

Adapting a Design and Development Research (DDR) Approach in Designing the Mobile Application Model for Tarannum Subject

Nurul Auji Hasbullah^{1*}, Norasikin Fabil², Adnan Mohamed Yusoff¹, Ahmad Sanusi Azmi¹

¹ Faculty of Quranic and Sunnah Studies, Universiti Sains Islam Malaysia, Bandar Baru Nilai, Nilai, Negeri Sembilan, 71800, MALAYSIA

² Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai, Nilai, Negeri Sembilan, 71800, MALAYSIA

*Corresponding Author Designation

DOI: <https://doi.org/10.30880/ahcs.2022.03.02.018>

Received 31 Juli 2022; Accepted 26 November 2022; Available online 31 December 2022

Abstract: This study aims to develop a model of mobile application for Tarannum subject. The development of mobile application model was for KKQ (*Kelas Khas Kemahiran Membaca dan Menghafaz al-Qur'an*) Tarannum subject towards highlighting the meaning-based concept in the model developed. To achieve this goal, the design and development research (DDR) were applied in accordance with the procedure of three phases as systematic process in conducting the research which respectively are analysis phase, design and development phase, and evaluation phase. The design and development research approach is currently widely used in educational research to test theory and validate a study empirically. This approach is also known as developmental research or development research, which is used in this study to design and develop a model systematically in a practical way. According to the result of this study, the main components of meaning-based Tarannum mobile app model designed for KKQ class are Tarannum types, Tarannum variation (*harakat*), Qur'anic chapters in audio version and text version, additional features which are the Tarannum practice and video of Tarannum, and multimedia elements which are text, audio, video, graphic and animation. The meaning-based concept was included in this model to be applied into the Tarannum recitation as users may understand the meaning of the verses. At the same time, users can feel and internalise (*tadabbur*) with the Qur'an recitation.

Keywords: Design and Development Research (DDR), Mobile Application, Tarannum Al-Qur'an, Meaning-Based Tarannum, KKQ Class.

1. Introduction

Tarannum al-Qur'an or Qur'anic chanting [1][2] is the art of reciting the Qur'ān. *Tarannum* al-Qur'an is one of the Qur'anic branches that emphasis on the method of reciting the Qur'an with a melodious voice. The sound and the pronunciation of the letters that are recited can describe the meaning that suits the intonation and the meaning of the verses itself. The melody of *Tarannum* al-Qur'ān is not the same as other singing songs such as poems, *qasidah* and *nasyid* in fact it has its own methods and principles and follow the laws of recitation in accordance with the requirements of Tajwid Al-Qur'an [3].

In Malaysia, *Tarannum* education is taught formally in higher education either in public higher education institutions (IPTA) or private higher education institutions (IPTS) and in selected secondary schools which are *Sekolah Menengah Kebangsaan Agama* (SMKA), *Sekolah Agama Bantuan Kerajaan* (SABK) and selected *Sekolah Menengah Kebangsaan* (SMK) schools that have religious stream class which is called *Kelas Aliran Agama* (KAA) [4]. For informal learning, *Tarannum* education has been taught in mosques, informal religious class, and private classes conducted by *Tarannum* experts and practitioners. In formal *Tarannum* education for secondary schools, the students are selected based on their capability and excellence in the Qur'an knowledge in order to place themselves to the class. *Kelas Khas Kemahiran Membaca dan Menghafaz al-Qur'an* known as KKQ class has been introduced by the Ministry of Education (MoE) in order to uplift Qur'anic knowledge among Muslims students. *Kelas Khas Kemahiran Membaca dan Menghafaz al-Qur'an* (KKQ) translated as Special Classes of Reading and Memorizing the Qur'an was first implemented in *Sekolah Menengah Kebangsaan Agama* (SMKA) since 1986 [4].

In the 21st century of learning, the innovation of technology were enable to deliver and tailor in students' learning that would be the best for their practices and educational system [5]. Due to the status of KKQ class as a co-curricular activity which should be held outside the mainstream class schedule, KKQ classes should leverage the technology in its teaching and learning process. Besides that, in Malaysia Education Blueprint (*Pelan Pembangunan Pendidikan Malaysia*) 2015-2025, the Ministry of Education, expects to ensure that students will not only know about ICT but also know how to utilize it effectively in order to enhance and improve the learning quality. Mobile technologies and portable devices such as laptops, smart phones, and tablets may offer many possibilities in education. Nowadays, it's becomes a needs rather than a want in daily routines. According to [6], the support of wireless network connectivity, mobile learning has gradually being valued and shift to the new learning environment, followed by distance learning and digital learning. This is in line with a study by Pereira and Rodrigues [7] which see that mobile learning or m-learning has emerged to a new learning paradigm shift into a new social structure with the increase number of mobile devices and wireless technologies. The use of mobile technologies has creates new opportunities and challenges in the teaching and learning process meanwhile, it is used to assist the teaching and learning process. Besides, it also can stimulate meaningful interaction of information by integrating the mobile technologies and services into variety of areas in teaching and learning. The conventional education method in teaching and learning is gradually transforms with the evolving of m-learning.

