Prototype Development of Mobile App for Trilingual Islamic Banking and Finance Glossary of Terms via iOS and Android Based Devices

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Abstract—The existing use of mobile technology nowadays can be integrated with various forms of learning materials such as electronic books and digital references in a form of dictionary or encyclopaedia. The expansion of Islamic banking practices through various local financial institutions which received vast attention nowadays by educationists and learners for instance, leads to the need in understanding the terminologies used in the industry. In view of this scenario, the paper shed some light on using a workable model for developing a purposeful mobile Islamic banking terminology glossary application in a more convenient way via mobile devices such as iPhone, iPad or any Android-based smart gadgets. The mobile terminology glossary app was designed by using a developmental research design using via rapid prototype instructional design model. The process begun with a need analysis conducted among 225 respondents in International Islamic University Malaysia (IIUM) It further explored the prototype development and its implementations for mobile accessibility by providing multilingual glossary of Islamic banking and finance termi-

nologies (Malay-Arabic-English). This paper reports the findings design and development prototype based on the need analysis stage, inclusive of mapping users' device type, Internet accessibility, reasons for owning mobile devices, delivery and user interface, and preferred features to be embedded in the mobile app.

Keywords—paper publishing, online journals, styles, how-to

1 Introduction

In Malaysia context, the interest of Islamic banking and finance is growing very rapidly with the introduction of the system by various banks and financial institutions. The concept of Islamic banking includes many terms which originated from the study of Muamalat or transactions in Islam. Those terms are originated from Arabic language and have evolved in the field for very particular definition and meaning. In relation to works on glossary terms in this field, there are very limited if not comprehensive in nature. Some may focus on bilingual terms used in Islamic banking [1] or an area rather border in spectrum (English to Arabic glossary of translation). None of these focusing on the trilingual version of the terms as intended to be endeavoured in the current research. Let alone a specific mobile app to cater in offering this service to the end users. The area is also considered to be a matter of concern in language teaching and learning where the students acquiring languages such as, Arabic or English for specific purposes (Islamic banking and finance).

With the increasing number of laptops and smart phone users mean that there is an increase in the number of readers who use these gadgets. This call for a study on how this mobile technology can be employed to develop the users' and access comprehension. Research has found evidence that online materials and software have attracted many teachers to use the internet to actively develop the students' comprehension strategies through mobile learning [2] & [3]. The notion of mobile learning as similar to other technology-based learning facilities can be tracked back theoretically to various learning frameworks include behaviourist [4], constructivist [5, situated [6], collaborative [7], informal and lifelong [8]. The previous studies are highlighting the importance of integrating the learning theories for facilitating the teaching and learning support in mobile learning applications.

2 Learning via Mobile Technology

Mobile learning -ML-provides an opportunity for readers, anywhere, anytime, to contribute confidently, without pressure from inadequate time. ML is defined as 'any educational provision where the sole or dominant technology are handheld or palmtop devices including mobile phones, smart phones, tablet PCs and laptops' [9] & [10]. Tururnen, et al. [11] view mobile learning as a universal medium that may help in merging works, study and leisure time in meaningful ways. Attewell and Savill-Smith [12], maintained that ML is the acquisition of any knowledge and skill through using

mobile technology, anywhere anytime that result in an alteration in behaviour by promoting active learning. There has been a lack of research on the attributes of successful online virtual courses which employ mobile technology and on how to bring good pedagogy to the online environment. This study will adopt a Virtual-Class (VC) approach to find out whether an M-active (Mobile and active) learning pedagogy can enhance reading comprehension. Multiple types of mobile technology can be used in a Virtual-Class such as laptops, tablets and smart phone [13]. Bromham and Oprandi [14] found that an active VC can save money in comparison to traditional classroom instruction by motivating slow learners to participate in the learning process.

In addition, there are many evidences supporting the effectiveness of mobile technology in a wide range of activities for learners of all ages [15],[16]&[17]. Other studies that are related to establishing the mobile learning foundation focused on students' perceptions and attitudes in using this sort of technology. Findings from these researches revealed that the integration of mobile-learning into classrooms generated strong positive interests among students [18], [19]&[20]. Furthermore, there were studies that indicated students really enjoyed learning via mobile devices [21]&[22] and they believed that they were competent and at ease when using the mobile devices in performing learning assignments [23]&[24]. Moreover, in terms of learning flexibility and portability, the learners perceived convenience when using the mobile applications and tools [25],[26]&[27].

