

CHAPTER 4

ICON DESIGN AND PROTOTYPE DEVELOPMENT

4.1 Introduction

The subsequent Chapter 4 and 5 will present the findings of the study. This chapter discusses the findings on the design of the fidelity semiotic icon design for reciting Quran using fidelity technique. The semiotic icon is designed based on the icon design elements from literature review in phase one, needs analysis design. This chapter also covers development of the semiotic icon design application for reciting Quran. The summary of the findings is presented in five stages of ADDIE instructional design model which includes analysis stage, design stage, development stage, implementation stage and evaluation stage. The result of this phase is presented to answer the second to fifth research questions. The chapter closes with the chapter summary.

4.2 Analysis Phase

The objective of analysis phase is to identify the need for the semiotic icon design for motivating youth in reciting Quran. To find the need of the study, there was preliminary study through expert and youth interview and systematic literature review (comparative study) on semiotic icon design elements. The details of the needs analysis discussed in the next section.

4.2.1 Expert Interview

The interview was conducted to find the need of this study with the three Quran and Arabic lecturers who are the experts in the Quran field in central region higher institutions. This study has selected the experts based on their experience of more than ten years and their broad knowledge in Quranic field of teaching and learning Quran and Arabic at higher learning institution as described in Chapter 3. There are four analyses involved which are sample data analysis, domain need analysis, youth need analysis and application need analysis.

a. Sample Data Analysis

The selection of Surah An-Nur, Surah Al-Hujurat and Surah As-Saff is according to the content of Surah in Quran that has much to do with the laws of human life as a servant of God. This selection was also considered on the content of the informative Quran to explore the messages of the verses of Surah as a living guide that are vital to humanity. In addition, informal interviews were conducted with three experts in Quran to acquire the opinion on the genre of Surah as the preliminary studies. Through the preliminary studies carried out, the experts suggested three Surah samples namely, Surah An-Nur, Surah Al-Hujurat and Surah As-Saff as the main sources of sample data of the Quranic domain. The reasons are:

- Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are indeed the source of Quran that contains the rules of Islam and rules of life as a Khalifah.
- Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are a reference to the Muslims as their verses contain the messages with very close connection to human life.

- Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are basic Surah containing guidance for the Islamic community of today.
- Visual icon can be adopted in presenting the Surah genre that can convey the message visually.

b. Domain Needs Analysis

In the analysis phase, the domain of Quran is carefully studied by the researcher. In selecting the sample of data used, experts in the domain of Quran were interviewed to ensure that there is a need for this study in the Quran field. Researchers have used few Surah samples in the Quran domain that have been approved by experts. As a result, the scope of this study was identified and presented in the phase 2 design and development phase.

The following Table 4.1 is the summary of preliminary study by three experts in the field of Quran to identify the need of the study from the perspective of experts in the analysis phase. The expert's view also includes the discussion on the need of the study, sample of data analysis and domain analysis for semiotic icon design studies for Quran domain: Here is an example of an interview done that discussed the application interface design.

Table 4.1: Sample Interview Data on Preliminary Study (Expert Quran)

Experts	Description
Researcher	<i>Do you think it is important to understand the genre of Surah in the Quran? Please give your comment</i>
Expert 1	<i>It is important to understand the genre of surah to identify its meaning/exegesis contextually.</i>
Expert 2	<i>Understanding the genre of something to read is very necessary in a Muslim community that cannot speak or understand Arabic. Understanding the genre allows (1) the reader of the Quran to have an internal motivation to continue reading because [of] the meaning and purpose obtained in the recitation (2) The Quran is not just to be read. The Qur'an was revealed to be understood and executed by God's command; how can the command be done if one does not understand? (4) The icon opens Language translation restrictions.</i>
Expert 3	<i>Yes, it is very important</i>

Researcher	<i>What do you think if there is a mobile application that can assist to understand the genre of Surah?</i>
Expert 1	<i>This mobile application will assist the genre of surah if the icon images are presented clearly.</i>
Expert 2	<i>Highly needed and fully supported.</i>
Expert 3	<i>Great idea! Barakallahu fiikum!</i>
Researcher	<i>“Semiotic icon is an icon designed based on Theory of Semiotics by Peirce (1839-1914). Semiotics is a study of signs that concerned with meaning; how representation (language, images, objects) generates meanings or the processes by which we comprehend meaning (Curtin, 2009). Icon is a visual sign to represent an object, actions, concept or idea. It creates better visual perception with the ability to communicate the meaning. (Chandler, 2007; Lin & Lin, 2014; Schneider, 2013). Semiotic icon has been used widely in many fields such as communication, marketing, medicine and education that can assist i conveying the messages and its meaning to the user. Hence, it can be applied in Quranic field to assist in understanding the genre of Surah, thus can motivate youth to recite the Quran”. Is the use of semiotic icon being a good approach in the development of this mobile application?</i>
Expert 1	<i>Yes, it is.</i>
Expert 2	<i>Excellent approach and effort in developing icons for the understanding of the Quran</i>
Expert 3	<i>Yes, especially in this technology era</i>
Researcher	<i>Can the semiotic icon make a good contribution to this Quran domain? Please give your comment</i>
Expert 1	<i>Yes. Can be a good contribution to Quranic domain but must be validated by Quranic experts before publishing any.</i>
Expert 2	<i>Definitely very helpful</i>
Expert 3	<i>Absolutely yes it can. It is a big contribution to assist and motivate youth in understanding Quran. Therefore, the choosing of semiotic icon must be well presented to convey the message of ayat.</i>
Researcher	<i>Appreciate your kind suggestions for the content of application (if any)</i>
Expert 1	<i>Icons might have identical meaning with the context. This research poses good contribution to Quranic field or domain.</i>
Expert 2	<i>Suggestion for samples Surah – An-Nur, As-Saff and Al-Hujurat. (1) Concept of the necessary meaning to be represented by an icon need to be clear. (2) Representation in the icon should take into account all the probabilities that they think of using it. (3) All aspects of color, shape, symbolism and arrangement need to be considered more critically and carefully. (4) Avoid using icons that can only be understood by certain groups and cannot be understood by others. Note: Congratulations to the researcher for starting an excellent innovation. However, it is certain that as an initial effort, there are weaknesses and difficulties. May this effort be listed as good deeds and charity for the contribution of the knowledge of the Qur'an and the ummah of Muhammad. Alfu Mubaarak</i>
Expert 3	<i>In overall, it is good. But hopefully if the chance is still there to improve the icon as suggested above. Besides that, it might be better if the researcher put the clear picture about how the icon was chosen. Is it just for vocabularies or to convey main messages to certain Quranic verses.</i>

Table 4.2: Summary of Preliminary Study with Expert

Feedback	Summary (Experts)
<i>Importance understands genre of Surah in the Quran</i>	It is very important to understand genre of surah to identify its meaning/exegesis contextually. Understanding genre of something to read is very necessary in a Muslim community that cannot speak or understand Arabic. Understanding genre allows (1) reader of Quran to have an internal motivation to continue reading because of the meaning and purpose obtained in recitation (2) Quran is not just to be read. Qur'an was revealed to be understood and executed by God's command; how can command be done if one does not understand. which is diverse. (4) Icon opens language translation restrictions.
<i>Mobile application to assist in visualise the idea or genre of Surah</i>	This mobile application will assist the genre of surah if the icon images are presented clearly. Highly needed and fully supported. Great idea! Barakallahu fiikum!
<i>Semiotic icon approach in development of this app Contribution of semiotic icon Quran domain</i>	Excellent approach and effort in developing icons for understanding of Quran. Yes, especially in this technology era Can be a good contribution to Quranic domain but must be validated by Quranic experts before publishing any. Definitely very helpful. It is a big contribution to assist and motivate youth in understanding Quran. Choosing of semiotic icon must be well presented to convey message of ayat.
<i>Suggestions for content app</i>	Icons might have identical meaning with the context. Research poses good contribution to Quranic field or domain. Suggestion (1) Concept of necessary meaning to be represented by an icon need to be clear. (2) Representation in icon should take into account all probabilities that they think of using it. (3) All aspects of color, shape, symbolism and arrangement need to be considered more critically and carefully. (4) Avoid using icons that can only be understood by certain groups and cannot be understood by others. Excellent innovation. Overall, it is good. Chance to improve icon as suggested. Better if researcher put the clear picture about how icon was chosen. Is it just for vocabularies or to convey main messages to certain Quranic verses? Suggestion for sample Surah – An-Nur, As-Saff, Al-Hujurat

Table 4.2 summarizes the expert feedback in preliminary study on the need of an application to assist in visualizing the genre of Surah in Quran. Based on the preliminary study and discussion with the experts, the researcher received positive view from the experts on the proposed semiotic icon design for this study. Their suggestions in many aspects were very useful for this research to be carried out successfully. They proposed that such research and application is a good innovation that can be developed and utilized for the benefit of the community and ummah.

c. Youth Needs Analysis

In the analysis phase, the needs analysis of the youth is the same as the initial analysis. To identify the problem faced by the youth in reciting Quran, an interview was carried out with youth. The researcher conducted the interviews on three students. The interviews were conducted to gain an initial insight into the reciting of Quran and the complexity of understanding the Surah genre in Quran.

The following Table 4.3 is the preliminary analysis conducted by the researcher with three (3) youth from Islamic and non-Islamic educational studies to identify the need for the study from the perspective of the youth in the analysis phase. The youth's view also includes the feedback on the need of the study and youth needs analysis for semiotic icon design studies for reciting Quran:

Table 4.3: Sample Interview Data on Preliminary Study (Youth)

Experts	Description
Researcher	<i>What is a technique for reciting the Quran that you know? Example: Reciting Quran with Tafsir Rumi</i>
Youth 1	<i>Read the talaqi using the Uthmani mashaf and read the Quranic translation using the interpretation.</i>
Youth 2	<i>Talaqqi.</i>
Youth 3	<i>Al-Quran with color tajwid and translation.</i>
Researcher	<i>Can you state the process of reciting the Quran using these techniques?</i>
Youth 1	<i>Read 1 constituents (juzuk) for at least 1 day (two strands before and after each obligatory prayer).</i>
Youth 2	<i>Recite Quran with the guidance of a teacher.</i>
Youth 3	<i>Reciting Quran by following the color tajwid. Read the translation</i>
Researcher	<i>What do you think about the importance of reciting the Quran?</i>
Youth 1	<i>Because it is a guide to life and friends in the grave.</i>
Youth 2	<i>Part of ibadah as a Muslim.</i>
Youth 3	<i>Become a good Muslim. Reward from Allah. Intercession in the grave/syafaat</i>
Researcher	<i>Is the previous method of reciting the Quran same as it is today?</i>
Youth 1	<i>Yeahh, I think so</i>
Youth 2	<i>Yes, it is the same.</i>
Youth 3	<i>No</i>
Researcher	<i>What do you think of reciting the Quran using mobile application?</i>
Youth 1	<i>Easier to use because now apps are evolving</i>
Youth 2	<i>It is good if the person has no other choice.</i>
Youth 3	<i>Easy to read anywhere at anytime</i>
Researcher	<i>Do you have any problem in understanding the genre/theme/idea of Surah in the Quran? If Yes, please state the reasons.</i>
Youth 1	<i>Yes. I have a problem understanding the meaning of the surah, but these apps can help people like me. Some translation is unclear.</i>
Youth 2	<i>Yes, because Surah in Quran are quite a lot, and we cannot simply understand it without authentic source.</i>

Experts	Description
Youth 3	<i>Yes, do not understand Arabic. Need translation.</i>
Researcher	<i>What do you think if there is a mobile application that can assist to understand the genre of Surah?</i>
Youth 1	<i>Makes it easy to use for those who want to understand the content of each verse in a Surah.</i>
Youth 2	<i>It is a good medium.</i>
Youth 3	<i>Yes.</i>
Researcher	<i>Please give your other comment and suggestion (if any).</i>
Youth 1	<i>To interest everyone to use it.</i>
Youth 2	<i>The content must be from authentic source.</i>
Youth 3	<i>Nil</i>

Table 4.4: Summary of Youth Needs Analysis

Feedback	Summary (Youth)
Difficulty to understand the genre of Surah in Quran.	Faced difficulty to understand the idea of Surah in Quran due low comprehension in Arabic in Quran. Some youth mentioned translation of surah is unclear. Some mentioned not understand the exact message delivered.
Motivation in reciting Quran	Less motivation to recite Quran due to low comprehension of Arabic language used in Quran. Unable to understand Arabic of Quran without learning language. Limited technique to visualise theme/genre Surah. Apps can assist to motivate in reciting Quran.
Application for Quranic	Applications for visual Quran are still limited. Majority applications involve text-based information app.

Table 4.4 showed the youth's feedback for preliminary study on the difficulty in reciting Quran and their views on the semiotic icon application proposed. The results of this preliminary analysis showed that the difficulties encountered by the youth are in terms of understanding the genre and information acquisition of Surah due to low comprehension in Arabic that may affect their motivation in reciting Quran. The applications for visual Quran are also limited where many apps involved text-based information apps only. The researcher believed that an alternative technique and a supportive tool is needed to support acquisition of information that can assist in understanding the idea of Surah genre in Quran for youth. In accordance with the needs analysis, the researcher reviewed the appropriate theory to be applied in the application design in this study.

d. Application Needs Analysis

The prototype development of this application is a mobile application that requires application and icon design guidelines. The need analysis of the semiotic icon design icon and application was explained in detail and summarized in Chapter 3.

4.2.2 Systematic Literature Review (Comparative Study)

This aim of systematic literature review (SLR) is to identify appropriate semiotic icon design elements that can be used for reciting Quran. This study has reviewed previous studies on icon design principles and elements for designing icons for mobile application. The identified icon design elements were used in the semiotic icon design. The research question guiding this analysis is:

RQ1: What are the appropriate icon design elements for reciting Quran?

The initial process of this analysis is to identify the icon design elements used in the mobile application in previous studies. To choose the relevant icon design elements, only papers nearly related to the icon design elements were analyzed. Hence, the papers that explained the icon design elements but did not apply the icon design elements are considered as inappropriate to this analysis and they were removed. This systematic literature reviewed forty (40) papers related to this study. The analysis of the icon design elements was explained in detail and summarized in next section and SLR method discussed further in Chapter 3.

Based on the result from the selected papers, there is big potential to be applied in designing mobile applications. Icon design elements will lead to benefit on visualizing the icon which can assist to motivate youth in reciting Quran.

a. **Analysis on Icon Design Element for Mobile Application**

This study has reviewed previous studies on icon design principles and elements for designing icons for mobile application. Several electronic databases were used, namely, Google Scholar, Scopus, ProQuest, and Research Gate. Other sources include secondary data through books and web pages. The search terms used were “mobile icon design”, “mobile icon design principle” and “apps icon design”. Studies were included if the articles were published between 2014 and 2019, with full text provided and written in the English language. Findings were collected from various icon design studies for mobile applications (see Table 4.5). Subsequently, a table of comparison matrix (see Table 4.6) was developed for a comparative study to identify the most common elements in icon design for mobile applications. Then, the common elements for icon design (see Table 4.8) were developed to summarize icon design elements for mobile app.

Table 4.5: Analysis on Icon Design Elements for Mobile Application

No	Studies	Field	Authors	Icon design elements
1	Icon attributes effect on search time	Science	Smythwood & Hadzikadic, 2019	Simple, attractive, and aesthetic.
2	Skeuomorphism vs flat design: user experience & age related favoured	Science	Backhaus et al., 2018	Flat and skeuomorphism.
3	Age effect on perception & preference of app icon styles	Advertising	Huang & Chen, 2015	Concrete.
4	Google Play icon design specifications	Design	Android Developer, 2019	Shape, unified, scalability, color consistency, familiarity
5	Icon design and styles influences on human mobile interaction: case study on e-literate vs, non e-literate user	IT	Memon et al., 2018	Familiarity, metaphor, and semantics.
6	Digital design in Action – Creative Solutions for Designers	Design	Jackson & Ciole, 2017	Form, shape, line, balance, repetition, color, unified and similarity
7	How to design an app icon: 5 aspects that matter	Design	Chitea, 2017	Scalability, recognizable, consistency, uniqueness, and no words.
8	Contrastive analysis on emotional cognition of skeuomorphic flat icon	Science	Zhang et al., 2017	Recognizable, cognitive, emotional, and skeuomorphism
9	Semantic distance as key feature for in-car infotainment system’s icon design	Science	Silvennoinen, Kujala, & Jokinen, 2017	Semantics and context.

No	Studies	Field	Authors	Icon design elements
10	An icon everyone wants to click on: relationship between consumer perceptions & app icon successfulness	Science	Jylha & Hamari, 2019	Aesthetic, uniqueness, memorable and fineness.
11	Aesthetic design of icons effect on app downloads: evidence from an android market	Science	Wang & Li, 2016	Color, complexity, and symmetry.
12	Human interface guidelines – Design Principle – App icon	Science	Apple Developer, 2019	Simple, salience recognizable, aesthetic, consistency, interactive and metaphor.
13	A study on formativeness of delivery app icon design	Science	Lee, 2016	Form, color, content, and shape.
14	A study on relationships between different presentation modes of graphical icons and users' attention	Science	H. Lin et al., 2016	Background and composition.
15	An icon design approach based on symbolic and users' cognitive psychology	Science	Qiang & Fei, 2016	Semantics, structure, context, and cognitive.
16	Exploring the attractive factors of app Icons	Science	Ho & Hou, 2015	Aesthetics and attractive.
17	Comprehension problem in icon design for mobile device: analysis prototype design	Science	Yang, 2015	Recognizable, relevance, uniqueness, and simple.
18	Triadic relationship of icon design for semi-literate communities	Science	Wan, Chang, & Lung, 2015	Concrete.
19	App icon preferences: app icon design effect and involvement on quality and intention to download	Marketing	Pol, 2015	Stylization, flat, skeuomorphic, and fineness.
20	User recognition and preference of app Icon stylization design on smartphone	Design	Chen, 2015	Recognizable, simple, shape, stylization, semantics and symbolic
21	The concreteness of searching module icons and their effectiveness in digital library application	Science	Rahrovani, Mirzabeigi, & Abbaspour, 2018	Concreteness
22	Icon usability - tips for designing with icons	Design	Harley, 2014	Simple, recognizable, memorability.
23	Real-time visualization of disaster behavior	Science	Isla & Estuar, 2014	Repetition and color.
24	Graphic Design Solutions 5 th edition	Design		Shape, form, angle, color, recognizable, consistency, background, and scalability.
25	Experimental study: the effects of mobile phone icons characteristics on users' age groups	Science	Ghayas, Al-Hajri, & Sulaiman, 2019	Semantics, familiarity, and complexity.
26	Factors attracting Chinese generation Y in the smartphone	Science	Luo et al., 2017	Attractive
27	Effects of icon concreteness and complexity on semantics transparency: younger vs. older users	Science	Schroder & Ziefle, 2008	Concrete, familiar, and simple.
28	The icon matters: how design instability affects download intention of mobile apps under prevention and promotion motivations	Advertising	Lin & Chen, 2019	Stability (consistency) and shape.
29	Mobile games icons design review based on graphic designer expertise	IT	Oscario & Luzar, 2016	Form, content, and context.