As a study done by [8], m-learning gives impact in the learning environment whereby its facilitate an access to the information and also increase the engagement towards the learning. Besides, Suartama [9] in their study specified that mobile learning is a powerful learning approach in increasing students' engagement equivalent to students' characteristics thus, it widely improve their learning experience due to the quality, mobility and its supporting platform. According to [10], m-learning has distinctive characteristics whereby the unique characteristics of m-learning are ubiquitous learning, portable in size, blended, private, interactive, collaborative, and gain instant information. Learners are able to undergo the authentic joy of learning at anytime and anywhere they want with these characteristics of mobile learning. As [11] has stated that m-learning is better than e-learning, whereby it achieves on-the-go learning with the nature by its mobility and not only focus on digitalization. With the unique characteristic of mobile learning devices have that is light and portable, compared to physical limit of desktop that is big and heavy, the learning environment would

provide freedom in learning and information can be obtain instantly by the means of wireless network environment.

2. Literature Review

2.1 Design and Development Research (DDR)

Design and development research (DDR) approach is a systematic study that provides systematic processes for developmental research. According to [12], a design and development research (DDR) is a pragmatic type of research study which offers to test the theory and validate practice empirically. In addition, it is a way to construct new procedures, techniques, and tools based on methodological of specific studies. Richey and Klein had offer a concise definition of this type of research as “the systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools, and new or enhanced models that govern their development”.

Design and development research covers a wide spectrum of activities and interest. It accomplishes the goals through two types of the research projects whereby type 1, is product and tool research and type 2, is a model research. For product and tool research, the design and development process used in certain circumstances basically it is outlined, analysed, and evaluated its final product. The product and tool research includes an attentive and extensive documentation of Instructional System Design (ISD) phases which are analysis, design, development, and formative evaluation phases. On the other hand, research on design and development of models is more focusing on the models and process where the study have to undergo, rather than its demonstration [12]. In the model research, there are three systematic phases as a guide which are the need analysis phase, the design and development phase and the evaluation phase based on the existing study of [13][15].

According to Richey and Klein [12], the type 1 of DDR referred to product and tool research in which it is the most straightforward design and development research whereby the entire design and development process have to be documented. However, in some cases, the product and tool research only focus on one aspect of design and development (such as production) or not emphasis of some phases (such as needs assessment). Recently, technology-based instruction dominates the design and development of product and tool research.

While, the second type of design and development research pertains to study on development, validation, and use of the model developed. This kind of study focuses on the models and processes itself, rather than the demonstration. It is also possible to conduct a model research concurrent with the development of a product or program. Most of the studies on model development inspired from the previously developed instruction, which resulted a non-specific project. The existing or newly constructed model, process, or technique can be addressed its validity and effectiveness. Furthermore, the model studies often seek to identify and describe the circumstances which lead to a successful design and development.

The utmost objective of this research is the construction of new knowledge, which often in the new form (or an enhanced) design or development model. This research highlights towards comprehensive models or particular design techniques or processes. For instance, the study done by [16] had employed the DDR approach in developing the product and tool research while, [17] had used DDR approach in developing the model research.

2.2 The Origin of Tarannum al-Qur'an

Tarannum al-Qur'an had emerged for centuries in the Arabs' country. It is believed that the art of *Tarannum* al-Qur'an has been practices since the time of the Holy Prophet Muhammad ﷺ [18]. According to historians, *Tarannum*'s origin were inspired from few elements of environmental sound

that are from wood friction, wind blowing, bird chirping, and water flowing. All the inspired sounds are then been composed and include melodies by the poet to make variation of *Tarannum* rhythms according to the respective cultures. The modernization of *Tarannum* (Arabic music) is believed to be originally influenced by Greek civilization. It was started by a music professor who was from Greek people and then extended to music experts in the Arab lands. It is believed from few hadith *sohih* that the history of *Tarannum* commencement is from the history of Nuzul Qur'an in Hira' cave in 610M where the Prophet Muhammad ﷺ himself recited the Qur'an well, nice and in a beautiful way. He also urged the community to recite the Qur'an with *Tarannum*, *Tazyin*, and *Tahsin* [18], [19].