3 Problem Statement

The current statistics have shown that the Arabic Learners in Malaysia have reached thousands especially with the introduction of J-QAF programme (Quran-Jawi-Arabic-Fardhu Ain Programme) imposed at Malaysian Ministry of Education schools. In fact, the learners of Arabic are increasing in number from time to time at various level; school, higher institution, and professional workplace. The relationship between Arabic and Islam to certain extent may assist these learners in understanding the terms learned or acquired but they are many other terms that need special procedures for finding their equivalent counterparts in the target language for definite explanation of meaning and understanding. In other scenario, the expansion of Islamic banking practices through various local financial institutions leads to the need in understanding the terms used in the field at anytime and anyplace due to the dynamism of the field itself. Thus this study attempt to develop a prototype of a mobile app for glossary of terms in Islamic banking and finance since technology has already evaded our houses, dominated school children, and expanded across our professional lives. Mobiles, iPads, tablets, laptops and many other technology devices have a great impact on educating the community. These devices can be employed as an alternative to traditional Arabic-Malay dictionary by providing a mobile as an active environment that could promote their excellence learning and reading comprehension strategies in the 21st century computational revolution [28]. Realizing the need to have a mobile access on these terms in the targeted trilingual version of the terms would be a main motivating factor behind this project.

The existing scenario illustrates this matter in a better way where the utilization of mobile gadgets among the educators and students is exponentially increasing nowadays and certainly the years to come. The mobile accessibility, in this respect, is a must or else the potential use of technology could not be made beneficial especially when it comes to academic and education – the two areas which are always being neglected by the modernity and technology. At the moment, mobile glossary of terms in Islamic banking and finance is not yet available in the mobile market (Apple and Android apps stores). Some of the mobile applications available in the market (iTunes and Google Play) with the similar intended functionality unfortunately cater for English-only based dictionary, such as *Financial Glossary* app (USD3.99) and *Financial Terms* (USD2.99).

4 Research Objectives

The main objective of this study is to embark on developing a mobile application for glossary term of Islamic banking and finance for the target community of academics and professionals using the step-by-step Rapid Prototype Model [29] as the followings:

1. To collect and enrich a comprehensive corpus of Islamic banking and finance terms.
2. To convert the data collected in electronic database format for inclusion to the mobile application.
3. To design and develop an workable mobile application for this purpose.
4. To design and develop interactive tools (search, word properties, related terms, custom word list) integrated in the mobile application.
5. To perform formative and summative evaluation on the procedures as stated above.

5 Research Methodology

The project implied a developmental research design using rapid prototype instructional design [30] as a workable model. This entails the stages as follows:

1. Access needs and content – analysing the needs of the development and what is the nature of the content in details among 225 respondents and subject matter experts in Arabic and Islamic banking and finance from IIUM
2. Set objectives - detailing out the objectives from the development and how the each of the objectives can be achieved in the project
3. Design – constructing a prototype for the project through programming, debugging, sketching storyboards and designing accurate user interface.
4. Research – utilizing the prototype and performing continuous evaluation.
5. System installation- installing the prototype through proper channel in this respect would be putting the application into the Apple store and Google Play store for commercial purposes.

