



Feasibility of Android-Based Application SCIQU (Science in Al-Quran) as Science Learning Media for Madrasah Ibtidaiyah (MI)

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Abstract: In this age of technological advancement, the process of learning in the classroom is required to be more adaptive, using various media that can enhance it. One of the learning media that can increase student's interest is picture story media (comics). In this study, an android-based comic media was developed, called Science in Al-Qur'an (SCIQU), with material about clean and healthy lifestyles for grade V Madrasah Ibtidaiyah (MI) students. The media was developed using Research and Development (R & D) Method with ADDIE (Analyze, Design, Develop, Implement, Evaluate) Model. The media developed and the material presented in the media were validated by media expert validators and material experts. From the validation results, it was found that the media developed fell into the "Very Feasible" category with a total validity value of 95.34%. Likewise, the material presented in the SCIQU comic media is included in the "Very Feasible" category with a total validity value of 96.48%. So the SCIQU comic media that has been developed can be said to be very feasible to be implemented to MI students across the country.

Keywords: Android-Based; Feasibility; Learning Media; Science in Al-Qur'an; Validity

Introduction

The development of technology is currently making it easier for humans or other living things and has a variety of benefits. One of them can help humans in learning science and present innovations for technology media-based learning, the development of information and communication technology as a tool that can develop according to the demands of the times to offer new things for education (Bali et al., 2019). In applying technology to education, two basic conditions are required: the technology must make teaching strategies more effective and the technology must always be available and accessible (Robson, 2003). One of the latest learning media that is very accessible is mobile learning (Firdawati et al., 2021; Yulianci et al., 2021).

The advantages of using mobile learning in the learning process include helping students improve literacy and numeracy skills, encouraging independent and collaborative learning, helping to overcome barriers to using ICT, removing the formal form of learning, helping students stay focused for a long time, and increasing learner confidence (Ghavifekr & Rosdy, 2015). Mobile learning that is widely used is learning using android devices, which is increasingly widespread among students and university students (Ntobuo et al., 2023; Wahyuni & Ridlo, 2023).

Learning media needs to be developed to increase effectiveness of learning and also students' motivation for learning (Muttakin et al., 2022). For today's students, learning media that are suitable for learning are learning media that have characterised or animated images. One

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of the media that can be used for learning which has a lot of flexibility is android smartphone (Lukman & Ulfa, 2020; Setiawaty et al., 2023). This gives a clear importance for the development of online learning media which can be accessed through smartphone by students or teachers.

The Qur'an is the foundation of the entire educational curriculum in the Islamic world, because the Qur'an is a religious message that strengthens one's creed and strengthens one's faith (Sri Anggoro et al., 2019). When studied more deeply, many science and technology truths can be explored in the Qur'an, so that it can be a good learning material for students in the school environment, especially Islamic schools when presented in the right learning media (Susilo & Kartowagiran, 2023; Taufik, 2020). The results of the trial application of the Qur'an-based science learning model with a project-based learning approach showed positive results where students gained new knowledge related to the process of plant respiration and its relationship with the power of Allah conveyed in the verses of the Qur'an (Sastradiharj & Dahliah, 2023). The learning outcomes of students who are given lessons with android learning media that has Islamic animated images are better than students who are not given learning with Islamic animated images media (Sulman et al., 2021). Animated learning media with Islamic characters has a better effect, both in terms of assessment and learner behaviour (Al Idrus et al., 2023; Praptiwi et al., 2021). Hence, the need for developing a learning media with strong Islamic values from the Quran is clearly of high importance.

In this research, an android-based application for learning media has been developed, called SCIQU (Science in Al-Qur'an). In this android application, learning media is presented in the form of illustrated stories with interesting characters, attractive visual design, and captivating stories that contain learning about science (especially health science) contained in the Al-Qur'an. This learning media is validated in terms of material and media feasibility by material experts and media experts.

Method

The development of learning media in this study was conducted using the Research & Development (R&D) method, namely the ADDIE model (Allen, 2006; Lasala Jr, 2022). The ADDIE model consists of five stages, namely: Analysis, Design, Development, Implementation, and Evaluation. This model is one of the most popular models used in learning media development. Various types of media have been developed using this model to assist the learning process in various fields, including mathematics (Julia & Bentri,

2023) and science (Martinopa & Amini, 2023). In this research, the stages carried out are Analysis, Design, and Development stages. The description of each stage is explained below.