The history of *Tarannum* and Qur'an learning in Malay Archipelago expands in line with the development of Islam itself through Arabic traders and missionaries especially in the tenth century until fifteenth century; that is before the arrival of the western colonist [18].

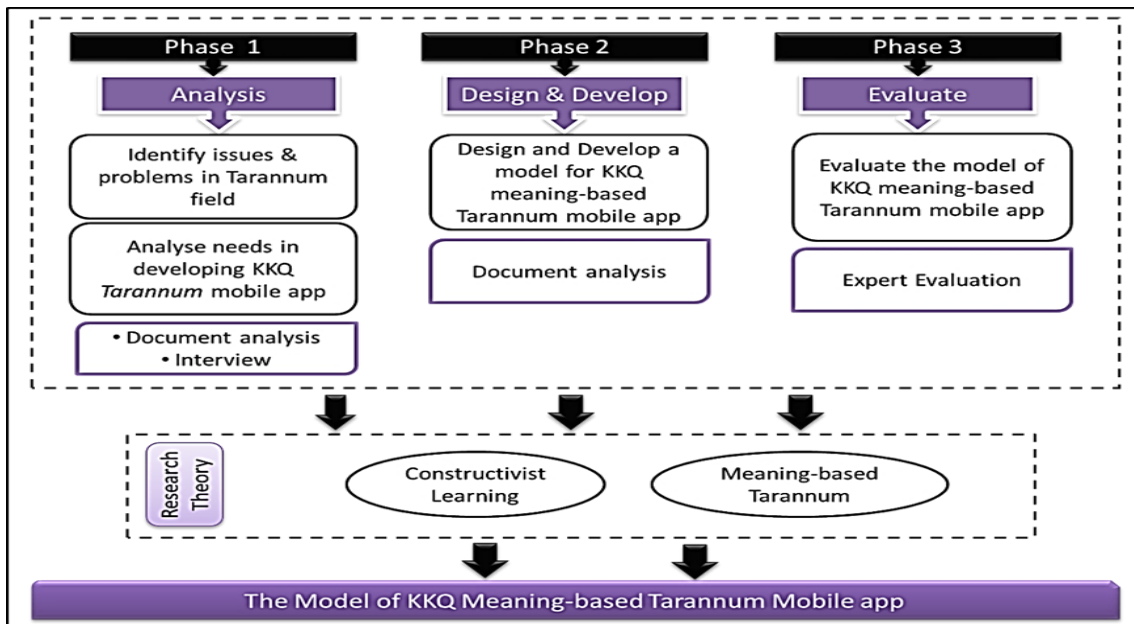
3. Methodology

This systematic study is basically based on the design and development research (DDR) approach by Richey and Klein [12]. These methods are also known as developmental or development research [20], [21] which seeks to create knowledge grounded that is systematically acquired from the practice. The formulated methodology was based on the design developmental research (DDR) which is empirical by its nature. DDR approach contributes to production of new knowledge in a more comprehensive understanding of the field being studied, and capable in making predictions. As mentioned before in the literature review, DDR accomplishes the goals across two large categories of the research project:

- 1) Type 1 : Product and tool research
- 2) Type 2 : Model research

The DDR can be employed multi-method in one study. Many design and development research on the product and tool development research and model research rely upon a wide diverse of qualitative methods, including case studies, interviews, document analysis, and observations. In the evaluation research, both qualitative and quantitative methodologies are also applied in many studies which focus on product and tool development. For model development studies, the use of case study and survey research techniques is commonly employed, while for model validation studies, traditional experimental design is frequently employed.

This paper had employed the DDR type 2 which is model research in order to develop a model of meaning-based *Tarannum* mobile application. Generally, this systematic study is comprised of three phases which respectively are the need analysis, design and development, and evaluation phase. Figure 1, depicted the research framework which describes the overall of the research done.



Adapted & Adopted from: Richey & Klein

Figure1: The Research Framework

Figure 1 shows the study had conducted in three phases which the first phase is the need analysis phase. In this phase, the objective of the study is to identify the issues and problems in *Tarannum* field as this field is currently lack of research and sources to discover. The second objective is to analyse the needs in developing the KKQ *Tarannum* mobile app. The methods used were document analysis and interview session. The second phase is the design and development phase. The objective is to design and develop a model for KKQ meaningbased *Tarannum* mobile app. The method used for this phase is document analysis whereby the researcher searched and analysed the existing *Tarannum* mobile apps in Google Play Store in configuring the elements for the model. The last phase, which is phase 3, is the evaluation phase. The objective for this phase is to evaluate the model of KKQ meaning-based *Tarannum* mobile app developed in the design and development phase. The evaluation process was done with the experts that are the KKQ teachers, the lecturers in Islamic education field and Quranic education field and the Qur’anic reciter (*qari*’), in order to obtain the consensus among those experts.