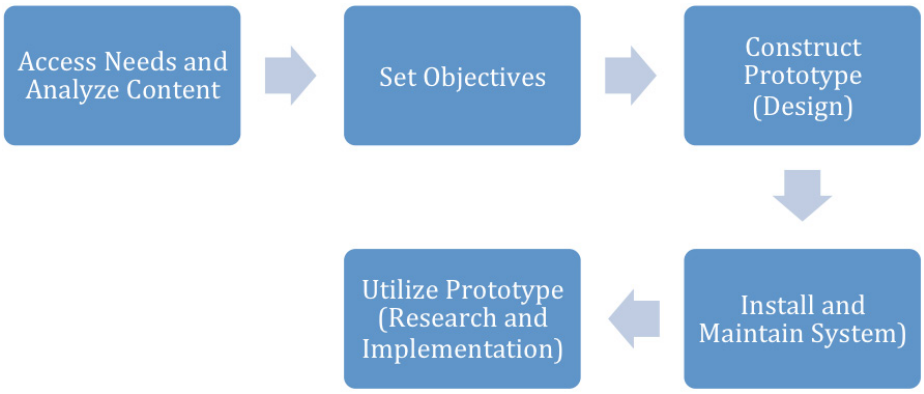

Fig. 1. Adapted Rapid Prototype ID Model

The model (as illustrated in Figure 1) allows a better communication between the designer and users right from the beginning. The feedbacks given by the users can be implemented at the earlier stage of the development of any prototypes. This non-linear approach gives more flexibility as well in detecting any drawbacks and defects existed in the development stages. It is, however, cautioned that this model is to be applied only in situations where time and costs are crucial factors [31].

5.1 Need Analysis and Analyse Content

The quantitative data collection procedures were used for this research. A survey for need analysis was distributed among 225 respondents from IIUM, who were coming from the Education and Social Sciences (95.1%) followed by Sciences and Health Sciences (2.7%) and ICT and Engineering (1.8%) participated. The breakdown of their educational backgrounds is as follow: Diploma (3.1%), Bachelor (89.4%), Master (4.9%), and PhD (2.7%). In this stage, the need analysis is important to conclude the user's needs, contents of app and the objectives as proposed by the respondents as the following:

Device Ownership: This survey is conducted to explore the device ownership by the respondents. Table 1 indicated that 159 out of 225 respondents (70.4%) had Android based device for their mobile phones followed by others (19%), Apple iPhone (11.1%), and Windows Phone (2.2%). The least was Blackberry mobile phone with a percentage of (1.3%) only. The possible factors that led to the high ownership rate of Android based mobile phones may be attributed to the competitive price of these devices. However, in lieu of this finding, the simplicity, reliability and functionality may be best attributed to others, such as, Apple iPhone or Windows Phone.

Internet Accessibility: For the internet accessibility**,** Table 2 showed that the most popular Internet access among respondents was through Wifi facility in the university (84.5%), followed by Broadband 3G/LTE (37.6%), Free Hotspots (18.1%), High-speed Broadband (11.1%), Streamyx (8.8%) and others (8.4%). Since most of the respondents were from the field of education and social sciences, this is the possible

explanation why University Wifi was chosen to be as the main preferred facility. This is balanced by Broadband 3G/LTE services with almost 40% of the respondents subscribed to them indicating that the Internet can be reached more than just the campus limited area.

Reasons for Having Mobile Devices: The respondents were asked on the reasons for having a mobile device. Table 3 portrayed the results with the majority of them (92.9%) selected Communication as the main reason, and it was was followed by Education (85.4%) and Entertainment (71.7%). Collaboration and Business reasons received lower adoption with only 23.5% and 16.4% accordingly. Since the selection of the respondents vastly came from the field of Education and Social Sciences as stated earlier, the findings disclose some insights of academic community in the study. It is noticeably clear from the findings that not only academic related matters (Education=85.4%) entice them to own a mobile device but some joyful activities might do as well (Entertainment=71.7%). However, surprisingly collaboration as the core activity in teaching and learning received less than normal with (23.5%) only.

Table 1. Ownership of mobile devices based on types

Device Type	Percentage
Android	70.4%
Others	19.0%
Apple iOS	11.1%
Windows Phone	2.2%
Blackberry	1.3%

Table 2. Internet accessibility preference

Internet accessibility	Percentage
University Wifi	84.5%
Broadband (3G/LTE)	37.6%
Free Hotspots	18.1%
High-speed Broadband	11.1%
Streamyx	8.8%
Others	8.4%

Table 3. Reasons for having mobile devices

Reasons	Percentage
Communication	92.9%
Education	85.4%
Entertainment	71.7%
Collaboration	23.5%
Business	16.4%
Others	0.9%

5.2 Set Objectives

The second part of this analysis survey was meant for analysing the objectives of mobile apps that will be designed. The objectives were determined based on the following results:

Content Delivery and User Interface: The respondents were asked to select their preferences on elements used for the delivery of the app and its user interface design for the design of practical use of this mobile app such as the form of the app, the navigation of content, the main menu design, the delivery platform, and the language interface as showed in Table 4. Apparently, the combination of non web-based and web-based app (hybrid) was the preferable one. This might refer to the fact that non web-based app is comparably faster in execution while at the same time any update if exist can be made seamlessly through limited online button click. As for the navigation, scrolling up and down using finger touch was rated highest which again might refer to the speed factor and the factor of responsiveness. The main menu was preferable to be in a combination of both icons and their descriptions. Though the limitation of the mobile screen size may have hindered this preference, an app with fewer items may be considered for the development. Furthermore, the delivery was opted to be on both phone and tablet platforms. Although having on both platforms may give advantages to users, the limitation of resources would obstruct it from becoming a reality. As for the current study, the development of the app is for mobile phone platform rather than tablet. Finally, the language interface of preference was English. Giving the fact that English interface is familiar to the users in almost the majority of apps available nowadays, the phenomenon is also true in this finding.

Table 4. Content Delivery and Interface Preferences

Interface preferences	Types of App	Percentage
I prefer to have the app in a form of	Hybrid (combination of both)	63.3%
	Non web-based app	9.7%
	Web-based app	27.0%
I prefer the navigation of the content app using	Page flipping	27.9%
	Previous and next buttons	11.5%
	Scroll up and down	60.6%
I prefer the Main Menu in a form of	Both	69.9%
	List of icons only	24.8%
	List of words only	5.3%
I prefer to have the app designed for	Both	67.3%
	Mobile phone	29.6%
	Tablet	3.1%
I prefer the language interface in one of these languages:	Arabic	18.1%
	English	76.5%
	Malay	5.3%

Preferable Features: Table 5 shows the features rated by the respondents in descending order. The highest requested feature was search functionality due to this is

the core function in any apps with dictionary like category. Next, the features received above 95% rating from the respondents were literal meaning of the term (97.8%) followed by settings section (97.3%). Features of trilingual form (English-Arabic-Malay) (96.9%) and terms arranged alphabetically received similar percentage of rating with (96.9%) each. This was tailed by Arabic transliteration of the term, word properties of the term, and list of related terms with (96%) each. Later followed by Arabic script of the term and view search history with (95.2%) and (95.1%) respectively. Noticeably in these selected features that the respondents need flexibility in using the app by being able to customise several settings incorporated in it. This message is obvious as settings section rated in third position from the list with 97.3%.

Table 5. Preferable features for designed mobile app

Features	Percentage
Search functionality	99.1%
Literal meaning of the term	97.8%
Settings section for changing the app appearance	97.3%
Trilingual form (English-Arabic- Malay)	96.9%
Terms arranged alphabetically	96.9%
Arabic transliteration of the term	96.0%
Word properties of the term (noun, adjective, verb, etc.)	
List of related terms	96.0%
Arabic script of the term	95.2%
View search history	95.1%
Add bookmarks	94.7%
Audio pronunciation of the term	92.9%
Custom list of terms	92.5%
Extended meaning of the term	92.0%
Terms arranged topically	91.1%
Share term definition via social networks (Twitter, Facebook, etc.)	88.1%
Share term definition via email	83.7%

6 Prototype Construction, Utilization, Installation and System Maintenance

The Islamic Banking and Finance (IBF) Dictionary was inspired circa 2014 in view of its importance towards the development of IBF industry not only in Malaysia, but in all countries in the world. Instead of having a printed version, it has an electronic version – a mobile application for Android and Mac users, called IBF Terms. IBF Terms is a continuation from the printed version of IBF Dictionary. The purpose of this mobile app is to provide an easy mean for IBF practitioners, academicians and students to make use of their mobile phones to learn and explore IBF in depth, as well as to facilitate a better understanding towards IBF principles, techniques and applications.

6.1 Development

This mobile dictionary comprises of two components: web server and mobile application. Web server houses all data and information, while mobile application serves as a platform to present such data and information stored in and retrieved from the web server. For an easier understanding, all data and information available in the mobile app came from the web server. Both are interdependent. Otherwise, this mobile dictionary would not be a reality. 5 types of technology are used for the purpose of establishing, managing and maintaining both web server and mobile application.