At the analysis stage, problem identification is carried out in the form of curriculum analysis and analysis of student characteristics to determine the right material and the right media for android-based digital learning. Literature studies related to science in the Qur'an are carried out through books and scientific journals, to strengthen the material. Likewise, a literature study was conducted on the characteristics of the student's Pancasila profile. This problem identification and literature study was conducted to design media that suits the needs of students and/or teachers, as well as in accordance with science materials in the Qur'an included in the Madrasah Ibtidaiyah curriculum.

At the design stage, the material that has been selected is then compiled to become the content of the application to be developed. Then a story script which will be presented in the application is designed and created. Then the story script is converted into a form of image (comic), and added with a question and answer question at the end of the story, to test students' understanding after using the application that has been designed. Furthermore, this illustrated story is then converted into an application (APK file) that can be used on a teacher's or student's smartphone device.

The development stage is the stage to produce a product prototype. This development stage includes providing materials and other needs that support the learning process. At this stage, the media that has been made will be validated by material experts and media experts to determine the feasibility of the media developed and also the material presented through the media. Media feasibility is assessed from the aspects of comic design, image layout and illustration, presentation and language, user-friendliness, and benefits for users. The feasibility of the material was assessed from the aspects of comic content, presentation and communication aspects, and aspects for learning strategies. Each aspect consists of a number of points assessed by the validator with the lowest score of 1 signifying "Very Inappropriate" and the highest score of 4 signifying "Very Appropriate". The validity value for each aspect is calculated using the formula (Sa'adah & Wahyu, 2021):

$$P = \frac{f}{N} \times 100\% \quad (1)$$

Where:

P = Validity score in percentage

f = Score of each aspect

N = Maximum score of each aspect

The percentage of the validity score can then be converted into criteria for the feasibility of the media and materials developed such as described in Table 1.

Table 1. Criteria for the feasibility of media and materials (Rahmi & Sumarmin, 2021)

Validity Score (%)	Criteria
$80 < P \leq 100$	Very Feasible
$60 < P \leq 80$	Feasible
$40 < P \leq 60$	Unfeasible
$0 < P \leq 40$	Very Unfeasible

Suggestions obtained from material experts and media experts become a reference for improving the products that have been developed. Revision (improvement) of the product is carried out at this stage, then validation is carried out again to see the expert's response after revision.

Result and Discussion

From the analysis stage, it was found that the material that met the needs of students and teachers was material about a clean and healthy lifestyle for grade V Madrasah Ibtidaiyah (MI) students (Rokhimawan et al., 2022). This material can be presented easily in the form of illustrated stories (comics) that will attract students to learn. The developed picture story media can be packaged in the form of an android application that can be downloaded by teachers and students through their respective devices (Kurniawan et al., 2022).

The script from this predetermined material is made to facilitate the development of comic media. Based on the script, illustrated story (comic) is then made with the help of a number of online tools. The

resulting comic is in the form of a PPT file. This PPT file is then converted into APK form using Unity engine. The APK file can be downloaded and installed on students' or teachers' smartphones. Snippets of the app developed are shown in Figure 1.



Figure 1. Snippets of the SCIQU app

Basic Competencies (KD) and Core Competencies (KI) expected from the students learning the material in this comic are described in the opening pages. Next, the characters in the comic are introduced. These characters are written to be characters that the students can relate with, and whose experiences are a typical experience of a children at the students' age range. After that, the story based on the script is illustrated with the intention of engaging students in a happy and attractive environment to learn the material. At the end, the students are given ten evaluation questions to test their understanding of the material given in the comic.

The media and materials that have been developed are then tested for validity through a validation questionnaire filled out by two media experts and material experts. The results of media and material expert validation are described below.

Media Validity

Table 2. Validity score of the media before revision

Aspects evaluated	Score		Average
	V1	V2	
I. Design Aspects			
Initial appearance of comic app	3	3	3
Appropriateness of comic size with android standard	3	4	3.5
Attractiveness of comic cover	3	4	3.5
Appropriateness of the font used	3	3	3
Selection of the right typeface	3	4	3.5
Letter clarity	2	4	3
Appropriateness of text spacing	2	3	2.5
Supportive color contrast	4	4	4
Color attractiveness	4	4	4
Appropriateness of text color	4	4	4
Attractiveness of icon (menu) button display	3	4	3.5
Display pictures of characters that match the storyline	3	4	3.5
Suitability of character's image with the conversation	3	4	3.5
Appropriateness of conversation balloons	4	3	3.5
			3