No	Studies	Field	Authors	Icon design elements
30	Heuristic evaluation of healthy eating apps for older adults	Science	Watkins, Kules, Yuan, & Xie, 2014	Semantic, familiar and color.
31	Effects of mobile phone icon background shape and figure/ background area ratios on visual search performance and user preferences	Science	Luo & Zhou, 2015	Shape and background.
32	Icon design for a tourism mobile app	Tourism	Batista et al., 2019	Simple, color, recognizable.
33	Effects of mobile apps icon complexity and border on college students' cognition	Science	Y. Cao, Ding, Deng, & Zhang, 2018	Simple and no border.
34	Options for labelling circular products: icon design and consumer preferences	Science	Bovea et al., 2018	Simple, familiarity, semantics, and aesthetic.
35	Effect of icon concreteness, semantic distance, and familiarity on recognition level of apps icon among e-literate & non e-literates	Science	Batra & Memon, 2016	Recognizable, concreteness, semantics, and familiarity.
36	Investigation of icon design and touchable area for effective Smart Phone Controls	Science	Im, 2014	Touchable and scalability.
37	Visual-related factors in mobile iconic communication	Communication	Alsuwailam, 2016	Color, shape, form, texture, uniqueness, familiarity, texture, pattern, balance.
38	Innovation design in Personal Centre Interface of mobile app	Science	Xin et al., 2017	Recognizable, uniqueness, consistent, color background and complexity.
39	Exploring the attractive factors of app icons	Science	Ho & Hou, 2015	Aesthetic, attractive, and cognition.
40	The role and importance of icons on mobile graphical user interface	Science	Kanmaz, 2015	Simple, color and recognizable.

Table 4.5 summarized the 40 articles that were identified and extracted during the literature review, which included various fields of icon design application. The analysis of icon design studies consisted of icon design elements for mobile application where 42 elements within the 40 icon design studies are found and presented. Table 4.6 presents the matrix comparison that identifies the common elements found in icon design studies. Appendix 11 describes the definition of each element.

No	Elements	Smyrthwood & M.Hadzikadic	Backhaus et al.	Stephanidis	Android Developer	Memon, et al.	Jackson & Ciolek	Chitea	Zhang et al.	Silvennoinen et al.	Jylha	Wang & X.Li	Apple Developer	Lee	Lin et al.	Qiang & H.Fei	Ho & Hou	Yang	Wan et al.	Pol	Chen	Rahrovani et al.	Harley	Isla & M.Estuar	Landa	Ghayas et al.	Luo et al.	Schroder & M.Ziefle	Lin & Chen	Oscario & L.Luzar	Watkins et al.	Luo & Zhou	Batista et al.	Ji	Bovea et al.	Batra & Memon	Im et al.	Alsuwaillem	Xin et al.	Hi & K.Hou	Kanmaz	Total	Percents (%)			
25	Complexity									√		√																														3	8			
26	Context									√						√																												3	8	
27	Symmetry											√																																1	3	
28	Stylization																				√	√																							2	5
29	Structure													√		√																												2	5	
30	Cognitive								√							√																												3	8	
31	Attractiveness	√															√																											3	8	
32	Relevance																		√																									1	3	
33	Concreteness			√																√							√																	5	13	
34	Angle																																											1	3	
35	Background												√																	√														3	8	
36	Symbolic																																											1	3	
37	No border																																	√											1	3
38	Touchable																																			√									1	3
39	Texture																																				√								1	3
40	Stability																												√																1	3
41	Saliency																												√																2	5
42	Interactive																																												1	3

From the comparative matrix, this study has identified ten (10) most common elements of icon design in science, communication and engineering out of forty-two (42) elements studied. This ranking of most common elements of icon design has been summarized in Table 4.7 and Figure 4.1. Recognizable and color are the highest ranked elements followed by simple, semantic, familiarity, shape, aesthetic, consistency, uniqueness, and concreteness. These elements contribute to about 25 percent of the importance that influences icon design for mobile application.

Table 4.7: Ranking of Icon Design Elements for Mobile Application

Elements	Total	Percentage
Recognizable	11	28
Color	11	28
Simple	10	25
Semantics	8	20
Familiarity	8	20
Shape	7	18
Aesthetic	6	15
Consistency	5	13
Uniqueness	5	13
Concreteness	5	13

A breakdown of the most common elements are as follows: “recognizable” and “color” were found in 11 studies, “simple” was found in 10 studies, “semantics” and “familiarity” were found in 8 studies, “shape” was found in 7 studies, “aesthetic” was found in 6 studies and “consistency”, “uniqueness” and “concreteness” were found in 5 studies.

The common ten (10) key elements of icon design for mobile application are recognizable, color, simple, semantics, familiarity, shape aesthetic, consistency, uniqueness, and concreteness summarized in the following Figure 4.1:

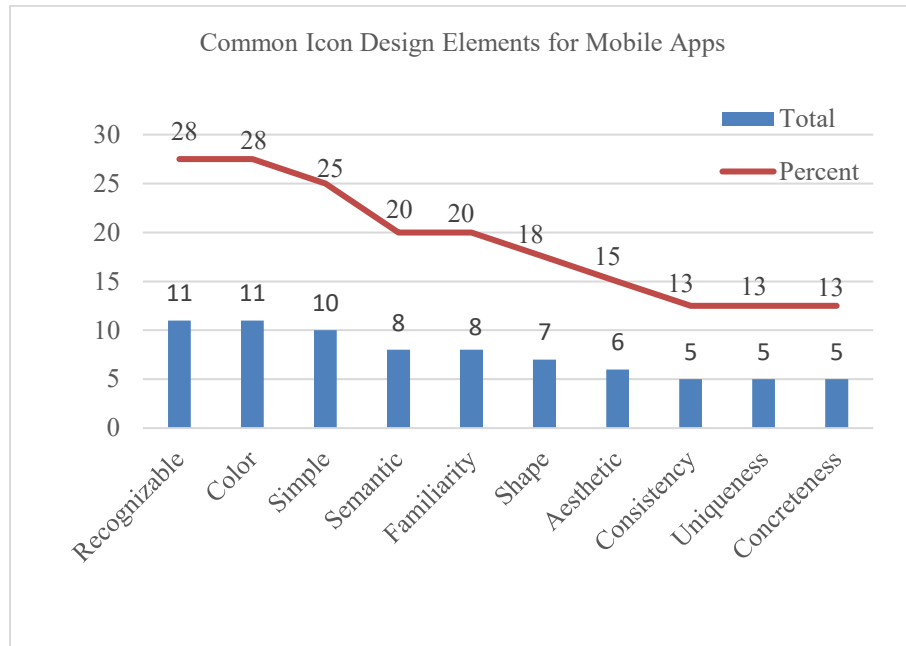


Figure 4.1: Ranking for Common Icon Design Elements for Mobile App

Recognizable is the ability to be recognized or identified from previous knowledge (Press, 2020). People will understand icons that use familiar images. High identification accuracy of icon yields better search performance (Zhang et al., 2017). Thus, identifiable icons are preferred (Harley, 2014; Xin et al., 2017) to establish mutual connection and grab attention (Silvennoinen et al., 2017). Icon has better recognition with simplified stylization, open edge shape and realistic adaptation (Chen, 2015).

Color is a property owned by object in producing diverse perceptions on eye that returns or produces light (Press, 2020). Icon colorfulness and brightness are related to number of downloads (M. Wang & Li, 2016) that attract user attention (Xin et al., 2017). Designers use exciting color contrast (Harley, 2014; Watkins et al., 2014) and warm color (Lee, 2016) graphic to connect event group and important action (Isla & Estuar, 2014). They select color for influence, legibility, meaning, storytelling, and environment (Landa, 2014). Unified design through effectual design principles, color palette, and flexibility form an effective icon set (Jackson & Ciole, 2017). Choose

background color for applicable brand and escape transparency (Android Developer, 2019).

Simple means straightforward and easily implicit (Press, 2020). Simple icons are easy to comprehend and found faster than complex icon (Smythwood & Hadzikadic, 2019). Simple forms deliver the message efficiently (Yang, 2015). Recommendations include embrace icon with simple graphic style (Chen, 2015; Harley, 2014) in two-dimensional (2D) (Harley, 2014) and keep icon design simple (Batista et al., 2019; Kanmaz, 2015; Schroder & Ziefle, 2008; Smythwood & Hadzikadic, 2019). In addition, maintain a simple background and escape transparency (Apple Developer, 2019).

Semantic is related to meaning in language or logic (Press, 2020). Regular adjacent connection between icon entity and its purpose (Ghayas et al., 2013; Memon et al., 2017) by reducing semantic distance (Memon et al., 2017) of icon. Semantic distance is closeness of an icon's graphic to its meaning (Isherwood, 2009) which is one of the most significant characteristics (Bovea et al., 2018; Silvennoinen et al., 2017) for improving user experience (Ghayas et al., 2019).

Familiarity is the close acquaintance with something (Press, 2020), also referred to frequency with which images are encountered (Ghayas et al., 2013). Easy to find familiar icon and familiarity of icon's color assisted in identifying app (Alsuwailem, 2016). Icons should represent concrete information from familiar context (Schroder & Ziefle, 2008), and use familiar metaphors (Memon et al., 2017). Familiarity improves the consumer experience (Ghayas et al., 2019).

Shape is the exterior appearance of something (Press, 2020). When designers illustrate the shape of object it will allow users to identify and interpret the icon instantly (Android Developer, 2019; Landa, 2014). The icon designed with open border shape will enhance recognition and icon favorite on the smartphone (Chen, 2015). The

background shape of icon design will affect search performance and user favorite (Luo & Zhou, 2015).

Aesthetic is concerned with artistic, or appreciation of elegance (Press, 2020). Aesthetic icon design will increase attentiveness (Lee, 2016) and user interaction (Ho & Hou, 2015). Aesthetic appeal is one of the most significant icon characteristics (Bovea et al., 2018) that adopt aesthetic integrity for appearance and behavior combination (Apple Developer, 2019).

Consistency means the way in which a substance holds together (Oxford, 2020). Maintain consistency in icon style of visualization (Apple Developer, 2019; Xin et al., 2017) and consistent design or design uniformity (Islam & Bouwman, 2016) for any circumstance (Chitea, 2017). Uniform shape is more tempting and simpler to adapt (Android Developer, 2019).

Uniqueness is the quality of being special, or unusual (Press, 2020) and is found in creative apps icon design (Chitea, 2017). Uniqueness of color aids in finding an app among other apps on a single screen (Alsuwailem, 2016). App icons deemed unique bring about more clicks, downloads and purchases (Jylha & Hamari, 2019).

Concreteness is specific or definite, not abstract (Press, 2020). The more specific the icon, the more operative it is (Rahrovani et al., 2018). Icon concreteness is vital to define user performance compared to complexity (Schroder & Ziefle, 2008). Concrete icons perform better than abstract icon (Wan et al., 2015). Perception correlated with solid and concrete icon compared to flat and abstract icon (Huang & Chen, 2015).

Based on the comparative analysis of icon design from the literature, the researcher would like to propose elements for icon design for mobile application as presented in Table 4.4. The proposed elements were then validated by the experts in IT

to verify the suitability of icon design elements for this study. The detail on expert validation for icon design elements was summarized in the next section.

Table 4.8: Common Elements for App Icon Design

Elements	Attributes
Recognizable	Identifiable, identification accuracy, familiar image, fast recognize, recognition, mutual connection, and attention
Color	Colorfulness, brightness, color contrast, warm color, color palette, background color
Simple	Simple graphic style, simple design, simple forms, simple background
Semantic	Reduce semantic distance, adjacent connection.
Familiarity	Close acquaintance, conversant, frequency, familiar icon, familiarity of color
Shape	Uniform shape, border shape, background shape
Aesthetic	Artistic, elegance, attentiveness, aesthetic appeal, aesthetic integrity
Consistency	Uniform style, uniform shape, consistent size, design uniformity
Uniqueness	Special, creative, unique color, deemed unique
Concreteness	Definite, not abstract

From this analysis, icon design for mobile application is among the vital challenges in adopting mobile applications. Appropriate icon designs for mobile applications are essential for improving the meaning of icons to the user. This comparative study has found forty-two (42) elements of icon design for mobile application from the total of 40 works studied. The common ten (10) key elements of icon design for mobile application are recognizable, color, simple, semantics, familiarity, shape, aesthetic, consistency, uniqueness, and concreteness. These proposed elements are useful for designing mobile icons that can assist designers and researchers in enhancing the user experience. Therefore, it is crucial to manage these elements to ensure icon effectiveness for mobile application.

This study could be enhanced by focusing on one specific field of study. The proposed elements for icon design can be applied in apps icon design but may require further work by assessing and adjusting through questionnaires, observation, interview, and expert evaluation to examine the most useful icon design elements and identifying the real situations related to icon design. In this study, from ten common icon design

elements, six icon design elements were identified and proposed for Semiotic Icon Design for reciting Quran (SIDQ), which are recognizable, color, simple, semantic, familiarity and consistency. The further analysis of the six elements and the results of expert validation for icon design elements are summarized in next section.

b. Gap Analysis on Semiotic Icon design elements

This is the literature review for gaps on icon design elements for mobile application. Table 4.9 shows the gap analysis of icon design elements for mobile application.

Table 4.9: Gap Analysis of Icon Design Elements

Authors	Field	Icon design elements	Icon design	Semiotic Icon design	Islamic Content
Smythwood & Hadzikadic, 2019	Science	Simple, attractive, and aesthetic.	/		
Backhaus et al., 2018	Science	Flat and skeuomorphism.	/		
Huang & Chen, 2015	Advertising	Concrete.	/		
Android Developer, 2019	Design	Shape, unified, scalability, color consistency, familiarity	/		
Memon et al., 2018	IT	Familiarity, metaphor, semantics.	/	/	
Jackson & Ciole, 2017	Design	Form, shape, line, balance, repetition, color, unified and similarity	/		
Chitea, 2017	Design	Scalability, recognizable, consistency, uniqueness, and no words.	/	/	
Zhang et al., 2017	Science	Recognizable, cognitive, emotional, and skeuomorphism	/	/	
Silvennoinen et al., 2017	Science	Semantics and context.	/	/	
Jylha & Hamari, 2019	Science	Aesthetic, uniqueness, memorable and fineness.	/		
Wang & Li, 2016	Science	Color, complexity, and symmetry.	/		
Apple Developer, 2019	Science	Simple, salience recognizable, aesthetic, consistency, interactive and metaphor.	/	/	
Lee, 2016	Science	Form, color, content, and shape.	/		
H. Lin et al., 2016	Science	Background and composition.	/		
Qiang & Fei, 2016	Science	Semantics, structure, context, and cognitive.	/	/	
Ho & Hou, 2015	Science	Aesthetics and attractive.	/		
Yang, 2015b	Science	Recognizable, relevance, uniqueness, and simple.	/	/	

Authors	Field	Icon design elements	Icon design	Semiotic Icon design	Islamic Content
Wan, Chang, & Lung, 2015	Science	Concrete.	/		
Pol, 2015	Marketing	Stylization, flat, skeuomorphic, and fineness.	/		
Chen, 2015	Design	Recognizable, simple, shape, stylization, semantics and symbolic	/	/	
Rahrovani et al., 2018	Science	Concreteness	/		
Harley, 2014	Design	Simple, recognizable, memorability.	/	/	
Isla & Estuar, 2014	Science	Repetition and color.	/		
Landa, 2014	Design	Shape, form, angle, color, recognizable, consistency, background, and scalability.	/	/	
Ghayas et al., 2019	Science	Semantics, familiarity, and complexity.	/	/	
Luo et al., 2017	Science	Attractive	/		
Schroder & Ziefle, 2008	Science	Concrete, familiar, and simple.	/		
C. H. Lin & Chen, 2019	Advertising	Stability (consistency) and shape.	/		
Oscario & Luzar, 2016	IT	Form, content, and context.	/		
Watkins et al., 2014	Science	Semantic, familiar and color.	/	/	
Luo & Zhou, 2015	Science	Shape and background.	/		
Batista et al., 2019	Tourism	Simple, color, recognizable.	/	/	
Y. Cao et a., 2018	Science	Simple and no border.	/		
Bovea et al., 2018	Science	Simple, familiarity, semantics, and aesthetic.	/	/	
Batra & Memon, 2016	Science	Recognizable, concreteness, semantics, and familiarity.	/	/	
Im, 2014	Science	Touchable and scalability.	/		
Alsuwailem, 2016	Communication	Color, shape, form, texture, uniqueness, familiarity, texture, pattern, balance.	/		
Xin et al., 2017	Science	Recognizable, uniqueness, consistent, color background and complexity.	/	/	
Ho & Hou, 2015	Science	Aesthetic, attractive, and cognition.	/		
Kanmaz, 2015	Science	Simple, color and recognizable.	/	/	
N.Osman, 2016	Medical		/		/

Based on these forty (40) studies on icon design reviewed, seventeen (17) studies relate to semiotic of icon design that focus on elements related to meaning such as semantic, recognizable, and symbolic. Limited studies were found on icon design study in Islamic content that focus on icon meaning. Therefore, there is a gap in semiotic icon design elements that focus on icon meaning for Islamic content. Hence this field has space for further exploration.

c. **Semiotic Icon Design Elements for SIDQ**

This section summarized on the icon design elements to be adapted in Semiotic Icon Design for Reciting Quran (SIDQ) in this study. The summary was extended from the analysis of icon design elements for mobile apps in Table 4.5. The proposed six (6) icon design elements are recognizable, semantic, simple, color, familiarity and consistency. These six (6) elements were adapted in this study as the guide to design the semiotic icon design for reciting Quran. The following discussed the further literature on icon design elements to guide in the design of icon for this study.

i. **Recognizable**

Recognizable is defined as the ability to be recognized, or identified from previous knowledge (Oxford, 2020). Landa (2014) emphasized design of icon with familiar image. Recognizable icons were more favored (Harley, 2014; Xin et al., 2017) as the high recognition accuracy produces better search performance (Zhang et al., 2017). Quick identification will create mutual relationship to grab user interest (Silvennoinen et al., 2017). Icon had better identification with simplified stylization, open edge shape and practical variation (Chen, 2015).

Furthermore, Harley (2014) stated that icons are fast to recognize immediately, and this is particularly true for standard icons that people have seen and used before. When designing new icons, try to make them easy to recognize and memorize by following this guideline: Firstly, keep design simple and schematic. Reduce number of graphic details by focusing on basic attributes of object rather than forming a highly realistic image to speed up recognition. Secondly, use the five second rule: if it takes more than five seconds to think of an appropriate icon for something, it is unlikely that an icon can successfully communicate that meaning.

