

Development of e-books integrated with the Qur'an to support learning in the nutrition and health course within the biology education program at the university

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Abstract

The education digitalization era is growing rapidly, and integrating information technology with religious values is becoming increasingly important, especially in providing relevant and holistic learning resources. This research aims to create an integrated e-book with the Al-Quran to support learning in nutrition and health courses in the Biology Education Study Program at UIN Alauddin Makassar, which is valid, practical, and effective. This research uses research and development with the ADDIE development model. Development products are tested through validity, practicality, and effectiveness tests. The research subjects were validation experts (validators), practitioners (course lecturers), and sixth-semester students taking the nutrition and health course in the Biology Education Study Program. The research instruments are media validation sheets, response questionnaires, and response questionnaires, as well as learning outcomes test items. The research results showed that the media developed had a validity level of 3.86 (very suitable) and a practicality level based on response assessment, namely 3.61 (highly practical). The learning outcomes test has a percentage level of effectiveness with a percentage of 20% in the very effective category, 68% in the effective category, and 12% in the quite effective category. Classically, 88% reached the minimum value for the effective category. Based on the findings of this study, the development of e-books integrated with religious values is recommended to be optimized in dissemination, similar development, and application.

Abstrak. Era digitalisasi pendidikan yang berkembang pesat, dan integrasi antara teknologi informasi dengan nilai-nilai keagamaan menjadi semakin penting, terutama dalam konteks penyediaan sumber belajar yang relevan dan holistik. Penelitian ini bertujuan untuk e-book terintegrasi Al-Quran untuk Menunjang Pembelajaran pada Mata Kuliah Gizi dan Kesehatan Prodi Pendidikan Biologi UIN Alauddin Makassar yang bersifat valid, praktis, dan efektif. Penelitian ini menggunakan jenis penelitian dan pengembangan dengan model pengembangan ADDIE. Produk pengembangan diuji melalui uji validitas, uji kepraktisan dan uji keefektifan. Subjek penelitian adalah ahli validasi (validator), praktisi (dosen mata kuliah), dan mahasiswa semester enam yang memprogramkan mata kuliah Gizi dan Kesehatan pada Progam Studi Pendidikan Biologi. Instrumen penelitian berupa lembar validasi media, angket respon dan angket respon, serta butir-butir tes hasil belajar. Hasil penelitian menunjukkan bahwa media yang dikembangkan memiliki tingkat validitas yaitu 3.86 (sangat layak), tingkat kepraktisan berdasarkan penilaian respon yaitu 3,61 (sangat praktis). Tes hasil belajar memiliki persentase tingkat keefektifan dengan persentase 20% kategori sangat efektif, 68% kategori efektif, dan 12% kategori cukup efektif. Secara klasikal 88% mencapai nilai minimum untuk kategori efektif. Berdasarkan temuan dari penelitian ini, pengembangan e-book terintegrasi nilai-nilai keagamaan direkomendasikan untuk dioptimalkan dalam penyebarluasan, pengembangan serupa, maupun penerapannya.

A. Introduction

Education is a crucial aspect in shaping character and enhancing the quality of human resources, pursued throughout life to achieve aspirations (Suraya & Anjeli, 2022; Rifa'i & Hasanah, 2022; Syahbudin, 2018; Rosita, 2018). In the current digital era, education has rapidly developed, particularly with the advent of various information and communication technologies (Laraphaty et al., 2021). Alongside technological advancements, educational media have progressed significantly, especially electronic-based learning media (Hanikah et al., 2022). The demand for digital learning media aligns with the requirements of 21st-century education. This demand is in line with Greenstein (2012), who assumes that assertion that one of the demands of the 21st century for students is the availability of information and technology literacy in education.

Various types of learning media can support 21st-century education, including the electronic book, commonly known as an e-book. An e-book is a digital book format accessible via computers or smartphones. In its application, an e-book is not merely a digital narrative but also material designed in a digital format. Therefore, the content presentation in e-books becomes more engaging and enhances accessibility (Aini et al., 2022).

In contemporary education, particularly within Islamic education and pesantren environments, efforts are being made to integrate general knowledge, especially in the sciences, with principles found in the Quran and Hadith (Fajar & Izzah, 2023). As the primary source of teachings for Muslims, the Quran serves as a guide encompassing spiritual, ethical, health, and daily life aspects. Integrating the Quran into education provides a spiritual dimension and assists students in developing attitudes and behaviors per

UIN Alauddin Makassar, one of the higher education institutions under the Ministry of Religious Affairs, envisions itself as a Center of Enlightenment and Transformation of Science and Technology based on Islamic Civilization. Therefore, education should integrate science, technology, and the arts (IPTEKS) with Islamic values. Each course should closely relate to Islamic teachings derived from the Quran and Hadith. Additionally, it is crucial to integrate digital learning media as an adaptation to rapidly advancing technology.