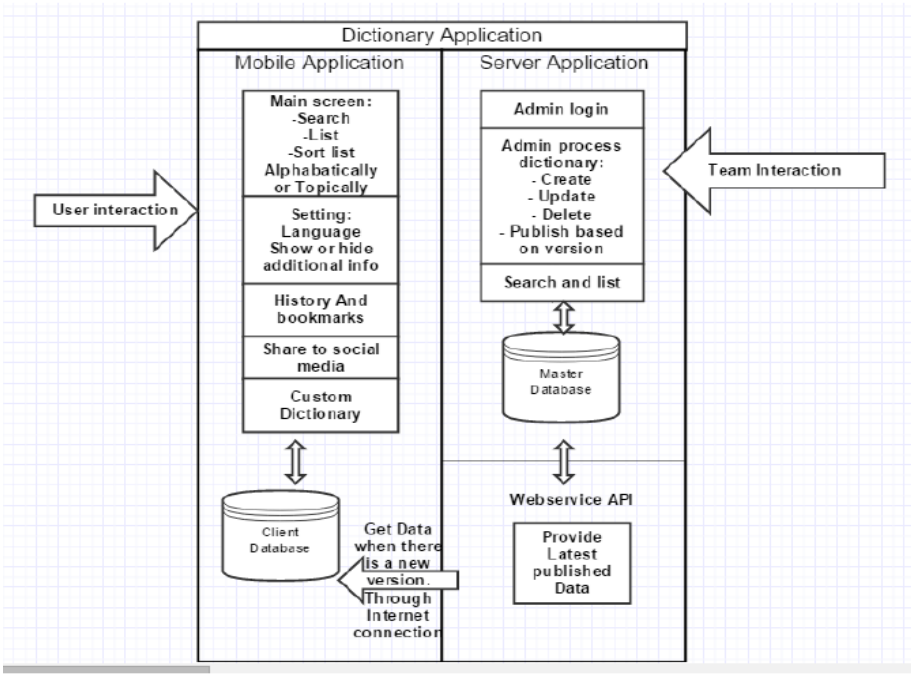

Fig. 2. Construction and installation of mobile dictionary app

6.2 Development map

Ruby on Rails, PostgreSQL and JavaScript are used in the web server. Ruby on Rails provides default structures for a database, a web service and web pages; PostgreSQL stores data securely; while JavaScript creates interactive pictures on applications and web pages through its own language. These 3 types of technology enable the developer to establish and exercise numerous roles – terms listing, terms searching, authentication, term management, document uploading and document processing. At the other side, Ionic and SQLite are used in the mobile application. Ionic serves as an open-source software development kit; while SQLite serves as a database engine. Both types of technology allow the developer to not only list and search terms, but also to bookmark them and insert custom terms.

6.3 Development team

The development of this mobile dictionary was made possible by Namlite Sdn. Bhd. led by Abi Dzar Jaafar. At the initiation of this project, the Company outlines numerous project objectives. The purpose of this project is to: (i) convert the data collected in the electronic database format for inclusion to the mobile application; (ii) design and develop a workable mobile application for this purpose; (iii) design and develop interactive tools integrated with the mobile application; and (iv) perform formative and summative evaluation on the procedures as stated previously.

6.4 Execution phases

The company initiated the project in June 2015 and underwent 7 phases of execution. The *first phase* was requirement and design, and system architecture. At this phase, the developer prepared a guideline called the User Requirement Specification, and design and architect the ecosystem between client and server.

The *second phase* was web application service running for data entry. At this time, the developer designed and developed a server for the purpose of storing the current updated version of the database to be used in the application and, at the same time, a server interface for the purpose of updating and displaying the database of terms in the application.

Phases 3 and 4 are phases for mobile application development. The developer underwent both phases to establish features in mobile application. They are: (i) searching, displaying, bookmarking and sharing the terms; (ii) customisation of settings; (iii) displaying of terms alphabetically and topically; (iv) viewing of the search history; and (v) establishment of seamless and user-friendly mobile interface. Only platform differentiates both phases: the first one was for Android; while the second one was for iOS platform.

Phase 5 was the continuation of Phase 2, where the developer designed and developed a server for storing the current updated version of the database to be used in the app. At this stage, the developer ensured the speed performance of the website backbone of the database is acceptable and in line with the common standard.