Third, test icons for recognizability: ask people what they expect icons to stand for. Fourth, test icons for memorability: ask a repeat set of users if they can remember the icon's meaning after being told what it represented a week before. Include a visible text label. As Tognazzini once said, "a word is worth a thousand pictures" (Harley, 2014). This study used familiar image to visualize the Surah genre for easy icon identification to allow fast recognition and close connection between icon and user visual perception and attention.

ii. Semantic

Semantic is defined as related to meaning in language or logic (Oxford, 2020). Semantic, or articulatory, distance is a measure of the closeness of the relationship between the symbol and what it is intended to represent. In some cases, the relationship is very clear (Batra & Memon, 2016). Clarity implies regular adjacent connection between icon entity and its purpose (Ghayas et al., 2013).

Semantic distance is the term used to refer to the closeness of the relationship between the icon and what it is intended to represent. This relationship can also be used to determine icon usability and may be either close or distant for both concrete and abstract icons. Latest research on user interface understanding of icons, has shown that it is the closeness of the connection between icon and function, known as the semantic distance, that is important in determining the success of icon usability (Isherwood, 2009) by reducing semantic distance (Memon et al., 2018) of icon.

The representation should be semantically close to the referent or the connection between the symbol and the referent must be familiar to the user before the symbol (Korpi & Ahonen-Rainio, 2015). In this study, the semiotic icon is designed with low

semantic distance that enables close connection to the meaning between icon object and its purpose to convey the message for genre of the Surah.

iii. Familiarity

Familiarity is defined as the close acquaintance with something. It also referred to frequency with which images are encountered (Oxford, 2020). Likewise, Ghayas (2013) defined familiarity as frequency with which images are encountered. While Batra and Memon (2016) defined it as reflecting the frequency with which symbols are encountered. Easy to find familiar icon and familiarity of icon's color assisted in identifying an app (Alsuwailem, 2016). Icons should represent concrete information from familiar context (Schroder & Ziefle, 2008) and use familiar metaphors (Memon et al., 2017) because familiarity improves the consumer experience (Ghayas et a, 2019). This is to assist in identifying the icon and application. This study used the familiar image for icon that users can understand and remember. For example, it adopts the familiarity of color green for Islamic feature.

iv. Color

Color is defined as a property owned by object in producing diverse perceptions on the eye that returns or produces light (Oxford, 2020). Color is an important aspect in visual communication. Kanmaz (2015) mentioned that color consists of primary (red, yellow, blue) and secondary color (green, orange, purple). Colors are selected to ensure that the meaning they represent are recognised by the largest possible user. Besides, Justas (2016) stated that color is powerful. It can make the icon or break it in the blink of an eye. That is why choosing the right color for our icons is so important by using proper palettes, we can transfer the message at a subconscious level.

Justas (2016) emphasized on first choosing the right color palette. Depending on the style of our icons we can decide to make them monochromatic, use shades of the same color, or choose the color palette with different matching color. This one is often used to create flat icons. Matching color palettes that look cool are hard to make, though. Justas recommended using two to five colors throughout the whole set. Second, understand the meaning of color. Even basic knowledge in color theory could make a huge difference. When you need to squeeze a huge message into a small icon, every small detail matters. The power of color can be used to strengthen and convey the icon message. The correctly chosen color makes the set look more cohesive and stylish, and delivers the message way better. In this study, the suggestion on matching color palette for icon and understanding on the color meaning further applied or the semiotic icon design to ensure the icon design looks cohesive and reflects the meaning of the icon to the user.

According to Lee (2016), linguistic images and visual images can be applied in combination to color images. A color image acts as a means of communication beyond language. Understanding of color and exact perception of color images will enable realistic use of color that can fulfill the various desires of users in color planning. Using right color gives right contents to users while wrong ones lead to the ill effect to the users in icon design. Therefore, the exact meaning association for the use of the icon is possible when distinguishing the characteristics of the color during designing of the apps icon and using it appropriately.

The other concern with color relates to icon colorfulness, brightness, and contrast. The icon colorfulness and brightness are basically associated with the user downloads (Wang & Li, 2016) because it made the icon show up, appealing to entice user interest (Xin et al., 2017). Use of sensational color contrast (Harley, 2014; Watkins et al., 2014)

and warm color (Lee, 2016) can make icons stand out. Landa (2014) mentioned to use color for inspiration, legibility, meaning, storytelling, and environment. Unified design through effective design principles, color palette and flexibility concern make this an effective set of icon (Jackson & Ciole, 2017).

Background color can be used for applicable brand and escape transparency (Android Developer, 2019). In this study, the icons were focused on contrast of black and white for the icon image and warm color of green as the background of the icon.

Table 4.10 summarizes the color and its meaning from previous studies.

Table 4.10: Summary of Color Meaning

Color	Definition	Attributes	This Study
Red	Love, romance, and intensity as cited by Kanmaz (2015). Danger, passion, love, heat (Justas, 2016). Represents life force and all forms of desire and passion (Mahdi et al., 2016)	Emotionally intense, quickens heartbeat and breathing color of love wish. Heart figure used for creating icon and aimed for strengthening perception of audience as cited by Kanmaz (2015). Represents everything associated with our most physical needs, and our will to survive (Justas, 2016). This color refers to achievement of desired results and success (Mahdi et al., 2016)	Used in few icons in medium fidelity icon as background and for strengthen perception to user.
Yellow	Has meaning of optimism, friendliness, and extraversion. Good emotions (Justas, 2016). Represent fleeting happiness, expansion, and easy mind (Mahdi et al., 2016).	Refers to sun, hence the day. Iconic form of sun and yellow color as a background color used to represent one day wishes as cited by Kanmaz (2015). Optimistic and sunny color (Justas, 2016). Could have abnormal effects on mind in long run and cause mental confusion and disorder unless combined with its complementary color i.e. purple (Mahdi et al., 2016).	Used in few icons in medium fidelity icon as background and to show optimism
Green	Money, health, harmony, and calmness as cited by Kanmaz (2015). Hope, innovation, natural (Murphy & Rowe, 1993); Eco (Justas, 2016). Represents will at work, effort, stable thought, faith, and self-awareness (Mahdi et al., 2016).	Illustrates nature of life, calming and refreshing color as cited by Kanmaz (2015). Often paired with shades of brown to give additional earth vibes. Also associated with freshness, success, and money (Justas, 2016). This comforting and calming color is associated with nature and is often used to help relieve mental dilemmas (Mahdi et al., 2016)	Used in few icons in medium fidelity icon as background and to show natural, hope, life Used in all icon in high fidelity icon – to show hope, life natural, harmony
Blue	Color of wisdom and intellectuality, represent imaginary wishes as cited	Refers to “night”, also has a subtopic of dreamy. Also considered directly related to human concentration and mind	Used in few icons in medium fidelity icon as background and

Color	Definition	Attributes	This Study
	by Kanmaz (2015). Calming color, stands for security, professionalism, and trust (Justas, 2016). Perfect peace; a sign of truth and trust, surrender, loyalty, eternity (Mahdi et al., 2016).	relaxation, used in creating icon in abstract forms of moon and stars. Imaginary as cited by Kanmaz (2015). Symbol of lasting traditions and values (Mahdi et al., 2016)	to show calm, peace and trust.
Orange	Links with meaning of happiness, energetic and change and is used for “good” wishes as cited by Kanmaz (2015).	“Smiling face” is used for representation of good wishes in the icon form as cited by Kanmaz (2015).	Used in few icons in medium fidelity icon to show happiness, and energetic
Purple	Signifies inhibition, emotional claustrophobia. Represents assimilation and indecision (Mahdi et al., 2016)	Physical weakness in a negative way as cited by Kanmaz (2015). Combines dominative nature of red and peaceful surrender of blue. Increases mediation and inner reflection and works well along with its complementary colors (yellow spectrum colors) (Mahdi et al., 2016).	Used in one icon in medium fidelity icon image
Black	Meaning sophistication, emotional safety, and glamor. as cited by Kanmaz (2015). Authority power, stability strength (Murphy & Rowe, 1993). Represents emptiness, withdrawal of interests, hasty conduct, and unwise behavior (Mahdi et al., 2016)	Black is used in part of image color of the semiotic icon design. By using black, aimed to reflect the perception of weight and seriousness. Also emphasizes authority and power. The contrast that is created with white image creates an excellence graphical user interface (GUI). The best color to belittle the environment. This color has a thick and heavy energy and represents the environment static and negative (Mahdi et al., 2016)	Used in few icons in medium fidelity icon to show authority, power and strength. Used in all icon in high fidelity icon to show to show authority, power and strength.
White	Symbolizes clarity, simplicity, and purity as cited by Kanmaz (2015). Clean, perfect, elegant, neutrality (Murphy & Rowe, 1993)	A clean and successful reflection is achieved using white as cited by Kanmaz (2015).	Used in few icons in medium fidelity icon as background and to show natural, hope, life. Used in all icon in high fidelity icon to show purity, clarity
Brown Gold	Perfect, reliability, stability, friendship. natural organic (Murphy & Rowe, 1993). Indicates social security and need for physical comfort and pleasure (Mahdi et al., 2016)	Often paired with shades of brown to give additional earth vibes (Justas, 2016). Covering a wide area of environment with this color creates a heavy atmosphere and even may cause depression (Mahdi et al., 2016)	Used in all icon in high fidelity icon to show hope, life natural, harmony
Grey	Easy on eyes and does not distract attention as cited by Kanmaz (2015).	Used in deactivated (passive or normal) forms of the clickable helper elements in the app while not diverging from its main purpose as cited by Kanmaz (2015).	Used in few icons in medium fidelity icon as background, life

Overall, colors play a vital role in providing the semantic harmony in the human psychological perception. That is why the choice of color and color scheme are the building blocks in semiotic icon design and application. The icon design approach can be regarded as minimalistic and simple.

In this study, the choice of two to five colors for icons was as suggested by Justas (2016) who stated to use two to five colors throughout the whole set of icon. For low fidelity icon, there is no color selection as it involved sketching the icon only in paper sheet. The medium fidelity icon was designed with two sets of color combination for each genre (see Appendix 4) using Adobe Photoshop software. After getting feedback from the icon survey with youth in preliminary study in design stage, the icon design and color were revised. The final concept of icon color was finalized for high fidelity semiotic icon.

For high fidelity icon, the concept and set of colors chosen were green, black, white, and gold/brown color for border of the icon. Green color was chosen as the concept color for the life wishes and messages, hopes and nature. Black is used in part of image color of the semiotic icon design. Black was aimed at reflecting the perception of weight and seriousness of the semiotic icon design and emphasized the authority and power of the genre. The use of white in image of semiotic icon creates contrast for GUI of the icon. White was used for image color for semiotic icon to reflect purity and clarity.

v. Simple

Simple means straightforward and easily implicit (Oxford, 2020). Simple icons are easy to comprehend and found more quickly than complicated icon (Smythwood & Hadzikadic, 2019). Simple forms deliver the message efficiently (Yang, 2015). Adopt




icon with simple visual style (Chen, 2015; Harley, 2014) in two-dimensional (2D) (Harley, 2014) and maintain simple icon design (Batista et al., 2019; Kanmaz, 2015; Schroder & Ziefle, 2008); also maintain a simple background and escape transparency (Apple Developer, 2019). In this study, semiotic icons were designed with simple image for icon genre. The icon applied the flat icon design, two-dimensional, simple graphic style, simple background color to ease comprehension and easy identification of Surah.




vi. Consistency

Consistency is defined as the way in which a substance holds together (Oxford, 2020). Consistency is also an indispensable element of a successful icon creation, as arousing familiarity in the user is the key point for being recognizable and effective (Kanmaz, 2015). In designing the icon, it is important to maintain consistency in icon style of image (Apple Developer, 2019; Xin et al., 2017) and consistent design (Islam & Bouwman, 2016) for any situation (Chitea, 2017). Consistent shape is more attractive and simpler to adapt (Android Developer, 2019). In this study, semiotic icon design consistency was maintained to ensure the standardization to maintain youth interest and motivation to recite Quran. The icon also maintained consistent style of design with flat icon, round shape icons and same size of icon.

The following Table 4.11 summarizes the icon design elements adapted in this study. The elements were then validated by the experts in IT to verify the suitability of the elements for this study. The validated icon design elements were applied in the instrument of the research to evaluate the icon design aspect of SIDAQ and to prove the research hypothesis on the significant influence between icon design of Semiotic Icon Design Application (SIDAQ) and the youth's motivation in reciting Quran. The result of the icon design validation and evaluation summarized in Chapter 4 and Chapter 5.

Table 4.11: Summary of Semiotic Icon Design Elements for SIDQ

<i>Icon Design Elements / Example</i>	Definition	Attributes	This Study
<p><i>Recognizable</i></p> 	<p>Ability to be recognized, or identified from previous knowledge (Oxford, 2020)</p>	<p>Used icon with familiar image (Landa, 2014), identifiable preferred (Harley, 2014; Xin et al., 2017), high identification accuracy yields better search performance (Zhang et al., 2017), fast recognition to establish mutual connection to grab user attention (Silvenmoinen et al., 2017). Icon has better recognition with simplified stylization, open edge shape and realistic adaptation (Chen, 2015).</p>	<p>Used familiar image to visualise Surah genre for easy icon identification. This allows fast recognition and create close connection between icon and user visual perception to attract user attention.</p>
<p><i>Color</i></p> 	<p>A property owned by object in producing diverse perceptions on eye that returns or produce light (Oxford, 2020).</p> <p>See Table 2.8 for detail of color.</p>	<p>Icon colorfulness and brightness are related to number of downloads (Wang & Li, 2016) that make icon stand out, attractive to attract user attention (Xin et al., 2017). Remarkable color contrast (Harley, 2014), (Watkins et al., 2014) and warm color (Lee, 2016) graphic to connect event group and critical action (Isla & Estuar, 2014). Use color for influence, legibility, meaning, storytelling, and environment (Landa, 2014). Cohesive design through effective design principles, color palette and flexibility concern for an effective icon set (Jackson & Ciole, 2017). Use background color for applicable brand and escape transparency (Android Developer, 2019). Choose right color palette and understand color meaning, use two to five colors throughout whole set of icon (Justas, 2016).</p>	<p>Use of bright and warm color for icon meaning to make the icon standout and attractive. For low fidelity icon, only sketching, no color selection. Medium fidelity icon was designed with few sets of color combination for two icon design. After survey, icon color were revised based on feedback. For final high-fidelity, color chosen were green for background, black and white for image, and gold/brown color for border icon. The reason for green (life wishes and messages, hopes and natural). Black (reflect perception of weight and seriousness of semiotic icon design and emphasized authority and power of genre, white (purity and clarity). Use of black and white for image show the contrast in icon.</p>
<p><i>Simple</i></p> 	<p>Straightforward and easily implicit (Oxford, 2020)</p>	<p>Simple icons easy to comprehend and quickly found than complex icon (Smythwood & Hadzikadic, 2019). Simple forms deliver message efficiently (Yang, 2015). Embrace icon with simple graphic style (Chen, 2015; Harley, 2014) in two-dimensional (2D) (Harley, 2014) and keep</p>	<p>Designed with simple image for icon genre. Apply flat icon design, 2D, simple graphic style, simple background color to ease the</p>

<i>Icon Design Elements / Example</i>	Definition	Attributes	This Study
		icon design simple (Batista et al., 2019; Kanmaz, 2015; Schroder & Ziefle, 2008). Maintain a simple background and escape transparency (Apple Developer, 2019).	comprehension and quick to be found in Surah.
<p><i>Semantic</i></p> 	Related to meaning in language or logic (Oxford, 2020)	Regular close connection between icon entity and its purpose (Ghayas et al., 2013; Memon et al., 2018) by reducing semantic distance of icon. Semantic distance is closeness of icon's graphic to its meaning (Isherwood, 2009) are one of most significant characteristics (Bovea et al., 2018; Silvennoinen et al., 2017) that can improve user experience (Ghayas et al., 2019). This relates meaning to ease understanding.	Designed with low semantic distance that close connection to the meaning between icon object and its purpose to convey the message for genre of the Surah.
<p><i>Familiarity</i></p> 	Close acquaintance with something. Frequency with images encountered (Oxford, 2020; Ghayas, 2013)	Easy to find familiar icon and familiarity of icon's color assisted to identify app (Alsuwailem, 2016). Icons should represent concrete information from familiar context (Schroder & Ziefle, 2008). Use familiar metaphors (Memon et al., 2017). Familiarity improves consumer experience (Ghayas et al., 2019). This to assist in identifying the icon app	Used the familiar image for icon that user can understand and remember. Example: The familiarity of color green for Islamic feature.
<p><i>Consistency</i></p> 	Way in which a substance holds together; thickness (Oxford, 2020)	Consistency means way in which a substance holds together (Press, 2020). Sustain consistency in icon style of visualization (Apple Developer, 2019; Xin et al., 2017) and consistent design or design uniformity (Islam & Bouwman, 2016) for any situation (Chitea, 2017). Consistent shape is more attractive and simpler to adapt (Android Developer, 2019).	Maintain consistency of semiotic icon design to ensure the standardization to maintain youth interest and motivate to recite Quran. Maintain consistent style of design with flat icon, round shape icons and same size of icon.

d. **Semiotic Analysis on Icon design element for Surah genre**

Semiotic analysis especially using Peirce’s theory of semiotics will improve our knowledge and understanding of semiotics. Table 2.17 shows the previous studies using semiotic analysis. In this study, semiotic analysis was employed by adapting the semiotic analysis studies by Ibrahim et al. (2012) using icon design elements to design Semiotic Icon Design for Reciting Quran (SIDQ). The semiotic analysis of icon design elements was integrated with three elements of sign namely object, representation and interpretant defined in Peirce’s Theory of Semiotics (1931-1958) (Chandler, 2007) as in Figure 2.15. The semiotic analysis of icon design elements for reciting Quran is summarized in Table 4.12.