Aspects evaluated	Score		Average
	V1	V2	
Appropriateness of material text balloons	4	4	4
Attractiveness of background images	3	4	3.5
Validity Score (%)			86.72
II. Image Layout and Illustrations			
Arrangement of elements on the cover gives good impression	3	4	3.5
Displays centered field of view	3	4	3.5
Placement of layout elements is consistent with writing patterns	4	4	4
Uniform placement of titles and stories on each chapter	3	4	3.5
Uniform text bubbles/balloons in each chapter	3	3	3
Consistent placement of the next and back icon buttons	4	4	4
Suitability of character's image with the conversation	3	4	3.5
Gestures of the characters in each dialog is consistent with the storyline	2	3	2.5
Background is appropriate to the context of the story	3	4	3.5
Illustrations of problems related to daily life is used	3	4	3.5
Validity Score (%)			86.25
III. Presentation and Language			
Clarity of storyline to understand the material	3	4	3.5
Attractiveness of character images	3	4	3.5
Compatibility of content with the background	4	3	3.5
Compatibility of story, images and material	3	4	3.5
The language used is easy to understand for students	4	4	4
The language used is straightforward	4	4	4
The language used is conversational and everyday language	4	4	4
Clarity in providing information	4	3	3.5
Appropriateness of the language to the student's level of understanding	3	4	3.5
Use of dialogue context in the comic make it easier for students to understand the material of clean and healthy lifestyle	3	4	3.5
Validity Score (%)			91.25
IV. Ease of Use			
Easiness to run	4	4	4
App loading speed	4	4	4
Effectiveness and efficiency of the app	4	4	4
Practicality of the app	3	4	3.5
Easiness of accessing the app	3	4	3.5
The app doesn't need a lot of storage space	4	4	4
The app can be accessed without internet	4	4	4
The app can be shared via Bluetooth and WhatsApp	4	4	4
Validity Score (%)			96.88
V. User Benefits			
Feasibility of the comic app as learning media	4	4	4
The app can be used as guide by teacher for teaching	4	4	4
The app can enhance the habit of student-centered learning	4	3	3.5
The app can help build effective communication between teachers and students	4	4	4
The app can provide opportunity for students to learn independently	4	4	4
The app can foster students' curiosity for learning	4	4	4
The app can encourage students to carry out learning activities so that learning objectives are achieved	4	4	4
Validity Score (%)			98.21
Total Validity (%)			90.69

In the first stage of this media validation, Validator 1 gave suggestions to clarify the letters, give more distance between the writing in the conversation, as well as to add gestures or expressions of characters in illustrated stories (comics). From Table 2 above, it can also be seen that the lowest validity score is on the design and layout aspects and illustrations of the comics

(86.72% and 86.25% respectively), so this aspect needs the most improvement. After making improvements according to Validator 1's suggestions, media validation was carried out again with the same two validators. The result is shown in Table 3.

Table 3. Validity score of the media after revision

Aspects evaluated	V1	Score V2	Average
I. Design Aspects			
Initial appearance of comic app	4	3	3.5
Appropriateness of comic size with android standard	4	4	4
Attractiveness of comic cover	4	4	4
Appropriateness of the font used	3	3	3
Selection of the right typeface	4	4	4
Letter clarity	3	4	3.5
Appropriateness of text spacing	3	3	3
Supportive color contrast	4	4	4
Color attractiveness	4	4	4
Appropriateness of text color	4	4	4
Attractiveness of icon (menu) button display	4	4	4
Display pictures of characters that match the storyline	4	4	4
Suitability of character’s image with the conversation	4	4	4
Appropriateness of conversation balloons	4	3	3.5
Appropriateness of material text balloons	4	4	4
Attractiveness of background images	3	4	3.5
Validity Score (%)			93.75
II. Image Layout and Illustrations			
Arrangement of elements on the cover gives good impression	4	4	4
Displays centered field of view	4	4	4
Placement of layout elements is consistent with writing patterns	4	4	4
Uniform placement of titles and stories on each chapter	3	4	3.5
Uniform text bubbles/balloons in each chapter	4	3	3.5
Consistent placement of the next and back icon buttons	4	4	4
Suitability of character’s image with the conversation	4	4	4
Gestures of the characters in each dialog is consistent with the storyline	3	3	3
Background is appropriate to the context of the story	3	4	3.5
Illustrations of problems related to daily life is used	4	4	4
Validity Score (%)			93.75
III. Presentation and Language			
Clarity of storyline to understand the material	4	4	4
Attractiveness of character images	3	4	3.5
Compatibility of content with the background	4	3	3.5
Compatibility of story, images and material	4	4	4
The language used is easy to understand for students	4	4	4
The language used is straightforward	4	4	4
The language used is conversational and everyday language	4	4	4
Clarity in providing information	4	3	3.5
Appropriateness of the language to the student’s level of understanding	3	4	3.5
Use of dialogue context in the comic make it easier for students to understand the material of clean and healthy lifestyle	4	4	4
Validity Score (%)			95
IV. Ease of Use			
Easiness to run	4	4	4
App loading speed	4	4	4
Effectiveness and efficiency of the app	4	4	4
Practicality of the app	4	4	4
Easiness of accessing the app	4	4	4
The app doesn’t need a lot of storage space	4	4	4
The app can be accessed without internet	4	4	4
The app can be shared via Bluetooth and WhatsApp	4	4	4
Validity Score (%)			100
V. User Benefits			
Feasibility of the comic app as learning media	4	4	4
The app can be used as guide by teacher for teaching	4	4	4