This systematic study had helps the researcher to design a study and it also can apply multi-method and various kinds of instrumentations according to the phases contained therein. Table 1 presents the method and instrumentation used throughout this study.

Table 1: Design and Developmental Research Phases

Phases	Method	Instrumentation
Phase 1: Need Analysis	Document Analysis & Interview	Interview Protocols
Phase 2: Design and Development	Document Analysis	Matrix Analysis
Phase 3: Evaluation	Fuzzy Delphi Method	Expert evaluation questionnaire

3.1 Research Flowchart

i) Need Analysis Flowchart

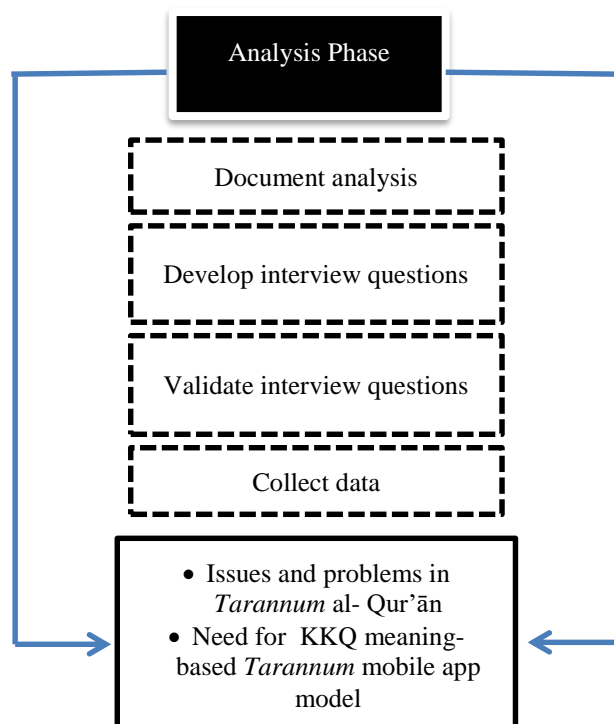


Figure 2: The need analysis Flowchart

In order to design the model of KKQ meaning-based *Tarannum* mobile application, the first step is to conduct the need analysis phase in configuring there is a need for the development. Figure 2, shows the flowchart of the need analysis phase. From depicted figure, this study had conducted a document analysis and interview sessions to gain the needs. For document analysis, documents such as the journals, proceedings, theses, and general articles regarding to *Tarannum* were reviewed in identifying the general issues and problems regards to the *Tarannum* field. All the relevant documents are included into Mendeley desktop and exported to Atlas.ti 8 software. Each of the documents was assigned with the relevant codes in order to find the answers for the research questions and the answers for this research question will be in the thematic. Then, the interview sessions were conducted. An interview protocol is developed to certify that the identical fundamental rules of questions are being followed to each person interviewed. The interview questions or interview protocols were developed align based on research questions [22], [23] and relevant literature [23]. The semi-structured approach of interview questions was applied in this study in order to give better freedom to query and explore the answers given by the participants in a more deeper understanding [24]. Besides that, it enabled for the modification in the order, phrasing the questions, any additions to the protocol and the questions were flexible indicating the emergent nature of the interview session [25]. The interview protocols then being validated by the experts to make sure the content and language used in the interview protocols is convenient. The data were collected by the researcher in one to one interview sessions with the participants that involved in this study which are the KKQ teachers and students, and the Qur'anic reciter (*qari'*). The documents are sorted and the transcriptions are deductively and inductively coded based on the research questions. The data from document was analysed through inductive and deductive coding using ATLAS.ti 8 software to analyse, synthesize and draw conclusions throughout the themes that have emerged from the analysis of data.