Table 4.12: Semiotic Analysis of Semiotic Icon Design for SIDQ

Icon Design Elements	Representation/ Representamen	Object	Interpretation / interpretant	Example	Reference
<i>Recognizable</i>	Common icon image	Home	Common images allow fast recognition and mutual connection between icon and visual perception to attract user attention.	House image represent home	Landa, 2014 Zhang et al., 2017 Harley, 2014 Silvennoinen et al., 2017
<i>Color</i>	Bright/warm color icon	Bright green color icon	Use bright and contrast color for user attention.	Green (hope, innovation, natural), white (clean, perfect, elegant, neutrality), black (authority power, stability strength), gold, brown perfect, reliability, stability, friendship. natural organic (Murphy & Rowe, 1993)	Wang & Li, 2016 Xin et al., 2017 Harley 2014 Watskins et al, 2014 Lee, 2016; Android Developer, 2019

Icon Design Elements	Representation/ Representamen	Object	Interpretation / interpretant	Example	Reference
<i>Simple</i>	Simple style, flat icon.	Simple home icon	Icon is designed with simple image, flat icon design, simple graphic style, simple background color to show.	Simple flat house image	Smythwood & Hadzikadic, 2019 Harley, 2014 Chen, 2015 Kanmaz, 2015, Schroder & Ziefle, 2008 Apple Developer, 2019
<i>Semantic</i>	Meaningful icon	Meaningful home icon	Icons are designed with close connection meaning between icon entity and its purpose to convey correct message of Surah genre	House close meaning to home	(Ghayas, Khan, & Jaafar, 2013, 2019), Memon et al., 2017 Isherwood, 2009 (Bovea et al., 2018), Silvennoinen et al., 2017
<i>Familiarity</i>	Familiar image	icon	Familiar icon	Icon uses familiar image that user can understand and remember.	Familiarity of color green for Islamic. Alsuwailem, 2016 Ghayas, 2019 Memon et al., 2017
<i>Consistency</i>	Uniform design	icon	Consistent design icon (similar round shape, color, style)	Maintain consistency of design, style, round shape, size to ensure uniformity design, maintain user interest and motivation to recite Quran.	Uniform round shape and same color icon Xin et al., 2017 Islam & Bouwman, 2016 Android Developer, 2019

This semiotic analysis showed the relation of the icon design element studies with the Peirce Theory of Semiotics. The icon design elements, reference (representamen), object and interpretation are related to each other to generate a meaningful icon design to the user. This is important to ensure the icon design elements were integrated and mapped with the main elements of sign in the Peirce Theory of Semiotics that will be employed in the icon design in the design stage. The detailed design of the icon was discussed in detail in phase 2 design and development, in Chapter 3.

4.2.3 Expert Validation on Initial Icon Design Elements for Reciting Quran

The ten common elements of icon design elements for mobile application were analysed through the systematic literature review and comparative study. Further, the six initial elements for icon design are proposed for reciting Quran. The proposed six initial elements for icon design were then validated by the three (3) experts in Information Technology (IT). The elements were validated by the expert in terms of icon design elements and its suitability for Quranic field. Three experts in IT were involved in validating the initial icon design element for reciting Quran.

In the set of questionnaires, six initial elements of icon design were: recognizable, color, simple, semantic, familiarity and consistency. The scale used was 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree. Table 4.13 summarized the result of expert validation on initial elements icon design for reciting Quran. This step received positive feedback from the experts to ensure the icon design elements is validated and suitable for icon design in design stage.

Table 4.13: Initial Elements of Icon Design for Expert Validation

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
Recognizable	The icons are easy to be recognized (Harley, 2014; Press, 2020; Xin et al., 2017, Zhang et al., 2017)			/ (2)	/ (1)		3.33 (medium high)	.58
<i>Ability to be recognized or identified from previous knowledge (Press, 2020)</i>	The image used on icons are common (Landa, 2014)				/ (3)		4.00 (medium high)	.00
	The icons grab my attention (Silvennoinen et al., 2017)			/ (2)	/ (1)		3.33 (medium high)	.58
	The icons can express the idea of Surah.			/ (2)	/ (1)		3.33 (medium high)	.58
	When I see icons, I understand what they mean.			/ (2)	/ (1)		3.33 (medium high)	.58
	Mean Recognizable						3.46 (Medium High)	.46

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
Color	The icons maintain matching color combination (Justas, 2016; Jackson & Ciole, 2017)			/ (1)	/ (1)	/ (1)	4.00 (medium high)	1.00
<i>Property owned by object in producing diverse perceptions on eye that returns or produces light (Press, 2020)</i>	The icon's color combination is harmony (Justas, 2016)			/ (1)	/ (1)	/ (1)	4.00 (medium high)	1.00
	The icon's color attract my attention (Xin et al., 2017)			/ (2)		/ (1)	3.67 (medium high)	1.16
	The icons used suitable color contrast (Harley, 2014; Watkins et al., 2014)				/ (2)	/ (1)	4.33 (high)	.58
	The icon is suitable for the content (Isla & Estuar, 2014; Landa, 2014)			/ (1)	/ (1)	/ (1)	4.00 (medium high)	1.00
	Mean Color						4.00 (Medium High)	.95
Simple	The icon's design is simple (Batista et al., 2019; Kanmaz, 2015; Schroder & Ziefle, 2008; Smythwood & Hadzikadic, 2019)				/ (2)	/ (1)	4.33 (high)	.58
<i>Straightforward and easily implicit (Press, 2020)</i>	The icons use simple graphic style (Chen, 2015; Harley, 2014)				/ (2)	/ (1)	4.33 (high)	.58
	The icons use simple background (Apple Developer, 2019)				/ (1)	/ (2)	4.67 (high)	.58
	The icons are easy to be comprehended (Smythwood & Hadzikadic, 2019)			/ (1)	/ (1)	/ (1)	4.00 (medium high)	1.00
	The icons are quick to be found (Smythwood & Hadzikadic, 2019)				/ (1)	/ (2)	4.67 High	
	Mean Simple						4.44 (High)	.55
Semantic	I can understand the meaning of the icons (Isherwood, 2009; Bovea et al., 2018; Silvennoinen et al., 2017)			/ (2)	/ (1)		3.33 (medium high)	.58
<i>Related to meaning in language or logic (Press, 2020).</i>	The icons assist me to understand the idea of Surah (Isherwood, 2009; Bovea et al., 2018; Silvennoinen et al., 2017)				/ (2)	/ (1)	4.33 (high)	.58
	The icons have a close connection to the Surah (Ghayas et al., 2013; Memon et al., 2017)		/ (1)		/ (2)		3.67 (medium high)	.58
	The icons can represent the genre of Surah (Isherwood, 2009; Bovea et al., 2018; Silvennoinen et al., 2017)				/ (2)	/ (1)	4.33 (high)	.58
	The icons representing their purpose/function (Ghayas et al., 2013; Isherwood, 2009)				/ (2)	/ (1)	4.33 (high)	1.16
	Mean Semantic						4.00 (High)	.70
Familiarity	The icons used familiar images (Memon et al., 2017)			/ (1)	/ (1)	/ (1)	3.33 (medium high)	0.58

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
<i>Close acquaintance with something.</i>	The icons are easy to be found in app (Alsuwailem, 2016)				/	/	4.33 (high)	.58
<i>Frequency with images encountered</i>	The icons are easy to be comprehended (Ghayas et al., 2019; Schroder & Ziefle, 2008)			/	/		3.67 (medium high)	.58
	I can relate the icons to their meaning (Ghayas et al., 2019; Schroder & Ziefle, 2013; Press, 2020)			/	/	/	4.00 (medium high)	1.00
	Familiarity with the icons ease my understanding (Alsuwailem, 2016)			/	/	/	4.00 (medium high)	1.00
	Mean Familiarity						3.87 (High)	.83
Consistency	The icons have a consistent style (Apple Developer, 2019; Xin et al., 2017)				/	/	4.67 (high)	.58
<i>Way in which a substance holds together, thickness</i>	The icons maintain consistent design (Islam & Bouwman, 2016)				/	/	4.67 (high)	.58
	The icons have a consistent shape (Android Developer, 2019)				/	/	4.67 (high)	.58
	The icons maintain consistent size (Islam & Bouwman, 2016)				/	/	4.67 (high)	.58
	Consistency of icons ease my understanding (Apple Developer, 2019; Xin et al., 2017)				/	/	4.33 (high)	.58
	Mean Consistency						4.60 (High)	.58
	Total Mean						4.87 (High)	.81

Table 4.13 showed the mean, standard deviation, and the mean interpretation of each item. Thirty (30) items for the initial icon design elements were outlined in this study. Thirteen items of icon design elements indicate the mean of each item is at a high mean interpretation level (4.01 – 5.00) and seventeen items are in the medium high mean interpretation level (3.01 – 4.00) based on mean score interpretation (Nunally, 1978) in Table 4.18.

The findings showed that experts were moderately agree to agree with the recognizable element (mean = 3.46, sd = .46), moderately agree to strongly agree with the color element (mean = 4.00. sd = .95), moderately agree to strongly agree with the simple element (mean = 4.00. sd = .55), moderately agree to strongly agree semantic

element (mean = 4.00, sd = .70), moderately agree to strongly agree with the familiarity element (mean = 3.87, sd = .83) and agree to strongly agree consistency element (mean = 4.60, sd = .58). The overall mean of the element of icon design was 4.87 which is high mean interpretation. These six initial icon design elements were verified and accepted by the experts, and it is suitable to be applied in the Quranic field.

Furthermore, the researcher had listed the proposed elements of icon design through the thematic analysis using Atlas.ti software. Six proposed icon design elements for reciting Quran were developed: recognizable, color, simple, semantic, familiarity and consistency. The codes under these icon design elements are summarized using schematic diagrams in Figure 4.2, Figure 4.3, Figure 4.4, Figure 4.5, Figure 4.6, and Figure 4.7.

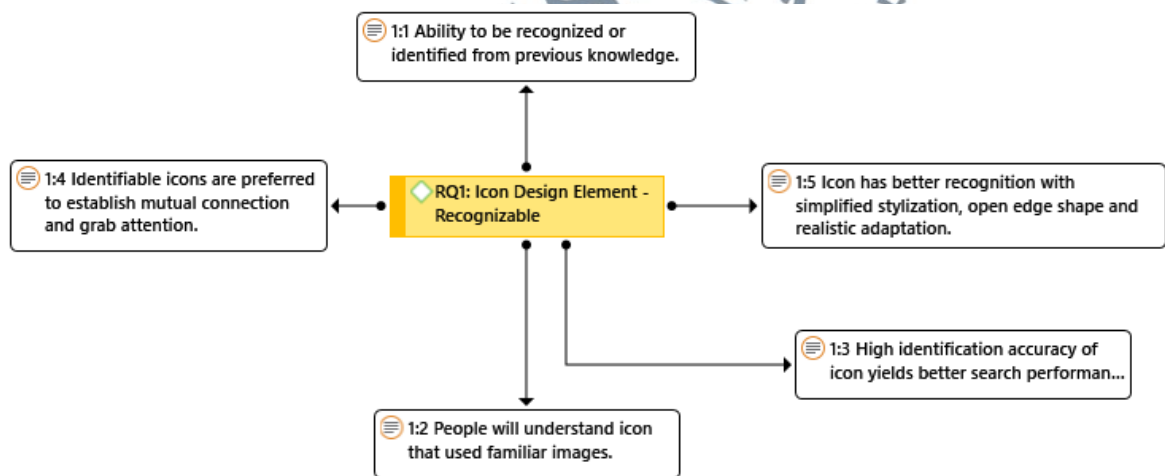


Figure 4.2: Recognizable theme

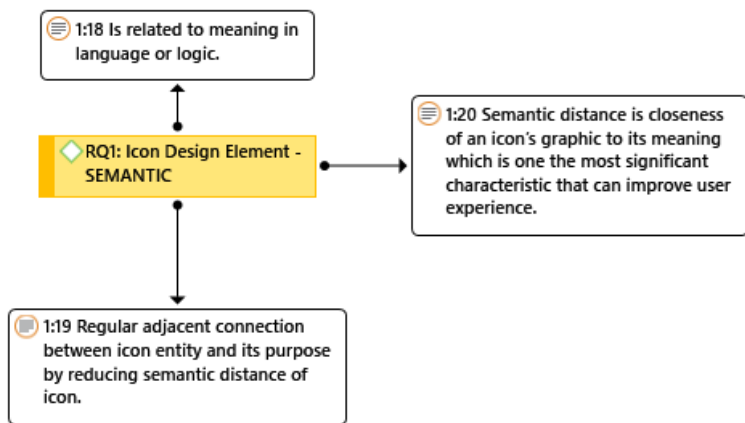


Figure 4.3: Semantic theme

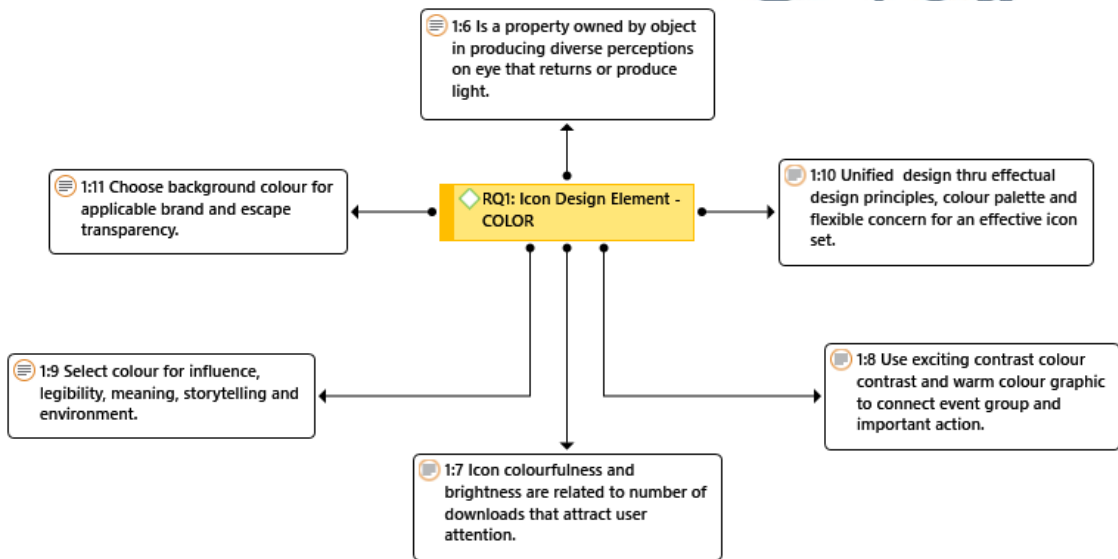


Figure 4.4: Color Theme

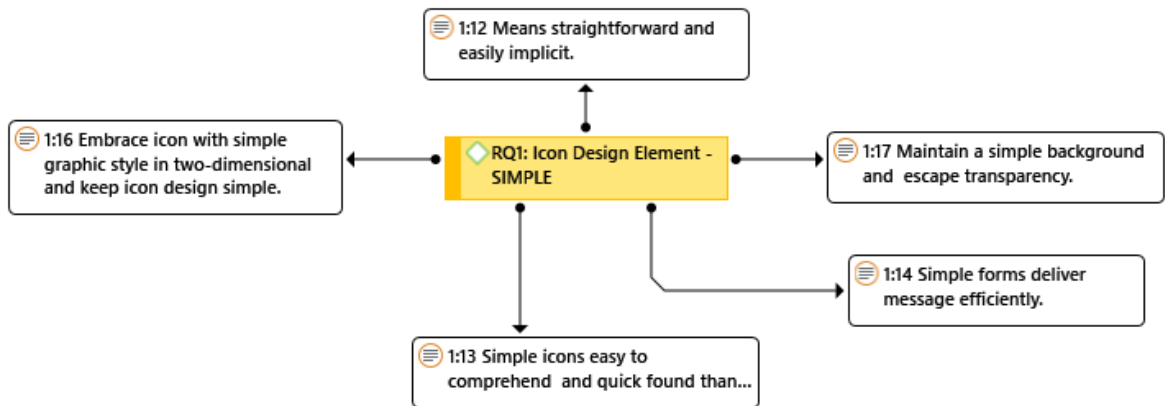


Figure 4.5: Simple Theme

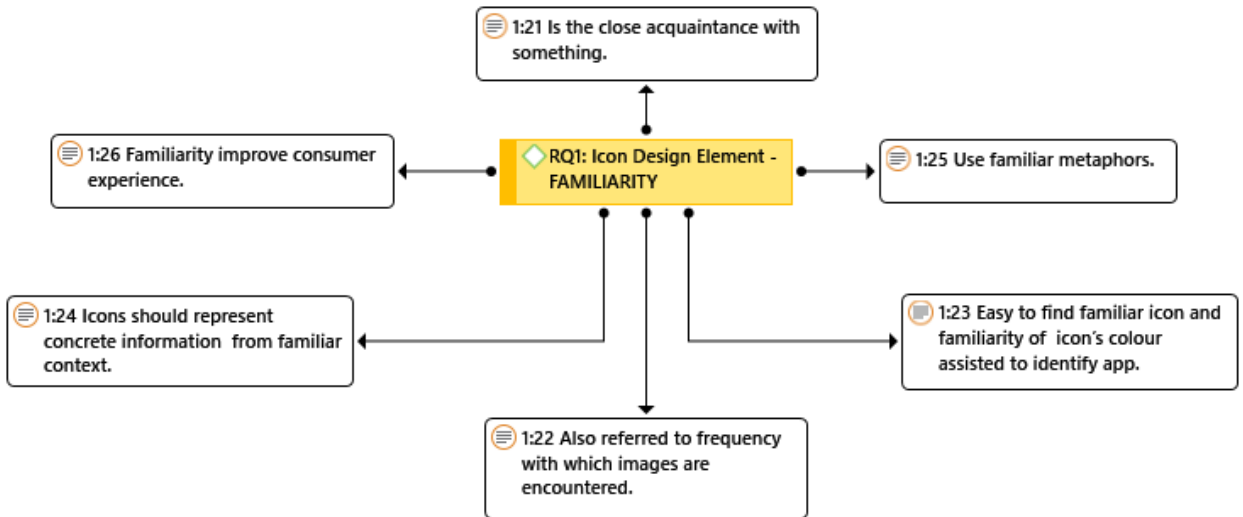


Figure 4.6: Familiarity theme

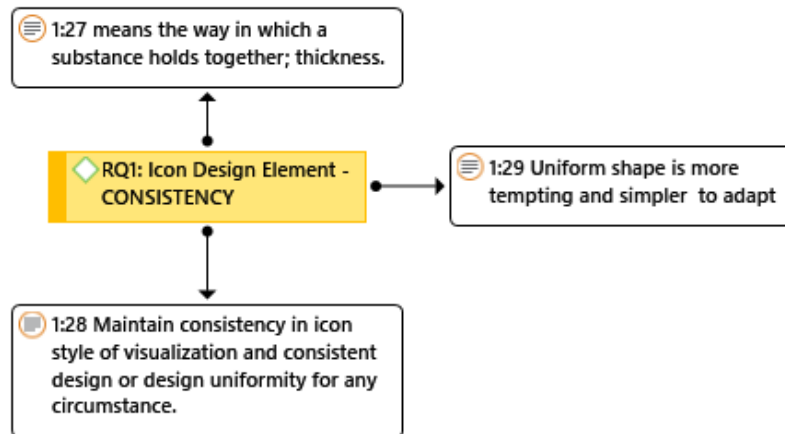


Figure 4.7: Consistency theme

The study of these icon design principles and elements is very significant to this research as it will guide the researcher on the technique for semiotic icon design for mobile apps. This proposed icon design framework which consists of six elements is used as a guideline for semiotic icon design of mobile application for Surah genre in Quran. The icon design gives high implication to the mobile application and assists in designing the fidelity prototype of icon for Surah genre.

Based on the analysis of semiotic icon design elements and expert validation, six main semiotic icon design elements have been identified as suitable for SIDQ, which are recognizable, color, simple, semantic, familiarity and consistency. Figure 4.8 shows a summary of the icon design elements and steps involved in SIDQ.

