledge on the citation software using either EndNote or Mendeley, thus it helps them to relate the interface of the application and its usage.

On the other hand, the result of usability analysis using SUS score indicating the acceptance of the proposed application software as suggested by several usability testing research such as [11], [12], Upitit *et al.* [25], and Rosman *et al.* [26]. Our result indicates that several criteria must be given utmost importance in the development of an information system, such as special features, user-friendliness, proper guidance, and training. Moreover, the future study must also consider the aspect of end-user in the development of an information system. Additionally, we utilise the SUS score to determine the usability of the application. A future study might look upon other usability assessments such as [26]–[28].

5. CONCLUSION

The study was conducted to answer two research objectives: first, to investigate the roles and usability assessment of CiteGuru application as a mobile solution for improving learners' skills, ability, and

knowledge on referencing, and second, to investigate the roles of demographic profiles on the usability perception among the respondents. To answer both objectives, we conducted a quantitative study involving 23 experts. Data was then analysed and imported into SPSS version 26. To answer the first objective, we adopted the SUS. Data were recorded based on positive and negative perceptions. Our findings indicate that the experts rate the CiteGuru application as *Acceptable*. In relation to the second objective, we use SPSS to determine the effect of demographic profiles (sector, education, and gender) on the usability assessment of the expert. Two tests were conducted: ANOVA and independent sample T-test. Results show that all three conditions (sector, education, and gender) do not have any influences on the usability assessment. This study, however, is not without a limitation. First, we collect the data from a small number of respondents. Although sufficient in the context of the usability study, we suggest future studies to involve more diverse respondents, especially the end-user that will be using the application. Second, this study looks upon the effect of demographic profiles on the usability assessment. We suggest future studies to develop theoretical modelling on the determinants and impacts of usability assessment especially concerning human-computer interaction and user engagement.

ACKNOWLEDGEMENTS

The authors would like to thank the financial support received from Universiti Teknologi MARA Kelantan Branch, Malaysia under Internal Grant 600-TNCPI 5/3/DDN (03) (004/2020).

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