ii) Design and development Flowchart

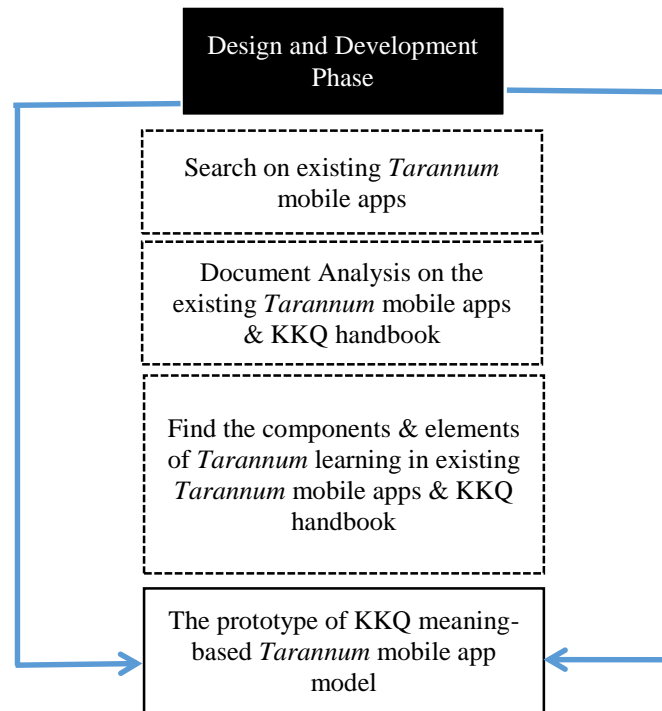


Figure 3: The Design and development Flowchart

In the second phase which is the design and development phase, before designing the *Tarannum* mobile app model for the use of KKQ classes, researcher had done searching on the existing *Tarannum* mobile app in the Google Play Store apps. There are ten apps chosen throughout the search based on the relevance keywords which are “*Tarannum al-Qur’an*”, “*Maqamat al-Qur’an*”, and “*Tilawah al-Qur’an*”. Researcher had selected ten *Tarannum* mobile apps based on the suitability of the learning style of KKQ students at the secondary school level, that have the interactive elements whereby it is convenient at the age of the students. The existing *Tarannum* apps had been documented in identifying the elements and components to be included into the KKQ meaning-based mobile app model. The researcher documented each of the *Tarannum* mobile apps’ content each page and navigation before tabulated for the document analysis purpose. Based on this document analyses, researcher had developed the matrix analyses to summarize and analyze qualitative data into a table. At the same point, the document analysis towards KKQ handbook was also conducted. Finally, from this phase, the prototype of KKQ meaning-based *Tarannum* mobile apps model was developed.

iii) Evaluation Flowchart

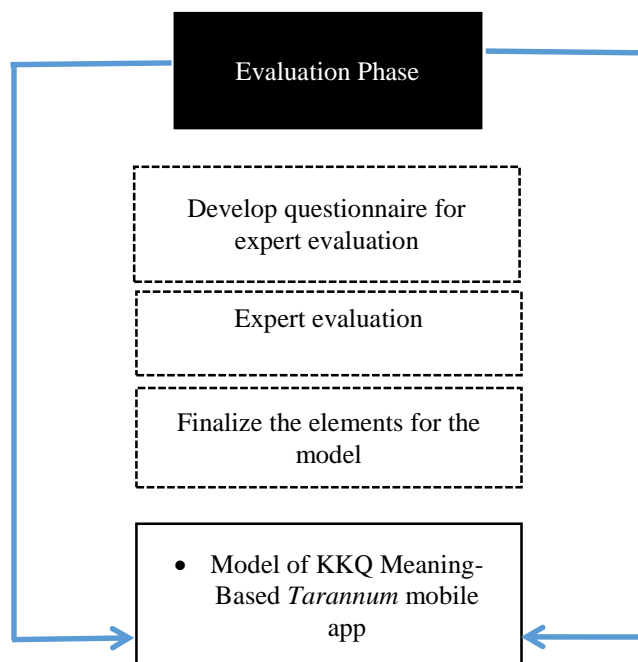


Figure 4: The Evaluation Flowchart

In the third and final phase which is the evaluation phase, researcher had developed questionnaires for experts to evaluate the prototype model. The questionnaires were developed based on the document analysis conducted in phase II, the design and development phase. The questionnaire was used in evaluation phase in order to seek consensus among the experts on the designed model. There are ten experts that had been appointed to be involved in this research study. The experts were appointed based on their experience in Islamic Studies field, Al-Qur'an field, KKQ teachers and also Qur'anic reciter (*qari'*). The experts need to evaluate the prototype model of KKQ meaning-based *Tarannum* mobile apps based on the questionnaire given which comprises of three sections. Section A is the demographic information, section B is the evaluation on the elements that are suitable with the KKQ meaning-based *Tarannum* mobile app model and section C is the evaluation on the overall usability of the model developed. The questionnaire had been distributed after the experts agreed to take part in this research. In analyzing the questionnaire, the data were analyzed by using Fuzzy Delphi template in Microsoft Excel developed by Mohd Ridhuan and Nurulrabihah [26]. This study had followed the steps in Fuzzy Delphi method and had finalized the elements of the model of KKQ meaning-based *Tarannum* mobile app based on the agreements among the participated experts. The final model of KKQ meaning-based *Tarannum* mobile app was developed throughout this phase.