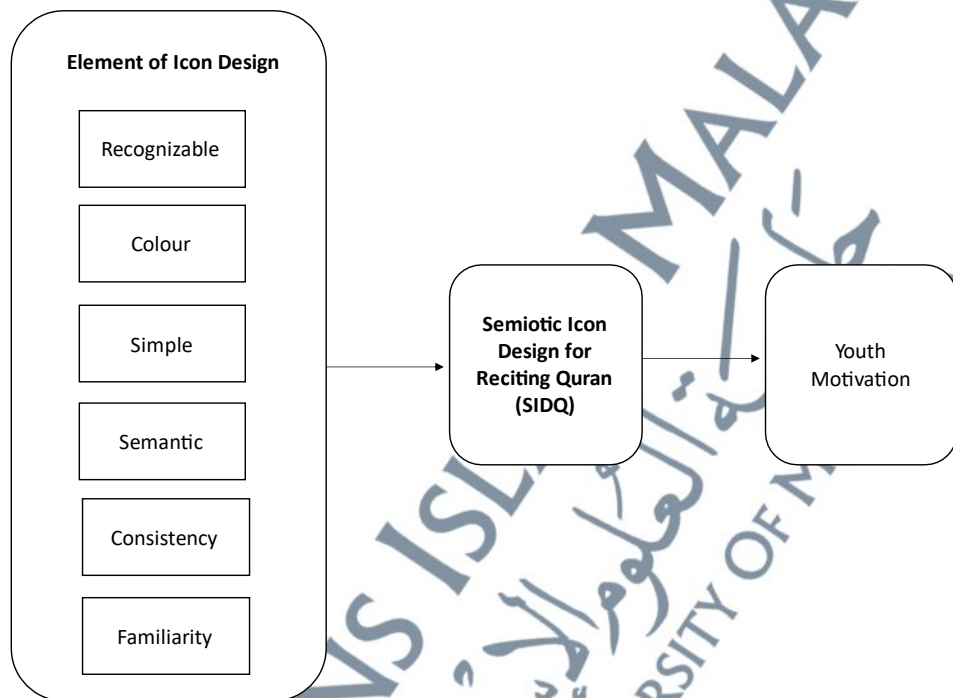


Figure 4.8: Icon Design Element employed in SIDQ

4.2.4 Expert Validation on Usability Elements for Reciting Quran

The two usability elements were then validated by the three (3) experts in Information Technology (IT) in terms of usability elements and their suitability for evaluating the semiotic icon design application in the Quranic field. In the set of questionnaires, two usability elements were: satisfaction and effectiveness. The scale used was 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree. Table 4.14 summarized the result of expert validation on usability elements for evaluating the semiotic icon design for reciting the Quran. This step

received positive feedback from the experts to ensure the usability elements are validated and suitable for the usability of the application in evaluation stage.

Table 4.14: Usability Elements for Expert Validation

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
Satisfaction	The content of the app is useful to me.				/	/	4.33 (high)	.58
<i>Fulfilment of user's wishes, expectations, or needs, or the pleasure derived from this (Press, 2020)</i>	The app assists me to understand the overall idea of Surah			/	/	/	4.00 (medium high)	1.00
	I will use the app to motivate me in reciting the Quran.			/	/	/	4.00 (medium high)	1.00
	I will recommend the app to others.				/	/	4.33 (high)	.58
	Overall, I'm satisfied with the app.			/	/	(1)	3.67 (medium high)	.58
Mean Satisfaction							4.07 (Medium High)	.75
Effectiveness	It is simple to use the app.				/	/	4.33 (high)	.58
<i>The degree to which something is successful in producing a desired result; success (Press, 2020)</i>	I like to spend more time reciting the Quran.			/	/	/	4.00 (medium high)	1.00
	The app increases my curiosity to understand Quran verses.			/	/	/	4.33 (high)	.58
	The app increases my understanding on the idea of Surah.			/	/	/	4.33 (high)	.58
	The app makes reciting Quran more effective.			/	/	/	4.00 (high)	1.00
Mean Effectiveness							4.20 (High)	.75
Total Mean							4.13 (High)	.75

Table 4.14 showed the mean, standard deviation, and mean interpretation of each item. Ten (10) items for the usability elements were outlined in this study. Five items of usability elements indicate the mean of each item is at a high mean interpretation level (4.01 – 5.00) and five items are in the medium-high mean interpretation level (3.01 – 4.00) based on mean score interpretation (Nunally, 1978) in Table 4.18.

The findings showed that experts moderately agree to agree with the satisfaction element (mean = 4.07, sd = .75), and moderately agree to strongly agree with the effective element (mean = 4.20. sd = .75. The overall mean of the element of usability was 4.13 which is a high mean interpretation. These two usability elements were

verified and accepted by the experts, and it is suitable to be applied in the evaluation of the semiotic icon design application in Quranic field.

4.2.5 Expert Validation on Motivation Elements for SIDAQ

The four motivation elements were then validated by the three (3) experts in Information Technology (IT) in terms of motivation elements and their suitability for evaluating the semiotic icon design application in the Quranic field. In the set of questionnaires, four motivation elements were: attention, relevance, confidence, and satisfaction. The scale used was 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree. Table 4.15 summarized the result of expert validation on motivation elements for evaluating the semiotic icon design for reciting the Quran. This step received positive feedback from the experts to ensure the motivation elements are validated and suitable for motivation of application in the evaluation stage.

Table 4.15: Motivation Elements for Expert Validation

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD	
Attention	The app's icons are unique.				/	/	3.67 (medium high)	.58	
	<i>Learner's interest (Keller, 2000)</i>	The app's icons have gained my attention.				/		4.00 (high)	.00
		The app's icons have stimulated my curiosity.				/	/	4.67 (high)	.58
		The app's content manages to keep my attention.		/		/	/	3.33 (medium high)	1.12
		The app's content is surprising.		(1)		/	/	3.33 (medium high)	.58
Mean Attention							3.80 (Medium High)	.57	
Relevance	The app's content is relevant to my interests.				/	/	4.33 (high)	.58	
	<i>Relevance of topic can understand topic clearly (Keller, 2000)</i>	The app's content relates to my way of life.				/	/	4.67 (high)	.58
		The app's content is useful to me.				/	/	4.67 (high)	.58
		The app's content is worth to know.				/	/	4.67 (high)	.58
		The app is significant to me.				/	/	4.67 (high)	.58

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
	Mean Relevance						4.60 (High)	.58
Satisfaction	I satisfied with the content of the app.				/	/	4.33 (high)	.58
<i>Direct relation among motivation and satisfaction.</i>	I feel good when successfully browsing the app.				/	/	4.33 (high)	.58
<i>Learners should satisfy of what achieved during learning process.</i>	I will use the app to understand the genre/theme of Surah.				/	/	4.33 (high)	.58
<i>(Keller, 2000)</i>	I would recommend the app to others.				/	/	4.33 (high)	.58
	I feel delighted when using the app.				/	/	4.33 (high)	.58
	Mean Satisfaction						4.33 (High)	.58
Confidence	My first impression was the app looked easy.		/	/	/	/	4.00 (high)	1.00
<i>Develop confidence thru learning</i>	As I worked on the app, I am confident that I could understand the content.		(1)	(1)	(1)	(1)	4.33 (high)	.58
<i>(Keller, 2000)</i>	I feel confident to use the app.		(2)	(1)	(1)	(1)	4.33 (high)	.58
	The organization of content assist me to understand the app.		(2)	(1)	(1)	(1)	4.33 (high)	.58
	The app increases my confidence to understand idea of Surah in Quran		(2)	(1)	(1)	(1)	4.33 (high)	.58
	Mean Confidence						4.26 (High)	.66
	Total Mean						4.23 (High)	.60

Table 4.15 showed the mean, standard deviation, and mean interpretation of each item. Ten (20) items for the motivation elements were outlined in this study. Seventeen items of motivation elements indicate the mean of each item is at a high mean interpretation level (4.01 – 5.00) and three items are in the medium-high mean interpretation level (3.01 – 4.00) based on mean score interpretation (Nunally, 1978) in Table 4.18.

The findings showed that experts disagreed to strongly agree with the attention element (mean = 3.80, sd = .57), agree to strongly agree with the relevance element (mean = 4.60, sd = .58), moderately agree to strongly agree with the confidence element (mean = 4.26, sd = .66) and agree to strongly agree with the satisfaction element (mean

= 4.33. sd = .58. The overall mean of the element of motivation was 4.23 which is a high mean interpretation. These four motivation elements were verified and accepted by the experts, and it is suitable to be applied in the evaluation of the semiotic icon design application in Quranic field.

4.2.6 Expert Validation on Acceptance Elements for SIDAQ

These three acceptance elements were then validated by the three (3) experts in Information Technology (IT) in terms of acceptance elements and their suitability for evaluating the SIDAQ in the Quranic field. In the set of questionnaires, three acceptance elements were: satisfaction and effectiveness. The scale used was 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree. Table 4.16 summarized the result of expert validation on acceptance elements for evaluating the semiotic icon design for reciting the Quran. This step received positive feedback from the experts to ensure the acceptance elements are validated and suitable for evaluating the acceptance of application in the evaluation stage.

Table 4.16: Acceptance Elements for Expert Validation

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
Perceived Ease of Use <i>Degree to which a person believes subjectively using a particular technology will enhance his or her performance</i> (Fred D. Davis, 1989)	The app's loading time is short.				/	/	4.67 (high)	.58
	The app uses simple language.				/	/	4.33 (high)	.58
	Learning how to use the app is easy.				/	/	4.67 (high)	.58
	I am happy to recite the Quran with the app.				/	/	4.33 (high)	.58
	Overall, I find the app is easy to be used.				/	/	4.33 (high)	.58
	Mean Perceived Ease of Use						4.47 (High)	.58
Perceived Usefulness <i>degree to which people believe that using new</i>	I have a better understanding of the idea of Surah when reciting using the Quran app.		/	/	/	/	4.00 (medium high)	1.00
	The app makes my Quran recitation more interesting.				/	/	4.33 (high)	.58

Element/ Definition	Items	1 SD	2 D	3 M	4 A	5 SA	Mean Interpretation	SD
<i>technology can help to reduce their efforts and how useful the technology would be (Davis, 1989)</i>	The app motivates me to recite Quran more frequently.				/	/	4.33 (high)	.58
	The content of the app is useful to me.				/	/	4.67 (high)	.58
	Overall, the app can benefit me.				/	/	4.67 (high)	.58
	Mean Perceived Usefulness						4.40 (High)	.66
Actual Use Intention to use technology can also be explained by a large portion of the user's actual use of technology (Shin, 2009)	Suitable for visualizing the genre of Surah in Quran				/	/	4.00 (medium high)	.00
	Help to understand the overall idea of Quran verse			/	/	/	3.67 (medium high)	.58
	It makes the Quran recitation more interesting			(1)	(2)	(1)	4.33 (high)	.58
	Increase motivation in reciting the Quran.			/	/	/	4.00 (medium high)	1.00
	This app can be used as a supportive tool.			(1)	(1)	(1)	4.67 (high)	.58
	Mean Actual Use						4.13 (High)	.55
	Total Mean						4.33 (High)	.60

Table 4.16 showed the mean, standard deviation, and the mean interpretation of each item. Fifteen (15) items for the acceptance elements were outlined in this study. Eleven items of acceptance elements indicate the mean of each item is at a high mean interpretation level (4.01 – 5.00) and four items are in the medium high mean interpretation level (3.01 – 4.00) based on mean score interpretation (Nunally, 1978) in Table 4.18.

The findings showed that experts were moderately agree to agree with the user perceived ease of used element (mean = 4.47, sd = .58), moderately agree to strongly agree with the perceived usefulness element (mean = 4.40. sd = .66 and moderately agree to strongly agree with the actual used element (mean = 4.13. sd = .55. The overall mean of the element of acceptance was 4.33 which is high mean interpretation. These three acceptance elements were verified and accepted by the experts, and it is suitable to be applied in the evaluation of the SIDAQ in Quranic field. The evaluation of acceptance elements also in line with the fourth research objective of this study to

evaluate on the acceptance of SIDAQ, and eighth research Question to determine does the acceptance of SIDAQ influence youth's motivation in reciting Quran. The details result on acceptance evaluation and hypothesis testing summarized in Chapter 5.

4.3 Design Phase

4.3.1 Semiotic Icon Design for Reciting Quran (SIDQ)

Semiotic Icon Design for Reciting Quran (SIDQ) is a fidelity semiotic icon designed by employing the icon design elements to visualize the genre of Surah that can motivate youth in reciting Quran. Few discussions have been done with a focus group to get the ideas of what SIDQ should contain based on the analysis findings. The researcher also discussed with a graphic designer to assist in designing the icon based on the specification of icon design elements and storyboard provided by the researcher. The SIDQ was designed using fidelity prototype technique that produced a fidelity icon (low fidelity, medium fidelity, high fidelity). The fidelity icon design was developed using paper sheet, Adobe Photoshop CS6 software as discussed earlier in Chapter 2 and 3. The fidelity prototype is discussed further in the next section.

4.3.2 Process Flow for Fidelity Semiotic Icon Design for Reciting Quran

Following are the detailed processes involved in designing the fidelity Semiotic Icon Design for Reciting Quran (SIDQ). (Refer Process Flow SIDQ in Figure 3.7).

a. Identify Surah and Genre (Step 1)

There are 114 Surah in the Quran. For this study, the research concentrated on three surah samples from Al-Quran. The researcher referred to the Quran experts to identify the suitable Surah sample for this study. The selection of sample Surah and genre of Surah was based on the expert suggestions and recommendations. The expert is from Quranic background from the University of Malaya dan University Sains Islam Malaysia. The researcher referred to the three experts in Quran for recommendations for 3 samples of Surah for this study.

Throughout the thematic analysis using Atlas.ti software, genres for three Surah sample were developed: genre Surah An-Nur, genre Surah Al-Hujurat and genre Surah As-Saff. The codes under these Surah genres are summarized using network diagram. Figure 4.9, Figure 4.10, and Figure 4.11 illustrated the three-surah samples.

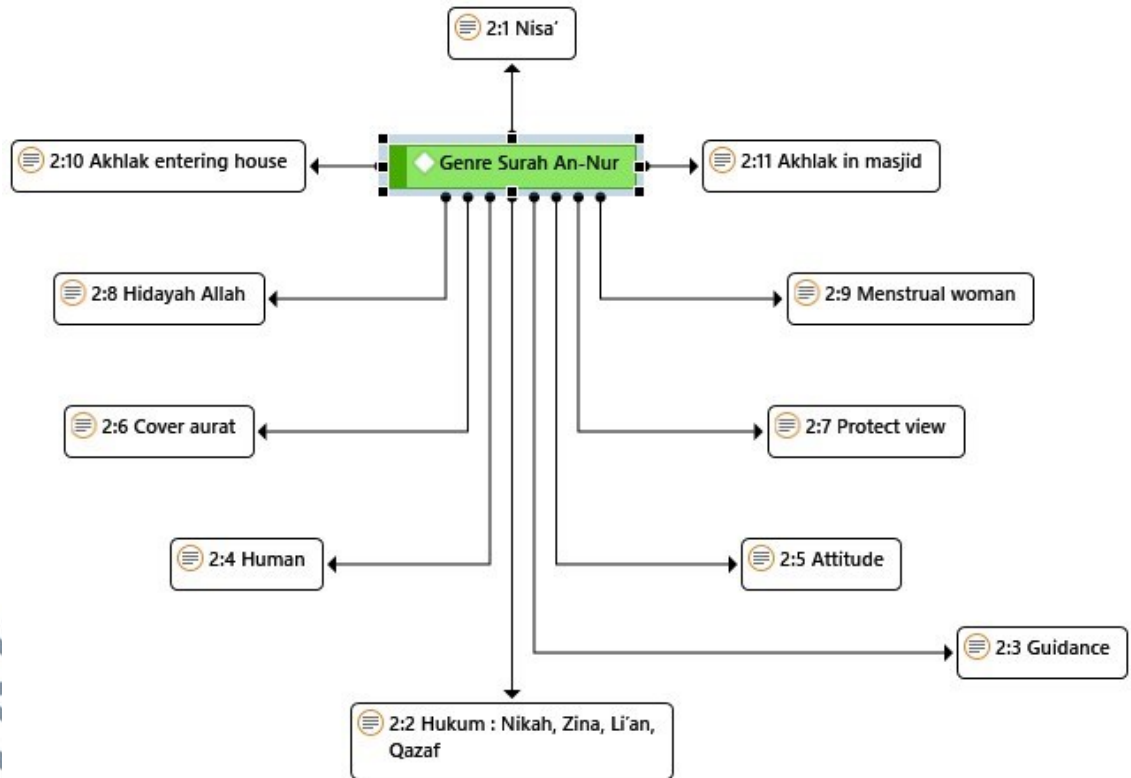


Figure 4.9: Genre in Surah An-Nur.