There are challenges in effectively integrating the Quran and technology in education, particularly in nutrition and health education. Based on research and observations conducted by the Biology Education Program at UIN Alauddin Makassar, no electronic teaching materials have been found that integrate Quranic verses for nutrition and health courses. This situation indicates a gap in providing learning resources that combine health aspects with Quranic values through electronic media in that academic environment. Previous research by Siregar et al.

(2020) noted that the separation between Islamic knowledge and science can lead to declining educational standards and setbacks in the Islamic world. Therefore, there is a need for development and innovation in creating electronic teaching materials integrated with Quranic verses to support the effectiveness of nutrition and health education in the Biology Education Program at UIN Alauddin Makassar.

Previous studies have developed teaching materials integrating Quranic verses, such as the integrated earth's layers science module with Quranic verses (Fajar & Izzah, 2023), the comic learning media on characteristics of living beings integrated with Quranic verses (Rohmah, 2022), the Quran-based biology learning module on blood circulation (Dewi et al., 2023), and the Quran-integrated Kvisoft biology e-book on the human reproductive system (Alam, 2019). Despite several studies developing teaching materials integrating Quranic verses, literature examining the development of Quran-integrated electronic teaching materials, particularly in nutrition and health courses, remains limited. Previous research has focused on specific fields of study, while there has been no specific exploration of Quranic verse integration in nutrition and health education.

The development of e-books integrated with the Qur'an is expected to support learning effectiveness in the nutrition and health course. The presence of e-books integrated with the Qur'an among students, particularly at UIN Alauddin Makassar, remains limited. Therefore, the developed e-book must meet the criteria of validity, practicality, and effectiveness. Integrating the Quran into learning aligns with the vision of UIN Alauddin Makassar. This e-book presents health information based on scientific knowledge and integrates Quranic teachings relevant to health concepts. Thus, students will better understand the relationship between health, religion, and daily life. As Murtadlo et al. (2023) emphasized, integrating religion, science, and social sciences is crucial for forming a solid foundation of knowledge with spiritual dimensions. Efforts to integrate these aspects contribute to the reliability of knowledge and have the potential to strengthen students' spiritual beliefs and foster positive character development.

Based on the background above, the researchers conducted a study titled "Development of e-books integrated with the Qur'an to support learning in the nutrition and health course in the Biology Education Program at UIN Alauddin Makassar." This study aims to contribute to developing innovative teaching methods, enhance students' understanding of health based on the Quran, and provide recommendations for developing similar e-books in other courses. Integrating religious values into health education is expected to cultivate a generation with a heightened awareness of comprehensive health through religious teachings.

B. Material and method

This study falls under the Research and Development (R&D) category utilizing the ADDIE model (Analyze, Design, Development, Implementation, Evaluation). This research focuses on developing e-books integrated with the Qur'an to support learning in the nutrition and health course within the Biology Education Program at UIN Alauddin Makassar. The study was conducted during the second semester of the academic year 2022/2023 in the Biology Education Program at UIN Alauddin Makassar. The research subjects included validation experts (validators), practitioners (course instructors), and sixth-semester students enrolled in the nutrition and health course.

This study employed several instruments, including a validation sheet used by expert validators to assess the validity of the e-books integrated with the Qur'an. Additionally, a pilot study utilized a response questionnaire to gauge feedback from educators and students regarding the practicality of using the e-book. This questionnaire consisted of statements measured using a Likert scale. Furthermore, a learning outcome test was conducted to evaluate students' achievement after using the e-books integrated with the Qur'an in the nutrition and health course.

The content validity of this instrument was assessed using Aiken's Validity Theory (Aiken's V). Aiken formulated a formula to calculate the content validity coefficient based on expert panel evaluations of each instrument item. The Aiken formula used to compute instrument validity is as Formula 1 by Retnawati (2016).

$$V = \sum s / [n(c - 1)] \dots \dots \dots \text{Formula 1}$$

Description:

- V = The validity of the instrument,
- s = The difference between the score given by the evaluator (r) and the lowest score (lo) on the validity scale,
- r = The score given by the evaluator,
- lo = The lowest validity score,
- n = The number of evaluators,
- c = The highest validity score.

The validity of questionnaire is assessed based on validity coefficient obtained during data collection. Categories of correlation coefficients used for questionnaire validity testing are detailed in Table 1.

Table 1 Coefficient of validity correlation

The "r" value magnitude	Interpretation
0,00 – 0,11	Not suitable for use
0,12 – 0,20	Suitable for use with certain considerations
0,21 – 0,35	Suitable for use
0,36 – 1,00	Highly suitable for use

An analysis was conducted to assess the practicality criteria of the media based on collected data. Practicality data were obtained from response

questionnaires distributed to educators and students using the e-books integrated with the Qur'an. Subsequently, the data were analyzed descriptively, and average values were categorized according to practicality criteria, as in Table 2 by Arsyad (2007).

Table 2 Criteria for practicality level

Value	Criteria
$\bar{X}_i > 3,5$	Highly practical
$3.0 < \bar{X}_i \leq 3.5$	Practical
$2.0 \leq \bar{X}_i \leq 3.0$	Moderately practical
$\bar{X}_i < 2.0$	Not practical

Description:

$\bar{X}_i$ = represents the average practicality rating from response questionnaires.