4. A Model of KKQ Meaning-Based Tarannum Mobile Application

After the data collection and analysis in the evaluation phase are done, researcher had come out with the finalized model of KKQ meaning-based *Tarannum* mobile app as depicted in Figure 5.

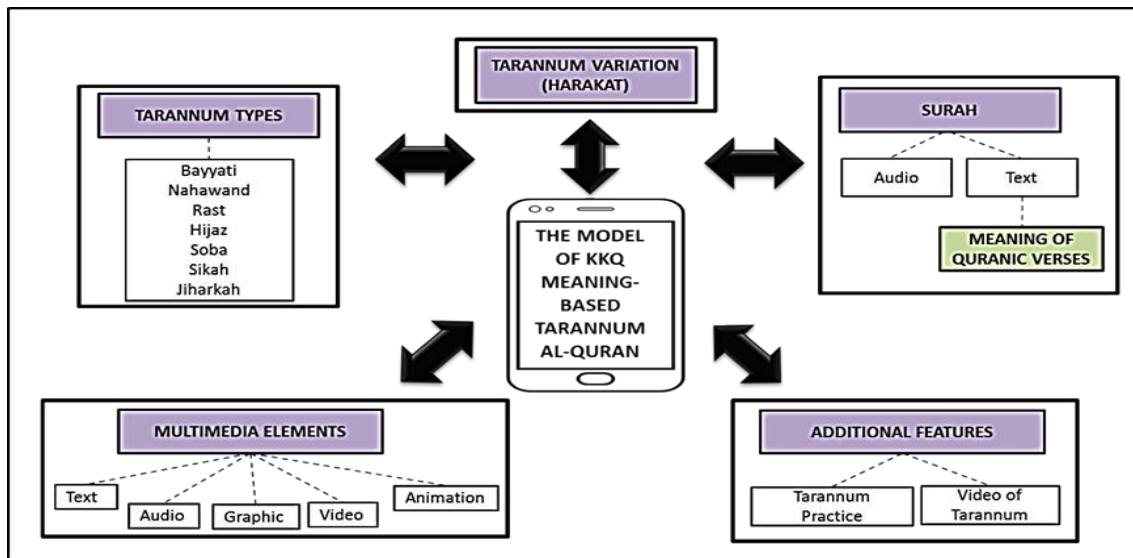


Figure 5: The Finalized Model of KKQ Meaning-Based *Tarannum* Mobile App

In conclusion, there are five main elements that the KKQ meaning-based *Tarannum* Al-Qur'an mobile application model should include. The main elements of the model are (1) ***Tarannum types*** which consist of seven types of *Tarannum* that is *Bayyati*, *Nahawand*, *Rast*, *Hijaz*, *Soba*, *Sikah* and *Jiharkah*. Each type of *Tarannum* melodies has its own characteristics, thus the recitation of *Tarannum* must be recited based on its characteristic which for example, *Tarannum Hijaz* is suitable for verses which indicates the command, prohibits and anger. So, the verses that indicate those meaning has to be the example for that type of *Tarannum*.

(2) ***Tarannum variation or the harakat of Tarannum***. *Harakat* means style of singing or chanting that is composed from several *qit'ah* with its particular mahattah. *Qit'ah* means the shortest motion of a song without a specific mahattah while *mahattah* means end style to a certain *harakat*. Generally, the role of *harakat* is to diversify the sound art, enliven the recitation, improve the quality of performance, and also as a measure of the melodies which to be recited afterwards. Basically, in *Tarannum* science, the number of *harakat* is six and each of it has its own role [18]. From the analysis of KKQ handbook, each of the *Tarannum* melodies has to be recited in different *harakat*. For example; in reciting *Tarannum Bayyati*, *surah As-sajadah* verses one until three, it must be recited based on *harakat* one until *harakat* four.

(3) ***Surah or chapters***; which include the audio or text or both of the *surah* or chapters. Based on the analysis done on the KKQ handbook, the chapters were from the selected *surahs* which are *surah al-Insan*, *surah as-Sajadah*, *surah al-Waqiah*, *surah Nuh*, *surah al-Jum'ah*, *surah as-Soff*, *surah al-Munafiqun*, *surah Yasinn* and *surah al-Mulk*. All of these *surahs* were chunked into verses and recited based on different *Tarannum* melodies with its variation (*harakat*).