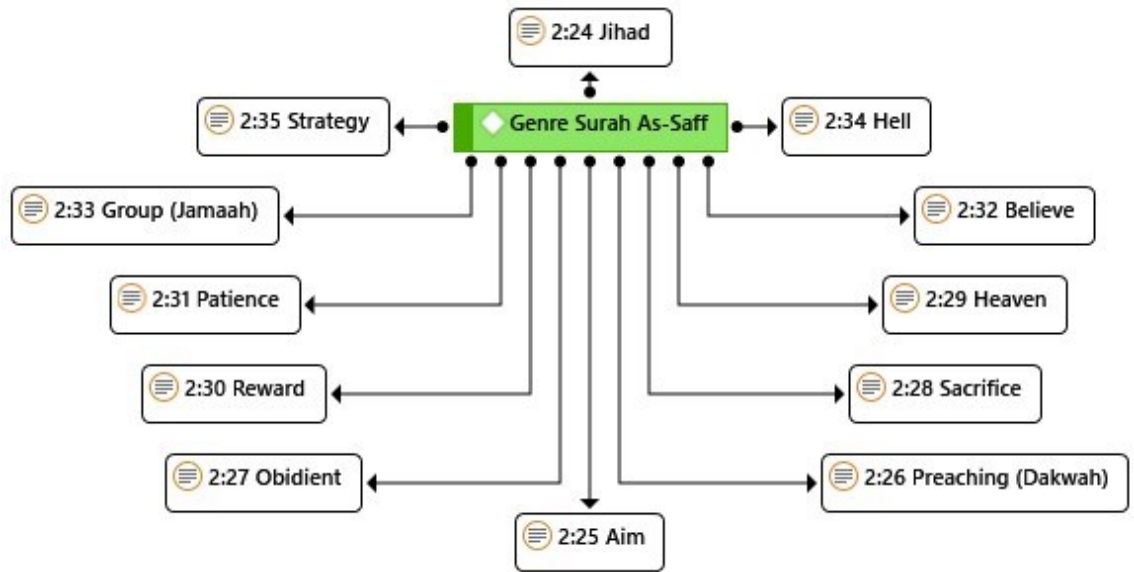


Figure 4.10: Genre in Surah As-Saff

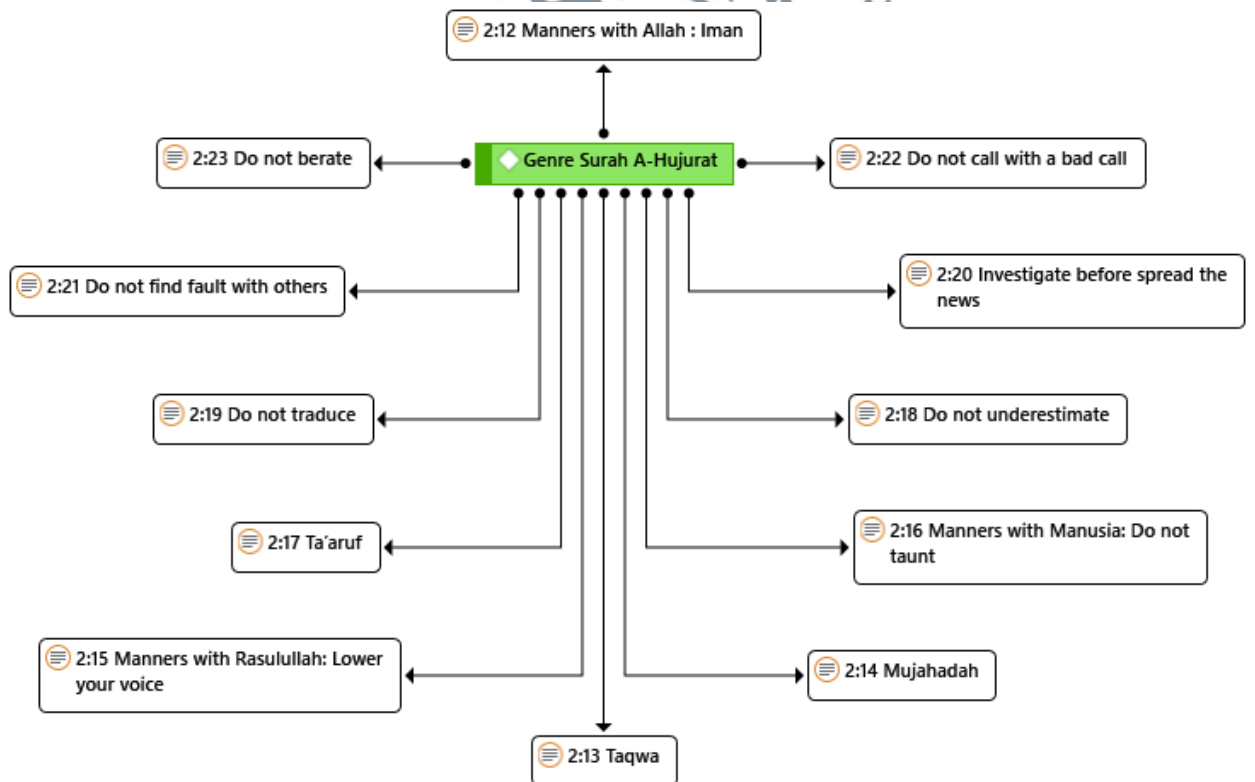


Figure 4.11: Genre in Surah Al-Hujurat

The selection of Surah An-Nur, Surah Al-Hujurat and Surah As-Saff was according to the content of Surah in Quran that has much to do with the laws of human life as a servant of God. This selection was also considered on the content of the informative Quran to explore the messages of the verses of Surah as a living guide that are vital to humanity.

Informal interviews were conducted with three experts from Quranic and Arabic field to acquire the opinion on the genre of Surah as the preliminary studies. Through the preliminary studies carried out, the experts suggested three Surah samples namely Surah An-Nur, Surah Al-Hujurat and Surah As-Saff as the main sources of sample data of the Quranic domain. The reasons are:

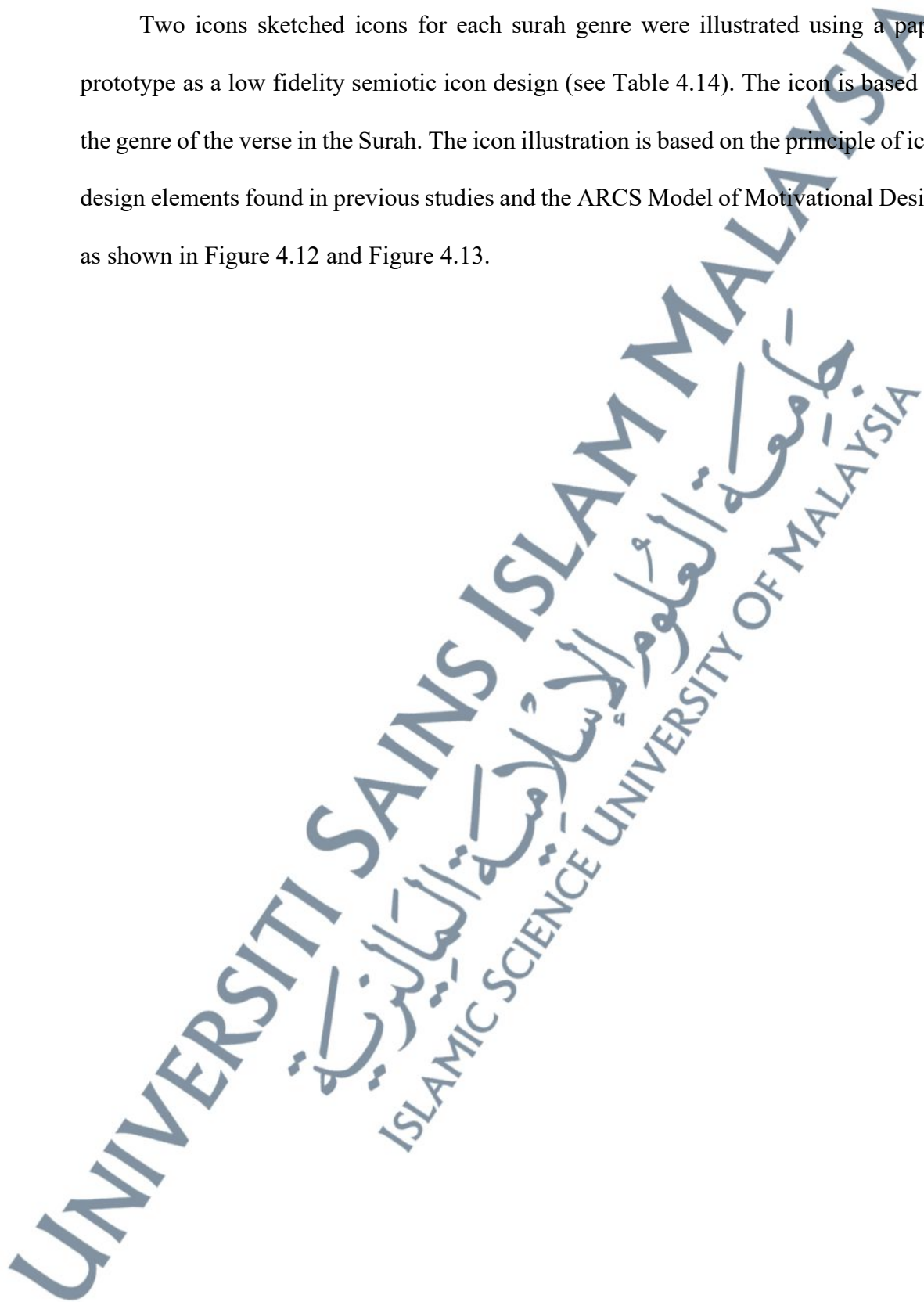
- i. Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are indeed the source of Quran that contains the rules of Islam and rules of life as a Khalifah.
- ii. The Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are a reference to the Muslims as its verses contain the messages that have very close connection to human life.
- iii. The Surah An-Nur, Surah As-Saff and Surah Al-Hujurat are basic Surah containing the guide for the Islamic community.

b. Icon Design Element for Mobile Application (Step 2)

The six key icon design elements for Semiotic Icon Design for reciting Quran (SIDQ) are recognizable, simple, color, semantic, familiarity and consistency that were illustrated in Figure 4.12. The elaboration of each icon element was summarized and discussed in detail in Chapter 2. The relation and mapping of the icon design elements studies with the Peirce's theory of semiotics was discussed in Chapter 2.

c. Illustrate Icon (Step 3)

Two icons sketched icons for each surah genre were illustrated using a paper prototype as a low fidelity semiotic icon design (see Table 4.14). The icon is based on the genre of the verse in the Surah. The icon illustration is based on the principle of icon design elements found in previous studies and the ARCS Model of Motivational Design as shown in Figure 4.12 and Figure 4.13.



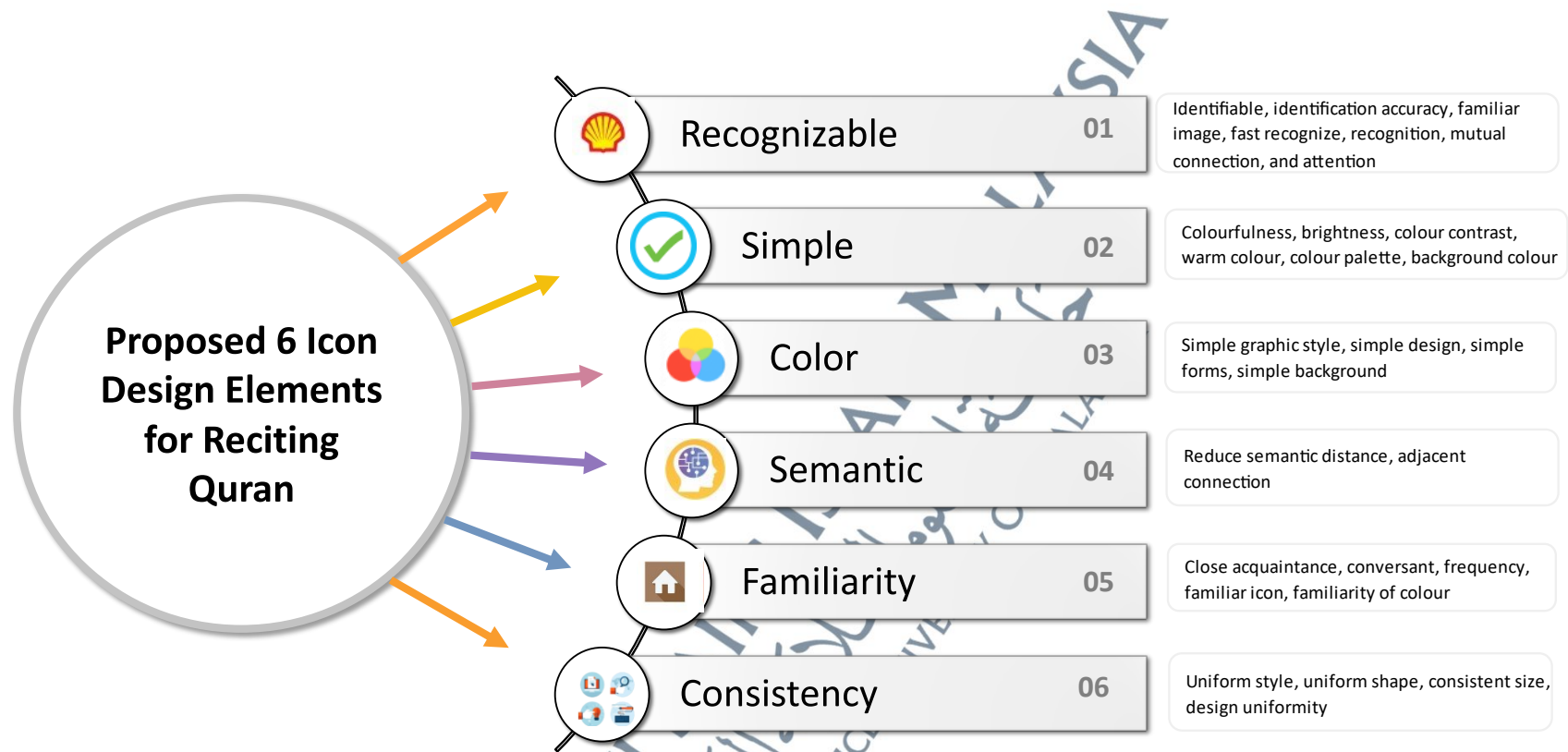


Figure 4.12: Proposed Icon Design Elements for Reciting Quran

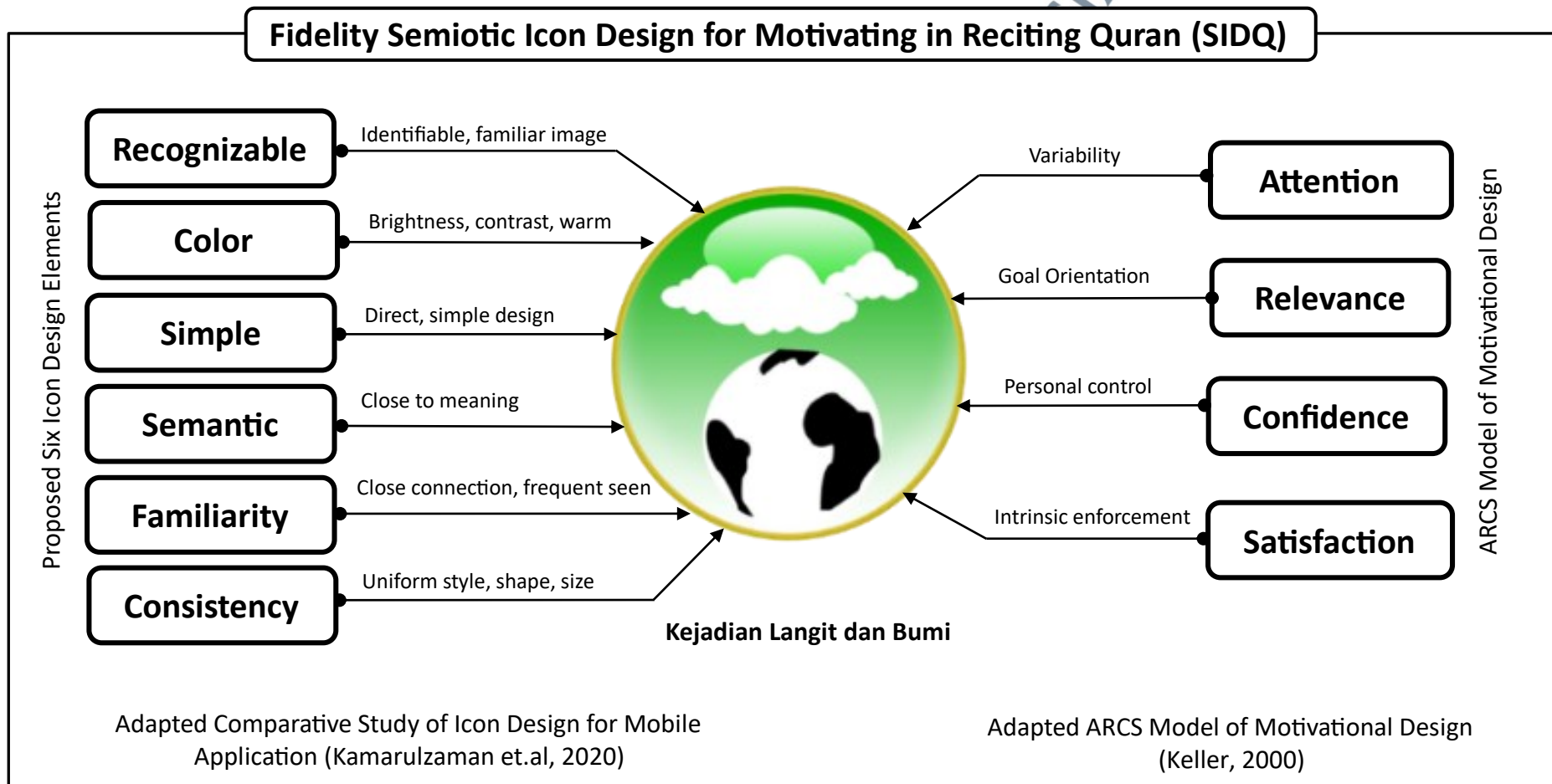


Figure 4.13: Fidelity of SIDQ

d. Digital Design Icon (Step 4)

The sample digital icon was illustrated using Adobe Photoshop software with .png files. Two different designs were presented for genre. The digital icon was designed based on elements of icon design and ARCS model of motivational design (see Table 4.13). Table 4.14 shows the fidelity of semiotic icon design for reciting Quran using low, medium and high fidelity of icon. There are two samples of digital icon as medium fidelity icon. The sample of digital icons described the icon meaning for genre 'Kejadian Langit dan Bumi' in Surah. A total of twenty-eight digital icons were illustrated and summarized in Figure 3.4 and Appendix 4.

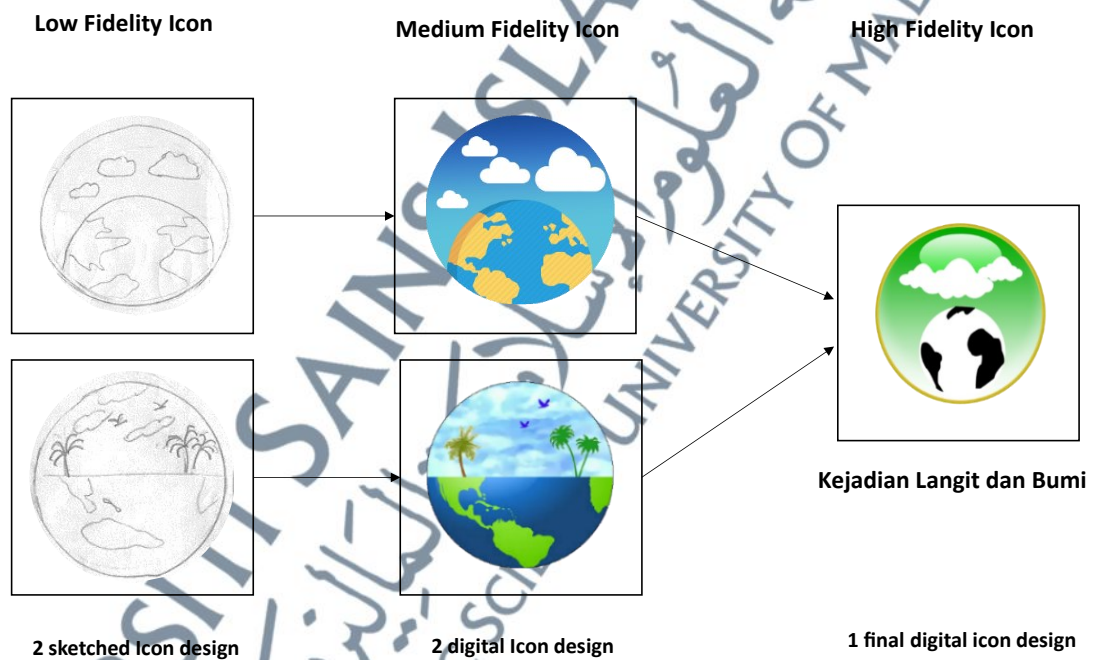


Figure 4.14: Fidelity of SIDQ (Low, Medium, High)

e. Preliminary Study/Icon Survey (Step 5)

The preliminary study aimed at providing an innovative solution to youth and providing them with a better experience in reciting Quran. A group of students from the Faculty of Quran and Sunnah, Universiti Sains Islam Malaysia (USIM) was voluntarily

recruited to participate in this study. The preliminary study was carried out with 113 youth (undergraduate students) from the Faculty of Quran and Sunnah, Universiti Sains Islam Malaysia (USIM) using the digital design of the icon from medium fidelity icon. The survey was performed using online icon survey (google form) to determine the student preferences and the suitability of icon in representing the genre of Surah. The most preferred icon was selected by the students from the icon design proposed. The results of the preliminary study (icon survey) are summarized in Appendix 2.

f. Proposed Final Icon Design (Step 6)

The proposed final icon was designed based on feedback from preliminary study as illustrated in Appendix 4. The improvement of the icon has been done based on literature and feedback from the youth.

g. Validated Icon Design (Step 7)







The final icon design was then validated by the experts in Quranic field and youth with Quranic background. The experts are from Arabic and Quranic background from University of Malaya and Universiti Sains Islam Malaysia. The validation by youth also has been performed for youth from age 18 to 22 from Quran and Multimedia background in the Faculty of Quran and Sunnah, Universiti Sains Islam Malaysia. The results of validated icon design by Quran experts are summarized in Table 4.14.









i. Youth Validation of Icon Design (Quran background)









The design of the icon is the main aspect of validation of icon design study. Icon design of the semiotic icon-based application for Quran is based on the design of the application in the application design phase. Among the aspects of the icon design are

recognizable, color, simple, semantic, familiarity and consistency. In the instrument provided there are twenty-eight (28) items constructed in part III to obtain information from the respondents of the study related to the icon design used in the application as shown in Table 4.17.