Phase 6 followed Phase 4. At this stage, a mobile interface for adding, updating and displaying custom list of terms was made available in the application. At the same stage, the developer continued building the application for iOS users.

Phase 7, taking place tentatively in June 2016, was for evaluation and deployment. At the final stage of the execution, the developer made a quality assurance exercise by performing formative and summative assessment. The application is, then, due for deployment to market place in both Google Play and Apple Marketplace for the use of end-users.

6.5 Features

At the end of this project, end-users are expected to download the application through the mobile applications market (i.e. Google Play) and enjoy numerous fea-

tures; not only searching and viewing terms in short or in detail, but also addition and deletion of custom terms for personal reference. The terms may, even, be shared to other social medias, especially WhatsApp and Facebook. The features of this prototype are shown in Figure 3 until Figure 9:

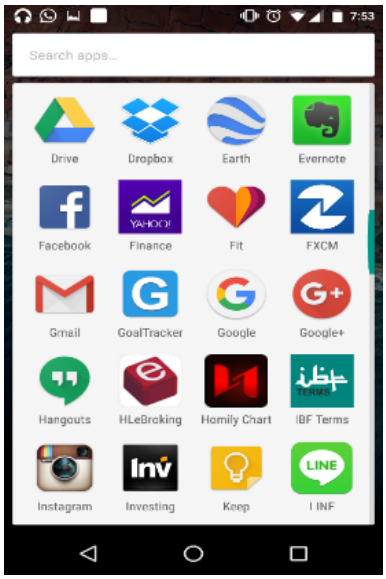

Fig. 3. Application icon, as shown in the menu

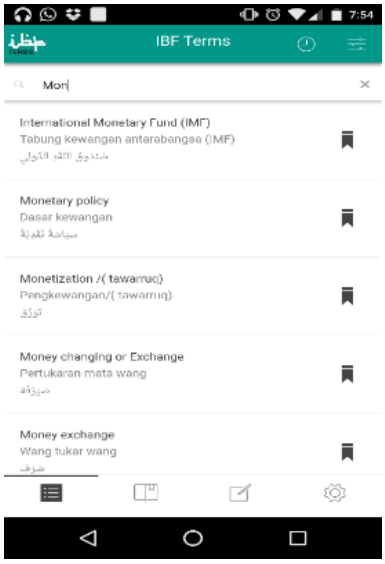

Fig. 4. Start Screen

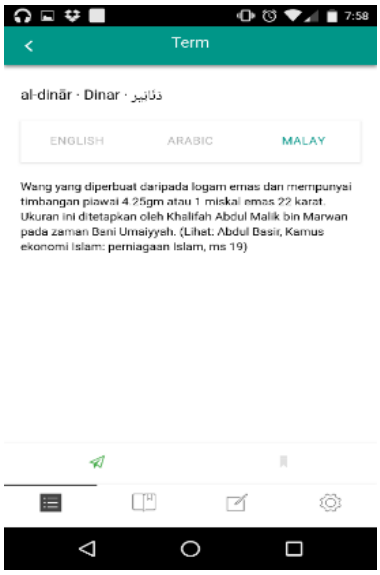

Fig. 5. Definition of a term shown in Bahasa Melayu

Fig. 6. Definition of a term shown in its original language (Arabic)