(4) ***Additional features*** (*Tarannum practice*, and *Video of Tarannum*). Additional features are the additional elements that are available in the existing *Tarannum* mobile apps. Based on the analysis done towards the exiting *Tarannum* mobile apps, researcher had found that there are three interesting features that can be included into the KKQ meaning-based *Tarannum* mobile app model. Then, these elements had been evaluated by the experts whereby they had agreed that only two elements should be included into the mobile app model in order to grab the users' attention and interest. The additional features of *Tarannum practice* and *video of Tarannum* are described as follows:

(a) The features of ***Tarannum practice*** is whereby users can do the *Tarannum* recording voice and the apps are able to give the marks for the recording of *Tarannum* recitation. This engaging function is attractive and will grab the users' interest to do more practices on *Tarannum* recitation.

(b) **Video of *Tarannum*** is one of the additional features that can be included in the designed KKQ mobile app model in order to attract the users' interest to learn and practice the *Tarannum* recitation. For example, the video of famous reciter that recites the Qur'ān with *Tarannum* recitation.

(5) The **Multimedia elements** which according to Vaughan [27] and Costello [28], there are five elements of multimedia which are text, audio, graphics, video and animation. In this study, researcher had proposed four types of multimedia elements in prototype model of KKQ meaning-based *Tarannum* mobile app which are the elements of text, graphic, audio and video. But, after conducting an expert evaluation, the experts agreed that the elements of animation should also be applied into the model. So, all elements of multimedia that is text, audio, graphic, video and animation have to be included in the KKQ meaning-based *Tarannum* mobile app model.

For the element of **Qur'anic verses meaning**, researcher proposed that the element of meaning of Qur'anic verses should be included into the KKQ *Tarannum* mobile apps in the form of text; so that the element of meaning can be applied into the *Tarannum* recitation as users understand the meaning of the verses. At the same time, users can feel and internalise (*tadabbur*) with the Qur'ān recitation. Based from expert evaluation analysis done, the experts agreed that the element of meaning should be included in the model.

5. Summary and future work

This paper systematically discusses the design and development the model of meaning-based *Tarannum* mobile application by adapting the design and development research (DDR) approach. In the DDR method there are three phases to complete the research. The need analysis phase attempted to identify the current issues and problems in *Tarannum* education field and figure out the needs in developing the multimedia technology for KKQ (*Kelas Khas Kemahiran Membaca dan Menghafaz al-Qur'an*) classes. The design and development phase successfully find the elements from the existing *Tarannum* mobile apps to be embed in a model and thus, develop the model. The evaluation phase achievably done to evaluate the model design with the experts and finally the meaning-based *Tarannum* mobile apps model were finalized. This study contributes some guidelines in using DDR approach for similar research and finally inspires the area of Qur'anic studies with multimedia technology. For future work, this model can be use in developing the meaning-based *Tarannum* mobile apps for KKQ class.

Acknowledgement

The author would like to thank the Center for General Studies and Co-curriculum, Universiti Tun Hussein Onn Malaysia (UTHM) for their support so that this writing can be published.

References

- [1] K. Nelson, "The Art of Reciting the Qur'an," University of California, Berkeley, 1980.
- [2] W. A. Wan Hilmi, S. Ahamad Asmadi, M. Sabri, and J. Ezad Azraai, "Meaning-based *Tarannum*: Preliminary research on uslub qira'ah of Sheikh Muhammad Rif'at (1880-1950)," *Middle - East J. Sci. Res.*, 2014.
- [3] Bahagian Pendidikan Islam, *Kelas Khas Kemahiran membaca dan menghafaz al-Quran (KKQ) Handbook*. Kementerian Pendidikan Islam.
- [4] Kementerian Pelajaran Malaysia, "Panduan Pelaksanaan Kelas Khas Kemahiran Membaca Dan Menghafaz Al-Quran (KKQ)." 2014.