Table 4.17: Frequency Distribution, Percentage, Standard deviation and Interpretation Semiotic Icon (Youth Validation)

Item	Genre	Icon	SD	D	M	A	SA	Mean Interpretation	SD
			F %	F %	F %	F %	F %		
C1	<i>No zina</i>		0 0	0 0	0 0	13 35.1	24 64.9	4.65 (High)	.48
C2	<i>Qazaf</i>		0 0	1 2.7	7 18.9	10 27	19 51.4	4.27 (High)	.87
C3	<i>Lian</i>		0 0	0 0	9 24.3	9 24.3	19 51.4	4.27 (High)	.84
C4	<i>Adab Masuk Rumah</i>		0 0	1 2.7	10 27.0	4 10.8	22 59.5	4.27 (High)	.96
C5	<i>Tundukkan pandangan</i>		0 0	1 2.7	5 13.5	9 24.3	22 59.5	4.41 (High)	.83
C6	<i>Nikah</i>		0 0	0 0	2 5.4	12 32.4	23 62.2	4.57 (High)	.60

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD
C7	<i>Hidayah</i>		0 0	1 2.7	0 0	12 32.4	24 64.9	4.59 (High)	.64
C8	<i>Kejadian Langit dan Bumi</i>		0 0	0 0	1 2.7	9 24.3	27 73.0	4.70 (High)	.52
C9	<i>Adab dalam Masjid</i>		0 0	0 0	6 16.2	4 10.8	27 73.0	4.57 (High)	.77
C10	<i>Kejadian Hujan dan Kilat</i>		0 0	0 0	1 2.7	7 18.9	29 78.4	4.76 (High)	.50
C11	<i>Kejadian Siang dan Malam</i>		0 0	0 0	0 0	10 27.0	27 73.0	4.73 (High)	.45
C12	<i>Kejadian Haiwan</i>		0 0	0 0	2 5.4	10 27.0	25 67.6	4.62 (High)	.59
C13	<i>Munafik</i>		1 2.7	0 0	1 2.7	10 27.0	5 67.6	4.57 (High)	.80
C14	<i>Taat</i>		0 0	0 0	0 0	7 18.9	30 81.1	4.81 (High)	.40

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD
C15	Taqwa		0 0	0 0	0 0	8 21.6	29 78.4	4.78	.42
C16	Solat		0 0	0 0	0 0	6 16.2	31 83.8	4.84	.37
C17	Perempuan yang taat		0 0	2 5.4	9 24.3	13 35.1	13 35.1	4.00 (Medium High)	.91
C18	Adab dengan Rasulullah		0 0	0 0	4 10.8	9 24.3	24 64.9	4.54 (High)	.69
C19	Larangan tinggi suara		1 2.7	0 0	5 13.5	6 16.2	25 67.6	4.46 (High)	.93
C20	Siasat		0 0	0 0	3 8.1	8 21.6	26 70.3	4.62 (High)	.64
C21	Iman		0 0	0 0	4 10.8	5 13.5	28 75.7	4.65 (High)	.68
C22	Mukmin		0 0	0 0	4 10.8	9 24.3	24 64.9	4.54 (High)	.69







Item	Genre	Icon	SD	D	M	A	SA	Mean Interpretation	SD
			F %	F %	F %	F %	F %		
C23	<i>Panggilan buruk</i>		1 2.7	0 0	8 21.6	9 24.3	19 51.4	4.22 (High)	.98
C24	<i>Mencari salah</i>		1 2.7	0 0	9 24.3	5 13.5	22 59.5	4.27 (High)	1.02
C25	<i>Larangan mengumpat</i>		1 2.7	0 0	7 18.9	6 16.2	23 62.2	4.35 (High)	.98
C26	<i>Lelaki & Perempuan</i>		0 0	0 0	6 16.2	4 10.8	27 73.0	4.57 (High)	.77
C27	<i>Jihad</i>		0 0	0 0	7 18.9	12 32.4	18 48.6	4.30 (High)	.78
C28	<i>Jihad di jalan Allah</i>		0 0	1 2.7	0 0	10 27.0	26 70.3	4.65 (High)	.63
Total Mean								4.50 (High)	.71

Table 4.17 shows the frequency distribution, percentage, mean, standard deviation and the mean interpretation of each item. Ten items in the design aspect icon design indicates the mean of each item is at a high mean interpretation level (4.01-5.00) and only one item is in the medium high mean interpretation level (3.01-4.00) based on mean score interpretation (Nunnally, 1978) in Table 4.18.

Table 4.18: Interpretation of the score

Value Mean Score	Interpretation Level
4.01-5.00	High
3.01-4.00	Medium High
2.01-3.00	Medium Low
1.01-2.00	Very Low

Source: Nunally (1978)

However, the overall mean is mean = 4.1 (standard deviation 0.49) is at a high level. Insights also show no one respondent disagrees or strongly disagrees with each of the icon design items.

Items of icons that convey high interpretation are no zina (no fornication)(mean = 4.65, sd = 0.48), qazaf (mean = 4.27, sd = 0.87), lian (mean = 4.27, sd = 0.84), adab masuk rumah (manners in entering houses)(mean = 4.27, sd = 0.96), tundukkan pandangan (lowering the gaze)(mean = 4.41, sd = 0.83), nikah (marriage)(mean = 4.57, sd = 0.60), hidayah (guidance) (mean = 4.59, sd = 0.64), kejadian langit dan bumi (mean = 4.70, sd = 0.52), adab dalam masjid (manners in the masjid)(mean = 4.57, sd = 0.77), kejadian hujan dan kilat (mean = 4.76, sd = 0.50), kejadian siang dan malam (phenomenon of night and day)(mean = 4.73, sd = 0.45), kejadian haiwan (creation of animals)(mean = 4.62, sd = 0.59), munafik (mean = 4.57, sd = 0.80), taat (mean = 4.81, sd = 0.40), taqwa (mean = 4.78, sd = 0.42), solat (prayer)(mean = 4.84, sd = 0.37), perempuan yang taat (obedient woman)(mean = 4.00, sd = 0.91), adab dengan Rasulullah (manners toward the prophet)(mean = 4.54, sd = 0.69), larangan tinggi suara (prohibition from raising voice)(mean = 4.46, sd = 0.93), siasat (investigate)(mean = 4.62, sd = 0.64), iman (mean = 4.65, sd = 0.68), mukmin (believer)(mean = 4.54, sd = 0.69), panggilan buruk (name calling)(mean = 4.22, sd = 0.98), mencari salah (finding fault)(mean = 4.27, sd = 1.02), larangan mengumpat (prohibit gossip)(mean = 4.35, sd = 0.98), lelaki dan perempuan (man and woman)(mean = 4.57, sd = 0.77), jihad

(mean = 4.30, sd = 0.78) and jihad di jalan Allah (jihad on the road to Allah)(mean = 4.65, sd = 0.63),

Based on the table, items with the highest interpretation were no zina, kejadian siang dan malam, taat, taqwa and solat, with 100 percent of the respondents choosing to agree and strongly agree. However, only perempuan yang taat (obedient woman) item had a mean average of 4.00 and a standard deviation of 0.91. It was also the lowest mean item with the highest percentage of respondents agreeing with only 70.2 percent. Some items have same mean value and interpreted as high with different value of SD due to the different scale score answered by the respondents.

This finding showed the overall feedback on icons used in the application. Based on informal interview with youth, feedback has been given to improve some of the icon image to improve its suitability for visualizing the genre of Surah. This app met the needs of user to motivate them in reciting Quran. It provides a simple icon design that eases understanding of the genre. The choice of icon image, colors used for icon and the use of simple graphics is great and it can be done on a consistent basis. Overall, the semiotic icon app is needed, simple, easy to understand and motivates youth to visualize the genre of Surah while motivating them in reciting Quran.



ii. Content Validation by Expert






The design of the icon is the main aspect of evaluation of application study. Icon design of the semiotic icon design application for Quran is based on the design of the application developed in the application design phase. Among the aspects of the design are recognizable, color, simple, semantic, familiarity and consistency. In the instrument provided there are nearly twenty-eight (28) items constructed in part II to obtain





information from the respondents of the study related to the icon design used in the application.






Table 4.19 describes the frequency distribution, percentage, standard deviation (SD), and interpretation of semiotic icon design by Quran experts. The remarks describe the feedback on suitability of the icon to the related verse in the Surah.





Table 4.19: Frequency, SD, Mean, Interpretation SIDQ (Quran Expert)







Item	Genre	Icon	SD	D	M	A	SA	Mean	SD	Remarks
			F %	F %	F %	F %	F %	Interpretation		
C1	No zina		0 0	0 0	2 66.7	0 0	1 33.3	3.67 (Medium High)	1.16	<i>Expert 1: This icon may confuse. Prohibition aspect is clear on red and crossed circles. Meaning aspect of adultery is somewhat vague and confusing. Icon will also be able to carry meaning of their prohibitions such as khalwat, prohibition, marriage etc. Expert 3: But, how about mahram? What is suitable icon for mahram?</i>
C2	Qazaf		0 0	0 0	2 66.7	0 0	1 33.3	3.67 (Medium High)	1.16	<i>Expert 1: The red circle with crossed should include allegations. The icon that carries meaning of accusation is a bit vague because it can be interpreted as a command and not an accusation. Expert 3: Related to icon no zina.</i>





Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
C3	Lian		0 0	0 0	2 66.7	0 0	1 33.3	3.67 (Medium High)	1.16	<i>Expert 1:</i> The meaning of the oath is there. But the element of accusation unclear. Element of adultery is also unclear <i>Expert3:</i> Related to icon no zina
C4	Adab Masuk Rumah		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	<i>Expert:</i> Doesn't mean anything. Can only be understood by some (oval shape). <i>Expert 3:</i> Suggestion "Adab" as "Guest"
C5	Tundukkan pandangan		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	<i>Expert 1:</i> Doesn't mean anything. Can only be understood by some. (oval shape). Impossible to be understood by those who are not Islamic oriented studies.
C6	Nikah		0 0	0 0	1 33.3	1 33.3	1 33.3	4.00 (Medium High)	1.00	<i>Expert 1:</i> What is the difference between the prohibition of adultery and marriage? If icon 1 (only with a circle and a red cross) means prohibition of adultery, then this can be taken for granted can/allowed adultery.
C7	Kejadian Langit dan Bumi		0 0	0 0	2 66.7	0 0	1 33.3	3.67 (Medium High)	1.16	<i>Expert 1:</i> The creation of the heavens and the earth of nature The verse means the creation of nature as a whole means the icons have to depict all the galaxies and others. People who

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
										are not religiously oriented find it difficult to understand. Very limited. People who don't religiously oriented is difficult to understand Expert 3: May be symbol that related to nuur"or"misyka" is better. Suggestion: "Tasbih Makhluk di Langit dan Bumi"
C8	Hidayah		0 0	1 2. 7	0 0	2 66.7	1 33.3	4.33 (Medium High)	0.58	Expert 2: Item no.7 - translation of word "mishkat". Expert 3: This symbol more likely refer to do ' a
C9	Adab dalam Masjid		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	Nil
C10	Kejadian Hujan dan Kilat		0 0	0 0	0 0	0 0	3 100	5.00 (High)	0.00	Expert 2: Item no.7 translation of wordn "mishkat"
C11	Kejadian Siang dan Malam		0 0	0 0	1 33.3	0 0	2 66.7	4.33 (High)	1.16	Expert 1: Day and night refer to the earth and not to the stars. People who do not religiously oriented is difficult to understand.

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
C12	Kejadian Haiwan		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	<i>Expert 1: People who do not religiously oriented is difficult to understand. Expert 2: Item no.14 - spelling Dia "Tiap-tiap" - "segala"</i>
C13	Munafik		0 0	0 0	0 0	0 0	3 100	5.00 (High)	0.00	<i>Expert 2: Item no.15 - word "sepauk" (part of them)</i>
C14	Taat		0 0	0 0	0 0	0 0	3 100	5.00 (High)	0.00	Nil
C15	Taqwa		0 0	0 0	0 0	8 21.6	29 78.4	4.78 (High)	.42	Nil
C16	Solat		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	<i>Expert 1: Another meaning is congregation or do not join congregation. Meaning of solat must be through icon of a person doing solat. Expert 2: Item no.18 - suggest icon of people bowing down onlyhj.</i>

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
C17	Perempuan yang taat		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	<i>Expert 1: The representation of meaning is somewhat vague. Please see obedience icon 17. People who don't religiously oriented difficult to understand. Expert 3: Suggestion: "Perempuan yang memelihara Kehormatan"</i>
C18	Adab dengan Rasulullah		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	Nil
C19	Taqwa		0 0	0 0	1 33.3	1 33.3	1 33.3	4.00 (Medium High)	1.00	<i>Expert 3: Suggestion: heart symbol (as shown in no 23 Iman) with lafz in the heart.</i>
C20	Perlahan kan suara		0 0	0 0	1 33.3	1 33.3	1 33.3	4.00 (Medium High)	1.00	<i>Expert 1: Does not mean lower one's voice but mute... need to leave one bar or line that is not muted. Expert 3: Summary of translation is: for no 21 Prohibition of raising one's voice. Same icon for lowering one's voice 21 and 20 but different wording?</i>

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
C21	Larangan tinggi suara		0 0	0 0	1 33.3	1 33.3	1 33.3	4.00 (Medium High)	1.00	Expert 1: Not the meaning of slowing down the voice but mute, need to leave a bar or line that is not muted. Expert 3: Summary of translation is for lowering one's voice, no. 20
C22	Siasat		0 0	0 0	1 33.3	0 0	2 66.7	4.33 (High)	1.16	Nil
C23	Iman		0 0	0 0	0 0	1 33.3	2 66.7	4.33 (High)	0.58	Expert 1: Meaning distraction (oval shape) Expert 3: Suggestion: love symbol with the word iman
C24	Mukmin		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	Expert 1: In one row. People who don't religiously oriented difficult to understand.
C25	Panggilan buruk		0 0	0 0	0 0	1 33.3	2 66.7	4.67 (High)	0.58	Expert 1: Meaning distraction (oval shape)
C26	Mencari salah		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	Expert 1: People who don't religiously oriented difficult to understand. Expert 2: Proposal lens icon raised, and body half waist, as well brought up.

Item	Genre	Icon	SD F %	D F %	M F %	A F %	SA F %	Mean Interpretation	SD	Remarks
C27	Larangan mengumpat		0 0	0 0	1 33.3	0 0	2 66.7	4.33 (High)	1.16	<i>Expert 1: It is not clear about the absence of the person being cursed. Expert 2: The two-headed icon suggestion is enough; the body doesn't need to enter. Expert 3: Please refer to no.19 Taqwa</i>
C28	Lelaki & Perempuan		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	<i>Expert 1: Is the separation giving the meaning of no zina? Please observe icon C1</i>
C29	Jihad di jalan Allah		0 0	0 0	1 33.3	1 33.3	1 33.3	4.00 (Medium High)	1.00	<i>Expert 3: Suggestion: combination of icon in Jihad no 35 and symbol of property/money</i>
C30	Jihad		0 0	0 0	0 0	2 66.7	1 33.3	4.33 (High)	0.58	<i>Expert 2: Proposed the "people on horseback" half only. Expert 3: As mentioned in Jihad di Jalan Allah no 31.</i>
Total Mean								4.45 (High)		

4.3.3 Expert Validation for SIDQ

a. Content Validation

Content validation for SIDQ was done by three academic experts. The achievement of the content validation is calculated using Percentage Calculation Method (PCM). Good content validation percentage was set at 70 percent. SIDQ has achieved the content validity of 85.37 percent with a coefficient value of 0.85, and the

value is above 70 percent or 0.70. Based on the result, contents in the SIDQ are considered of good quality. Table 4.20 shows the content validity measurement for the SIDQ.

Experts suggested improvement of some content in SIDQ. Rater 1 suggested that icons might have identical meaning with the context. This research poses good contribution to Quranic field or domain. In addition, Rater 1 suggested that the concept of necessary meaning to be represented by an icon must be clear. Representation in icons should consider all the probabilities they think of using it. All aspects of color, shape, symbolism, and arrangement should be considered more critically and thoroughly. Rater 1 suggested avoiding using icons that can only be understood by certain groups and cannot be understood by other groups.

Table 4.20: Content Validation Measurement

Items	Rater 1	Rater 2	Rater 3
1	3	5	3
2	3	5	3
3	3	5	3
4	4	5	3
5	4	5	4
6	3	5	4
7	3	5	4
8	4	5	4
9	4	5	5
10	3	5	4
11	3	5	5
12	5	5	5
13	3	5	5
14	4	5	5
15	5	5	5
16	5	5	5
17	4	5	3
18	4	5	5
19	4	5	4
20	4	5	5
21	4	5	3
22	4	5	3
23	4	5	3
24	5	5	5
25	4	5	4
26	4	5	5
27	4	5	5
28	4	5	4
29	3	5	5

Items	Rater 1	Rater 2	Rater 3
30	3	5	4
31	3	5	3
32	3	5	4
33	3	5	4
34	3	5	4
35	4	5	4
36	4	5	3
Total	134	180	147
Content Validity Achievement (100%)			85.37
Content Validity Coefficient (1.00)			0.85

i. Content Validity for Language Used in SIDQ

SIDQ was made in Bahasa Melayu to satisfy youth needs. During the design phase, SIDQ, content of Surah translation was prepared based on content and translation from Tafsir Pimpinan Ar-Rahman (Sheikh Abdullah Basmeih, 2001). To verify correct use of translation and icon design suitability, expert validation procedure was performed. The validation includes face validation to check for spelling errors in SIDQ. Language validation was performed by 3 experts consisting of two Quran experts and one language expert. For grammar and tenses, language experts reviewed the SIDQ thoroughly and gave recommendations for improving the syntax and sentence structure of the content.