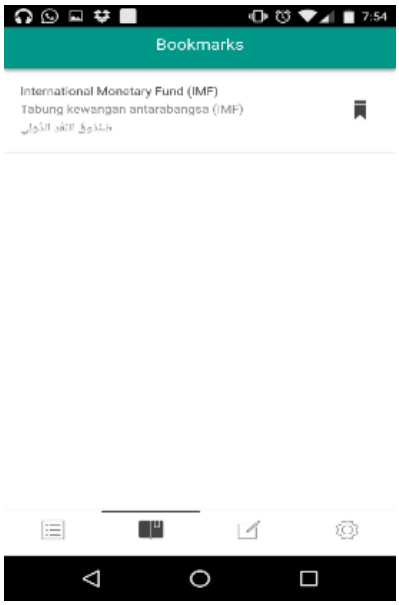

Fig. 7. Bookmarking a term in IBF

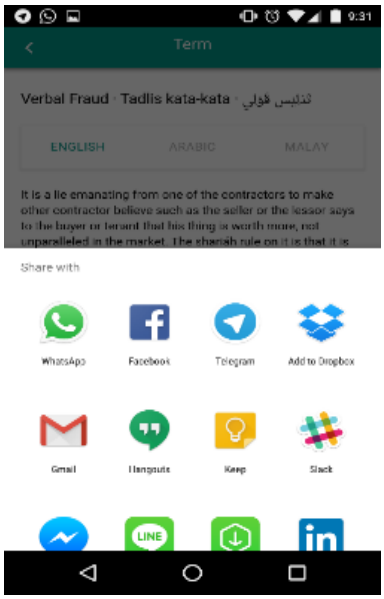

Fig. 8. Sharing a term and its definition to social media networks

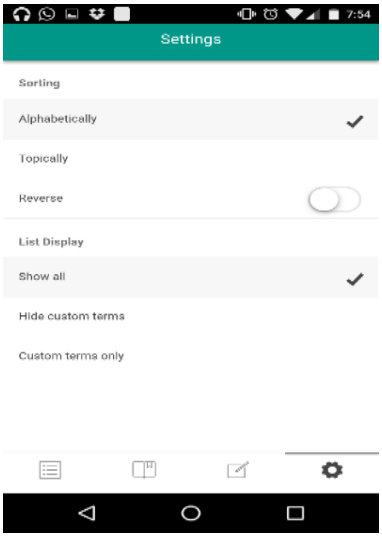

Fig. 9. Settings in mobile app

7 Discussions of Construction of Mobile App

Based on previous phases of the construction of mobile app in this paper, the researchers noticed several important issues related to the design and development processes as the following:

7.1 Facilitating user's needs as mobile learners

In this study, the learners shared their information on device type, Internet accessibility, and reasons for owning a mobile device. They also conveyed their preferences on the delivery platform, user interface, and requested features of the intended app, glossary of terms in Islamic banking and finance. The study suggests that the app can be later developed taking into account these findings to enhance its practicality and embrace by the academics and professionals at large. Future research has to build a bridge between technological innovations and users' satisfaction is important to ensure the use of the tool could trigger learning attainment, engagement, and motivation [32],[33]&[34].

7.2 Technical support for designed mobile app

The step-by-step development of mobile glossary of terms in Islamic banking and finance has employed the findings of the current needs analysis. Elements in aspects stated earlier which received higher rating from the respondents will be emphasised and put into consideration during the development. This includes the app of a hybrid type, navigation using scroll up and down, use of icons for the main menu, and the English interface. Although mobile web apps can be advantageous to the user compared to normal mobile app [35], the findings in this study suggest the combination of both as an opted preference. This is not only for the preference per se, but well supported by the results in the Internet accessibility where users may face difficulties to get the connection outside of the university territory as the number of subscribers to Broadband 3G/LTE is less than 40%. It is anticipated that the designated mobile app will not only be characterised as a user-friendly but can also provide a spectrum of experiences to the users particularly those interested in Arabic representations of the terms.

7.3 Integrating the learning contents with suitable supported features

Prior to the mobile app features, it is also wise to note here that the developed app will be supported on both platforms; iPhone and Android. It will serve on Android platform due to its popularity and be made available on iPhone device for its reputation in the field of education [36] and executive professionalism [37]. The content of the mobile app is multilingual in nature where it is supposed to cater the display of both Latin and non-Latin characters especially Arabic. Elements of the content include literal meaning of the terms in trilingual form (English-Arabic-Malay), Arabic

transliteration, word properties, and Arabic script of the term. On top of that, the capability of customising the app display is a feature that received higher request from the respondents. Other customisations like disclosing and closing some information of the term during the navigation, changing the language user interface, font type and size, and reading mode can be considered to be integrated during the development.

8 Conclusion

This paper has discussed the design of a mobile prototype app which enables users to look for Malay-Arabic-English terms in Islamic banking and finance via mobile access and interface. The users' needs and preferences are being taken account during the development of the mobile app. The app could be utilised to engage users in improving their knowledge on Islamic banking and finance. This is because not only the integrated features are those preferred and suggested by them but the overall interface itself that makes it likely unique from any other mobile apps available in the field. Hopefully it would contribute to a significant input in disseminating the intended information not only in an efficient and effective way but also engaging and enjoyable to the users.

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