- [5] Kementerian Pendidikan Malaysia, “Pelan Pembangunan Pendidikan Malaysia 2015-2025 (Pendidikan Tinggi),” 2015.
- [6] P. Chiu, C.-C. Kao, Y.-H. Pu, P.-F. Lo, and Y.-M. Huang, “The Development of a Decision Support System for Successful Mobile Learning,” *15th Int. Conf. Adv. Learn. Technol.*, pp. 3–4, 2015.
- [7] O. R. E. Pereira and J. J. P. C. Rodrigues, “Survey and analysis of current mobile learning applications and technologies,” *ACM Comput. Surv.*, vol. 46, no. 2, 2013.
- [8] J. Nurul Farhana, T. Zaidatun, C. L. Noor Hidayah, and M. A. Zakiah, “Students’ Preferences of m-Learning Applications in Higher Education: A Review,” *Adv. Sci. Lett.*, vol. 24, no. 4, pp. 2858–2861, 2018.
- [9] I. K. Suartama, P. Setyosari, Sulthoni, and S. Ulfa, “Development of an instructional design model for mobile blended learning in higher education,” *Int. J. Emerg. Technol. Learn.*, vol. 14, no. 16, pp. 4–22, 2019.
- [10] F. Ozdamli and N. Cavus, “Basic elements and characteristics of mobile learning,” *Procedia - Soc. Behav. Sci.*, vol. 28, pp. 937–942, 2011.
- [11] M. Sharples, J. Taylor, and G. Vavoula, “Towards a Theory of Mobile Learning,” *Proc. mLearn*, vol. 1, pp. 1–9, 2005.
- [12] R. C. Richey and J. D. Klein, *Design and Development Research*. New York: Routledge, 2007.
- [13] S. Mohd Paris, “Model Pengajaran m-Pembelajaran Berasaskan Kaedah Inkuiri Mata Pelajaran Sejarah Peringkat Menengah,” (PhD Thesis). Universiti Malaya, 2016.
- [14] A. R. Mohd Nazri, “Pembangunan Model HOMESCHOOLING berasaskan Nilai dan Amalan Masyarakat bagi Kanak-Kanak Orang Asli,” (PhD Thesis). Universiti Malaya, 2014.
- [15] M. Ramlan, “Reka Bentuk Model Integriti Akademik Berasaskan Penghayatan Rohani,” (PhD Thesis). Universiti Malaya, 2017.
- [16] S. Muhammad Sabri, A. Nor Aziah, I. Zawawi, and O. Nurulhuda, “Employing Design and Development Research (DDR) Approaches in the Design and Development of Online Arabic Vocabulary Learning Games Prototypes,” *Turkish Online J. Educ. Technol.*, vol. 11, no. 2, pp. 108–119, 2012.
- [17] R. Mazidah Mat, C. Suriyati, and F. M. A. Nurulhuda, “Proposed Methodology using Design Development Research (DDR) Improving Traceability Model with Test Effort Estimation,” *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 8, no. 8, pp. 686–699, 2018.
- [18] N. I. Nik Jaa’far, *Buku Qawaid Tarannum; Cara Berlagu*. Kuala Lumpur: Darul Fikir, 2012.
- [19] A. B. Mohd Ali, *Seni Lagu Al-Quran di Malaysia*. Kuala Lumpur: Darul Fikir, 2015.
- [20] B. B. Seels and R. C. Richey, *Instructional Technology: The definition and Domains of the field*. Washington, DC: Association for Educational Communications and Technology, 1994.
- [21] R. C. Richey, J. D. Klein, and W. A. Nelson, “Developmental Research: Studies of Instructional Design and Development,” in *Developmental Research*, Mahwah, NJ: Lawrence Erlbaum Associates, Publishers, 2004, pp. 1099–1123.
- [22] M. Castillo-Montoya, “Preparing for interview research: The interview protocol refinement framework,” *Qual. Rep.*, vol. 21, no. 5, pp. 811–831, 2016.
- [23] P. Pollara, “Mobile Learning in Higher Education: A Glimpse and A Comparison of Student and Faculty Readiness, Attitudes and Perceptions,” 2011.

- [24] Y. P. Chua, *Kaedah Penyelidikan Edisi Kedua buku 1*. Kuala Lumpur: McGraw Hill, 2011.
- [25] J. Gikas and M. M. Grant, "Internet and Higher Education Mobile computing devices in higher education: Student perspectives on learning with cellphones , smartphones & social media," *Internet High. Educ.*, vol. 19, pp. 18–26, 2013.
- [26] M. J. Mohd Ridhuan and M. N. Nurulrabihah, *Kepelbagaian Metodologi dalam Penyelidikan Reka Bentuk dan Pembangunan*. Selangor: Qaisar Prestige, 2020.
- [27] T. Vaughan, *Multimedia: Making It Work*, Eighth. New York: McGraw Hill, 2011.
- [28] V. Costello, S. Youngblood, and N. E. Youngblood, *Multimedia Foundation Core Concept for Digital Design*. UK: Focal Press, 2012.