For calculating the percentage from the expert given score, SIDQ has achieved the validity measurement for the language of 87.78 percent with a coefficient value of validity of 0.88, and it is above 70 or 0.70. Based on the result, the language and terminology used in SIDQ achieved good validity measurement. Table 4.21 shows the validity measurement for the language used in SIDQ.

Table 4.21: Content Validation Measurement for Language Used

Items	Rater 1	Rater 2	Rater 3
1	5	3	4
2	5	3	4
3	5	3	4
4	5	3	4
5	5	4	4
6	5	4	4
7	5	4	4
8	5	4	4
9	5	5	5
10	5	4	4
11	5	5	5
12	5	5	5
13	5	5	5
14	5	5	5
15	5	5	5
16	5	5	5
17	5	3	3
18	5	5	5
19	5	4	4
20	5	5	5
21	5	3	3
22	5	3	4
23	5	3	4
24	5	5	5
25	5	4	4
26	5	5	5
27	5	5	5
28	5	4	4
29	5	5	5
30	5	4	4
31	5	3	3
32	5	4	4
33	5	4	4
34	5	4	4
35	5	4	4
36	5	3	3
Total	180	147	147
Content Validity Achievement (100%)			87.78
Content Validity Coefficient (1.00)			0.88

Spelling errors in translation of SIDQ needed correction. For example, ‘sesungguhnya’ term was spelled as ‘sungguh’. Rater 1 suggested changing the term ‘sepuak’ to ‘sebahagian daripada mereka’. All spelling errors and grammar mistakes shown by expert through face validation were fixed. All recommendations were accepted.

All the findings in the design phase were arranged systematically to provide insight to design SIDQ during the development phase. Table 4.22 shows the summary of the findings in the design phase. Overall, this section explains the process flow for fidelity of semiotic icon design. The low fidelity to high fidelity semiotic icon design is an important part of this research which serves as a key process for icon design. The design of the prototype was implemented based on semiotic icon design. The next action addressed application development phase for the semiotic icon design application.

Table 4.22: Summary of Design Phase

Design Information	Source	Was the objective met?
What are the forms of SIDQ and SIDAQ?	Literature review and interview	Yes. Semiotic icon design SIDQ using fidelity icon technique. Semiotic icon deig application (SIDAQ) using fidelity prototype techniques.
What is the software used to design and develop icon?	Discussion with graphic multimedia designer	Yes. Adobe Photoshop. Adobe Flash
What is the content in SIDQ and SIDAQ?	Three Surah (Surah An-Nur, Surah Al-Hujurat, Surah As-Saff. Al-Quran) and Summary of Translation Semiotic Icon design	Yes. Chapter 4 (SIDQ and SIDAQ)
What languages should be used in SIDAQ?	Interview expert and youth	Yes. Bahasa Melayu

4.4 Development Phase

The development phase discussed the development of the application of SIDAQ. This section discussed the scope of the development of application based on the semiotic icon design discussed in the previous chapter. Furthermore, the Semiotic Icon Design for Reciting Quran (SIDAQ) prototype is described in detail.

4.4.1 Prototype of Semiotic Icon Design Application for Reciting Quran

A prototype is a model or a program which is not based on strict planning but is an early approximation of the final product or software system. A prototype acts as a sample to test the process. Model prototype is employed within this study. While making the model, the user keeps giving feedback from time to time and based on it, a prototype is made. Prototype assists in providing proof of concept. A prototype is a draft version of a product that allows us to explore the ideas and show the intention behind a feature or the overall design concept to users before we invest time and money in development (Cao & Kamil, 2015; Jackson & Ciole, 2017; Mcelroy, 2017). Usually, low fidelity prototypes are used in early iteration to get the general look, feel and overall navigation evaluation (Zezovski & Hultgren, 2016). In this study, the prototype model (Summerville, 2000) was employed in the semiotic icon design application development process (see Figure 2.15 and Chapter 3).

4.4.2 Application Architecture

Application architecture is important in providing an overview of the design of the application being developed (Fabil, 2009). Figure 4.15 shows the application architecture that describes the framework for semiotic icon application for Quran that was implemented based on six key elements of icon design which are recognizable, color, simplicity, familiarity, semantic and consistency. Briefly, the icon design for Surah was developed based on the fidelity prototype. The use of the fidelity prototype is the most suitable technique for icon design for Quran to satisfy the user needs and the applications interface developed.

The first process starts when users enter the semiotic icon design application for Quran (SIDAQ) on their mobile device. Users are provided with semiotic icon application that allows them to use the application in a user-friendly manner. When the users enter the application, they can see the verse of Surah and see the icons that can assist them in understanding the idea of Surah. This could motivate the user to read the entire surah. Briefly, the application architecture of this semiotic icon design application for Quran can be divided into three main parts:

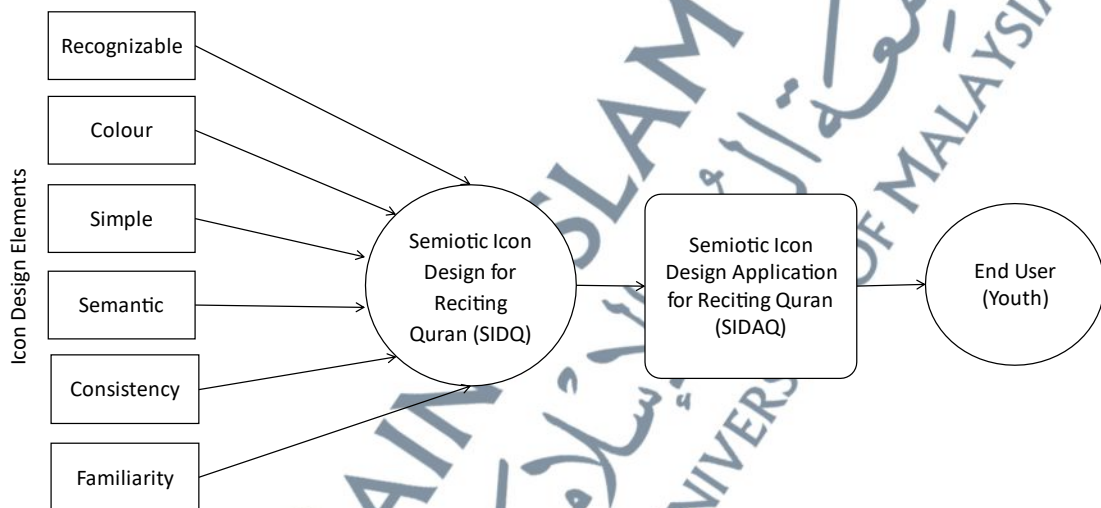


Figure 4.15: Architecture of semiotic icon design application for Quran

i. Semiotic Icon Design for Reciting Quran (SIDQ)

A semiotic icon design for reciting Quran was developed based on the Peirce's theory of semiotics (1931-1958) (Chandler, 2007) and six most common icon design elements from literature (Kamarulzaman et al., 2020). Twenty-eight semiotic icons have been designed using the fidelity icon technique. The semiotic icons were designed to assist in visualizing the Surah genre that can assist in understanding the idea of Surah and motivate youth to recite the Quran. The six icon design elements for semiotic icon

design application were proposed (see Figure 4.12) based on the analysis on the icon design study for mobile application.

ii. Semiotic Icon Design Application for Quran (SIDAQ)

A prototype of semiotic icon design application was developed by combining twenty-eight semiotic icon designs into semiotic icon design application in three Surah samples, Surah An-Nur, Surah Al-Hujurat and Surah As-Saff. The application was developed in Android mobile application platform using Adobe Flash.

iii. End User (Youth)

Youth is the end user for the Semiotic Icon Design Application Quran (SIDAQ) as a supportive tool in reciting Quran. The SIDAQ will assist youth in reciting Quran with icon. The icon will assist youth in visualizing the genre that can help to understand the idea of Surah thus motivating them to recite Quran.

4.4.3 Application Interface Design (Storyboarding)

The development of this application involves development of interface design of the semiotic icon design application for this study. This interface design is important in providing the physical overview of the applications that are fully developed. The application developed consists of three main Surah, namely Surah An-Nur, Surah Al-Hujurat and Surah As-Saff. User may click directly to the surah selected. For each of the selected surah, user can perform the reciting of Surah with icon. The Quran recitation with icon assists in understanding the idea of surah genre.

Figure 4.16 illustrates the flow of the application consisted of main page, home page and Surah page in the SIDAQ application.

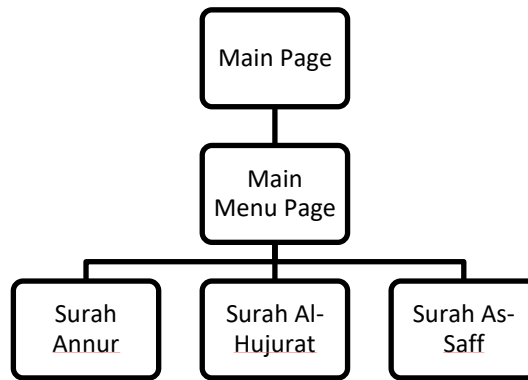


Figure 4.16: Prototype Flow Design for SIDAQ

The following is the description of interface design for application developed in this study:

a. Main page

The page showed the main page of the application. The page listed three Surah namely An-Nur, Surah Al-Hujurat and Surah Al-Saff. This page also provides information for application. The storyboard for screen layout of main page is shown in Figure 4.17.

Title : Main Page	Page : 1/23
<p>Draw / Sketches:</p>	<p>Explanation:</p> <p>Graphic: G1 – Quran image G2 – 3 Selected Surah G3 - Background</p> <p>Text: T1 – An-Nur, Hujurat, As-Saff T2 – Summary of application</p> <p>Action: 1. Page automatically linked to main menu</p>

Figure 4.17: Storyboard - Main page for SIDAQ.

b. Main menu page

This main menu page showed the menu of the application. The menu has three selections of Surah namely Surah An-Nur, Surah Al-Hujurat and Surah As-Saff. The storyboard for screen layout for main page is shown in the following Figure 4.18.

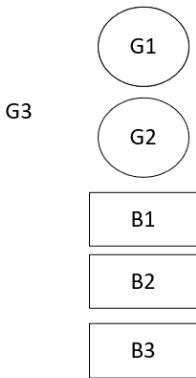
Title : Main Menu	Page : 2/23
Draw / Sketches: 	Explanation: Graphic: G1 – Quran image G2 –3 Selected Surah G3 - Background Button B1 – Button An-Nur B2 – Button Hujurat B3 – Button As-Saff Action: 1. Select Surah 2. Surah page will be displayed

Figure 4.18: Storyboard - Main menu page for SIDAQ

c. Surah page

The Surah interface focused on the three Surah. Figure 4.19 shows the storyboard for Surah page. There are 23 screen layouts for the Surah page. The remaining storyboards for the screen interface are illustrated in Appendix 3.

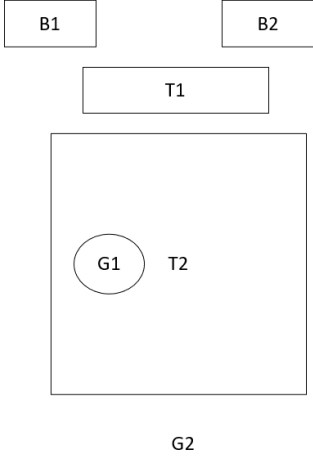
Title : Surah An-Nur	Page : 3/23
<p>Draw / Sketches:</p> 	<p>Explanation:</p> <p>Graphic: G1 – Icon G2 - Background</p> <p>Button B1 – Button Home B2 – Button Next</p> <p>Text: T1 – Surah Info Bilik-Bilik (text color : gold) Hujurat (text color: cyan) 18 Ayat – Madaniyyah. (text color: black)</p> <p>T2 – Surah verses text color: black text color : gold (relate to icon)</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Display Surah 2. Click Icon to display icon and summary of translation 3. Icon displayed with summary of translation

Figure 4.19: Storyboard - Surah page for SIDAQ

4.4.4 Scope of Development

There are several scopes identified as an attempt to visualize the genre of Surah. The following are the scopes discussed in the Surah. There are three Surah samples developed in this prototype namely Surah An-Nur, Surah Al-Hujurat and Surah As-Saff. The Surah only involves certain verses. The icon is designed for the verses that consist of message or genre of Surah. The icon does not design for each verse since few verses may represent one icon. The mobile application provides a platform to integrate the icons design in an application that display the Surah which can assist to visualize genre of Surah thus motivating youth in reciting Quran.

4.4.5 Role of Semiotic Icon Design Application Quran (SIDAQ)

Nowadays, it is vital to support the acquisition of information in the domain of Quran using technology. This study employed the technique semiotic icon design in

developing SIDAQ prototype to help visualize the message of Surah verses in Quran. The following are some of the roles covered in SIDAQ.

- Icon as the visual sign for the theme of Surah
- By understanding the theme of surah one can get a clear idea of the messages delivered by the Surah.
- To increase the motivation among youth to recite Quran often and anywhere. As a supportive tool to motivate youth to recite Quran daily.
- To introduce a new technique of reciting Quran using icon as a visual sign that can deliver the information of the Surah genre.
- To apply the semiotic icon design study in the field of Quran that has been used widely in other fields. Hence, it can contribute to the body of knowledge in Quranic field pertaining to the icon design.

Based on the application and design in the previous phases, prototype development is carried out in line with the scope of the prototype being framed. The following discussed in detail the interface developed in this study:

4.4.6 Application Interface Design

The following are application interface views developed in the prototype semiotic icon design application. Figure 4.20 was the main interface possible reached by the user through the SIDAQ application. This main interface becomes intermediaries to semiotic icon design application of the Quran domain.

This section displayed the interface of Semiotic Icon Design Application for Quran (SIDAQ) developed as the main outcome in this study. Through the Android mobile application platform, the application can be reached by the user. The twenty-eight-fidelity icons in Semiotic Icon Design for Quran (SIDQ) in design stage were

assembled in one mobile application to become a working prototype of SIDAQ. There are three types of Surah covered in this application which are Surah An-Nur, Surah Al-Hujurat and Surah As-Saff.

a. Main page

The page begins with main page showing the name of Surah covered in the application. This is the main page displayed in the application. Figure 4.20 is an overview of the Surah page displaying the three available Surah in this application. There is description of application at the bottom of the page. The page will automatically go to home page in five seconds and home page will be displayed.



Figure 4.20: Main page for Semiotic Icon Design Application (SIDAQ)

b. Main menu page

This is the main menu page displayed in the application. Figure 4.21 is an overview of the Surah page showing the selection of three Surah. There are links to the Surah sample. Users may click the Surah they want to recite. For example, the user can select Surah As-Saff and then recite the Surah As-Saff in detail.



Figure 4.21: Main menu for Semiotic Icon Design Application (SIDAQ)

c. Surah page – Surah An-Nur/Surah Al-Hujurat/Surah As-Saff

Figure 4.22 until Figure 4.24 show the Surah page selected. The page shows the detail of the Surah verses with the icon as supportive visual tool in reciting Quran. The icon is located near the related verses. The icon representing the message or genre of Surah in a particular verse. This will increase the understanding on the idea of the Surah. Not all verses have an icon. Few verses may represent one icon due to its similar meaning and translation. Enhancement was made three times before the evaluation phase. Some icon design may need further improvement in terms of design to ensure suitability of the icon and to avoid confusion.



Figure 4.22: Surah page – An-Nur



Figure 4.23: Surah page – Al-Hujurat



Figure 4.24: Surah page – As-Saff

4.5 Implementation Phase

After completing the pilot study and testing, all amendments have been made based on the youth feedback. SIDQ has been implemented to the youth from age 15 to 30 years in secondary school and higher learning institutions in the Central Region. Since the pilot test has been discussed in Chapter 3, the result will not be discussed in this section. In the implementation phase, post experimental evaluation was conducted through online platform from March 2020 to June 2020 due to COVID-19. The pilot study's descriptive analysis results listed in Appendix 12 and implementation phase activities and results are summarized in Chapter 5.

4.6 Evaluation Phase

The formative evaluation has been discussed in the implementation stage; it will not be discussed further in this section. In the evaluation phase, evaluation through post experimental was conducted through online platform from March 2020 to June 2020 due to the COVID-19 pandemic. The findings in evaluation phase are summarized in the next Chapter 5.

The evaluation of this study was done by applying the quantitative and qualitative methods. After completing the implementation phase, the data from the post-test were recorded and analyzed using SPSS 26.0 for descriptive analysis. Besides that, qualitative data were analyzed using Atlas.ti software to get the themes. Both results are considered as summative evaluation for the development research design. Hence, the result will be presented detail in Chapter 5 to discuss the main findings of this study.

4.7 Chapter Summary

The chapter has discussed the findings of the research for phase 1 and phase 2 which is the needs analysis phase and design and development phase. The result of this finding is the analysis and design and development of semiotic icon design for reciting the Quran. For the first phase, it was discovered that the needs analysis is an important step to firmly establish the need to design the icon and develop the application. Needs analysis involved a systematic literature review, comparative study, and preliminary studies that include the expert interview, youth interview, and expert validation on the initial six icon design elements. The output of phase 1 is the validated six icon design elements namely recognizable, simple, color, semantic, familiarity, and consistency were utilised in the design of semiotic icon design (SIDQ). These research findings

align with the several studies by Ghayas (2019), Guo (2016), Yang (2015), and Zender & Meija (2013).

For the second phase, the design and development phase involved the icon design process using fidelity technique and content validation by the experts. Fidelity technique was chosen to enable the visualisation design of icons (Cao & Kamil, 2015; Mcelroy, 2017; Zezovski & Hultgren, 2016; Merdeyen et al., 2014). The output of phase 2 is the validated fidelity icon design for reciting Quran (SIDQ) and prototype of semiotic icon design for reciting Quran (SIDAQ) with validity and reliability test through experiment to check the feasibility of proposed design (Sommerville, 2016). These research findings align with the several studies by Batista et al. (2019), Chandler (2007), Jackson & Ciole (2017), Yang (2015), and Zender & Meija (2013). The third phase, the evaluation phase involves the evaluation of the application based on the icon design, usability, motivation, and acceptance. The next chapter will discuss the detailed findings of the evaluation phase in Chapter 5, Data Analysis and Findings.