Aspects evaluated	Score		Average
	V1	V2	
The app can enhance the habit of student-centered learning	4	3	3.5
The app can help build effective communication between teachers and students	3	4	3.5
The app can provide opportunity for students to learn independently	4	4	4
The app can foster students' curiosity for learning	4	4	4
The app can encourage students to carry out learning activities so that learning objectives are achieved	4	4	4
Validity Score (%)			96.43
Total Validity (%)			95.34

After revisions and improvements, an increase in the validity value of the developed media was obtained. The total validity value obtained increased from 90.69% before revision to 95.34% after revision. Each aspect of the developed media is categorised as "Very Feasible", from the aspects of design, layout and illustrations, presentations and language, ease of use, and user benefits all get a value of more than 80%. Overall, from the total validity value obtained, it can be seen that the media developed is already in the "Very Feasible" category (> 80%). The results of the media validity are illustrated in Figure 2.

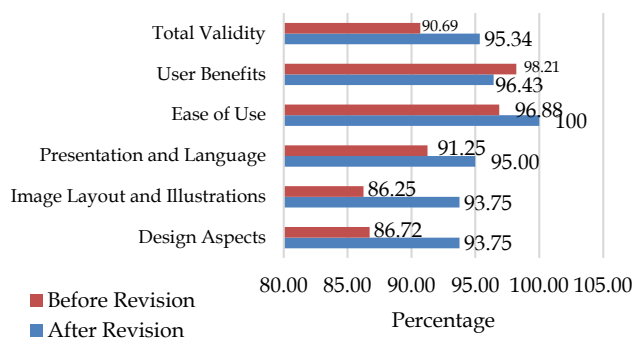


Figure 2. Comparison of media validity before and after revision

The learning media presented to students have to be interesting to the students to help them gain as much valuable knowledge as they can from the media. The media need to attract students' focus and attention to increase the students' literacy or numeracy skills (Heliawati et al., 2022; Istyadi et al., 2022). As indicated by the score of validity of the learning media developed, it can be said that the media is valid and very feasible to be used in the classroom, and very interesting to the students in the classroom.

The validity for aspects of design increased significantly from 86.72% to 93.75%, which shows that the revision successfully addresses the validators criticism of the design. The letters are made clear and the distance added between conversations. This made the experience of students when reading the comic more pleasant and comfortable. The validity for image layout and illustrations of the comic also shows significant increase from 86.25% to 93.75%. The gestures and expressions of characters in the comic is enhanced to make the story more interesting and attractive to students. The attractiveness of learning media can positively affect students' learning outcome (Wahyuni, Fatmi, & Faradhillah, 2023). Generally, the validity of other aspects also increased with the exception of user benefits.

Material Validity

Table 4. Validity score of the materials

Aspects evaluated	Score		Average
	V1	V2	
I. Comic Content			
Learning objectives in the comic are in accordance with the basic competencies (KD) and core competencies (KI)	4	4	4
The materials in the comic are in accordance with the basic competencies (KD) and core competencies (KI)	4	4	4
The materials are presented coherently	4	4	4
The materials are presented thoroughly	4	4	4
The materials presented in the comic can help students understand other materials	4	3	3.5
The materials presented in the comic are straightforward	3	4	3.5
Accuracy of dialog / text story with the materials	4	4	4
Clarity of learning topics	4	4	4
Correctness of concepts in the materials with aspects of science	4	4	4
Suitability of the story with material "Health is important"	4	4	4
Formulas and symbols in accordance with aspects of science	4	4	4
Dialogue between characters leads to understanding of the material	3	3	3

Aspects evaluated	Score		Average
	V1	V2	
The context of the story is in accordance with the topic of the material in each chapter	4	4	4
The problems presented is linked to daily life	4	4	4
Illustrations are presented in accordance with the material content in the comic	3	4	3.5
The steps in solving the problems are true and easy to understand	4	4	4
The steps in solving the problem are presented in detail	4	3	3.5
Clarity of evaluation questions in the app	4	4	4
The evaluation questions cover all materials that has been presented in the SCIQU app	4	4	4
Compatibility of the comic storytelling with the content materials	4	4	4
Compatibility of object images with the materials	4	4	4
Validity Score (%)			96.43
II. Presentations and Communications			
Clarity of storyline that supports the understanding of the materials	4	4	4
Presentation of the essence of the material as a confirmation of students' understanding	4	3	3.5
Presentation of evaluation questions as an exercise for students' understanding	4	4	4
Appropriateness of language to the students' level of thinking	4	4	4
Ease of understanding the flow of material through the use of language	4	4	4
Dialogue between characters directs students to understand the materials	4	4	4
Compatibility of texts and dialogue with the story and the materials	3	3	3
Validity Score (%)			94.64
III. Learning Strategy Aspects			
The comic media can be arranged and used for other learning strategies	4	4	4
The comic media can support students' learning	4	4	4
The comic media can increase students' motivation	4	4	4
The comic media can be used as learning media	4	4	4
Validity Score (%)			100
Total Validity (%)			96.48

There were no suggestions for improvement given by the material experts in the material validation, so no revisions were made to the material presented in the SCIQU comic application. It was found that each aspect assessed from the material validation fell into the "Very Feasible" category, as well as the overall validity, which was 96.48%. The results of the material validity are made in the form of a graph in Figure 3.

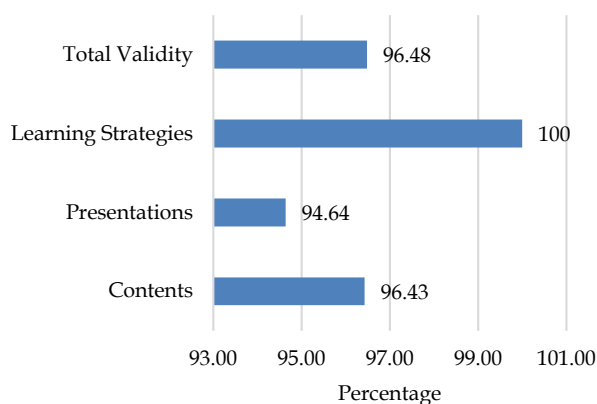


Figure 3. Material validity

The aspect of contents in the comic with validity score of 96.43% indicated that the contents shown are already in accordance with the basic competencies (KD) and core competencies (KI), the materials are presented coherently and thoroughly, and the story and the

illustrations are compatible with the materials. The presentations aspect with validity score of 94.64% also indicated that the presentation of the materials' essence through the language, the dialogue, and the evaluation questions can help students' understanding. The comic is indicated to have high availability with other learning strategies and can increase students' motivation as shown in the aspect of learning strategies with validity score of 100%.

The material in various teaching materials that will be taught to students must be declared and approved as correct and accurate material in accordance to the curriculum and KD and KI (Pangesti et al., 2017; Rahmi & Sumarmin, 2021; Rehusisman et al., 2017). From the results of the material validation carried out, the material presented in the SCIQU comic media has the content, presentation, and use of learning strategies that are categorised as "Very Feasible". The learning objectives and material presented can be stated to be in accordance with the Basic Competencies (KD) and Core Competencies (KI) expected of students.

Conclusion

Android-based digital learning media SCIQU (Science in Al-Qur'an) has been successfully developed. The validity or feasibility of the SCIQU comic media, as well as the material presented in the SCIQU media, has

been assessed by each of the two validators of media experts and material experts. For each aspect of the validity assessment carried out, SCIQU comic media received validity scores of 93.75%, 93.75%, 95.00%, 100%, and 96.43% respectively for the aspects of design, layout and illustrations, presentation and language, ease of use, and user benefits. All of them fall into the "Very Feasible" category. For the material validity assessment, the scores were 96.43%, 94.64%, and 100% for the contents, presentations, and learning strategies aspects, respectively. All three were also categorised as "Very Feasible".

The results of the validity assessment of this SCIQU media show that both the material and the media itself are already in the "Very Feasible" category, so that SCIQU comic media can be delivered to students in class and go through the next stage of its development, namely the Implementation and Evaluation stages.

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Author Contributions

Conceptualization, M., Z.M., A.T.H.; methodology, M., Z.M.; validation, M., Z.M., A.T.H.; formal analysis, A.T.H., M.A.; investigation, M., Z.M., A.T.H., M.A., T.A., R.N.; resources, M., Z.M., A.T.H.; data curation, A.T.H., M.A., T.A., R.N.; writing-original draft preparation, M.A.; writing-review and editing, M.A. and M.; visualization, M.A.; supervision, M.; project administration, M., Z.M., A.T.H.; funding acquisition, M. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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