The effectiveness data were obtained from the learning outcomes after students participated in the Plant Anatomy course using e-books integrated with the Qur'an. The categorization of effectiveness data is presented in Table 3.

Table 3 Categories of effectiveness levels

Completion percentage	Classification
$p > 80$	Highly effective
$60 < p \leq 80$	Effective
$40 < p \leq 60$	Moderately effective
$20 < p \leq 40$	Less effective
$p \leq 20$	Not effective

Description:

p = represents the score of learning outcomes.

C. Results and discussion

The researcher elucidated the results and discussions regarding a study conducted on the development of e-books integrated with the Qur'an to support learning in the nutrition and health course of the Biology Education Program at UIN Alauddin Makassar for sixth-semester students in the academic year 2022/2023. The results and discussions of this research will be presented based on the stages of the ADDIE development model (Branch, 2009).

The first stage of this research is analysis, comprising several steps: 1) problem validation, which involves the identification of issues through observations conducted in nutrition and health courses; The identified issues include educators' need for technology-based learning media to aid in explaining nutrition and health topics, while students require engaging, easily understandable, accessible anytime-anywhere, and non-fatiguing learning media. 2) establishment of learning objectives: Based on the problem validation, these issues can be addressed by developing an e-book as a technology-based interactive learning medium for the nutrition and health course. 3) confirmation of targets: In this step, confirmation is obtained from the user subjects,

namely students, regarding their ability and availability to use technology-based learning tools. Additionally, students' learning styles need consideration to accommodate diverse learning styles in the media used. 4) identification: This involves determining the resources needed for developing learning media, including human resources capable of operating tools in media design, gathering teaching materials, and sourcing content. 5) determination of delivery system: Students use this media in the learning process at this stage, facilitating their understanding of content through relevant illustrations and easy accessibility via mobile or other electronic devices without concerns about physical damage. Furthermore, this e-book can enhance students' motivation and interest in learning while their literacy improves as the presented content is engaging and uses easily understandable language. 6) planning for development implementation: In this step, a development implementation plan is formulated, spanning different time frames from the analysis to the evaluation stages.

The next stage is design, which establishes appropriate testing goals and strategies, consists of three steps: Conducting a Task Inventory in the development of e-books integrated with the Qur'an, encompassing content and construction components. The content components of this e-book include the front cover and lecture materials on nutrition and health integrated with relevant Quranic verses. This e-book is accessible via Kvisoft Flipbook Maker Pro and SWF Flash Player and is in PDF format. Meanwhile, the construction components of the e-book utilize Adobe Illustrator 2021 and the primary application, Kvisoft Flipbook Maker Pro. The interface of Kvisoft Flipbook Maker Pro is illustrated in Figures 1 and 2.

Kvisoft Flipbook Maker Pro is professional software for creating digital publications with page-flipping effects from PDF files. Its editing features allow users to incorporate videos, images, audio, hyperlinks, hotspots, and other multimedia objects into the resulting publications. This software makes creating multimedia e-books with page-flipping effects effortless. Kvisoft Flipbook Maker provides a professional method to integrate hyperlinks, videos, images, sound, and other multimedia objects into e-books with page-flipping effects. The display of an e-book when opened with Kvisoft Flipbook Maker Pro can be seen in Figure 3. Next, developing e-books integrated with the Qur'an involves composing product development objectives (Compose Performance Objectives). Developing this e-book aims to address issues identified during the observation process, where students tend to use physical books as their primary learning medium. Therefore, this e-book is designed to be engaging and enhance comprehension of the material, utilizing appealing illustrations and easily understandable language. The subsequent step is to formulate testing strategies

(Generate Testing Strategies) to assess students' understanding of nutrition and health topics. These testing strategies involve creating questions that align with the intended learning outcomes.

The third stage involves developing the planned product. This stage consists of three steps: 1) composing the product materials, where the planned e-book components will be implemented into the Kvisoft Flipbook Maker Pro application. 2) Formative revision is conducted by validating the learning product through expert validation by content and media specialists before implementation. 3) Preliminary testing is conducted with a small group before the product is widely implemented. Participants are instructed to access e-books integrated with the Qur'an from start to finish, complete response questionnaires, and provide feedback regarding the media's utility, presentation, and effectiveness. The results and analysis of the preliminary testing with participants are presented in Table 4.

Based on Akbar (2013), a product is considered usable without revision if its practical percentage falls within the 81-100% range. Based on Table 4, it can be concluded that 23 individuals, or approximately 92%, fall into the practical and highly practical category. Some participants commented that the e-book is engaging, enhances learning motivation, and saves time by allowing access anytime and anywhere. These findings are consistent with research by Nurhidayah (2021), which indicates that e-book usage supports independent learning for students at any time.

The next stage is the implementation phase when the validated and tested product is deployed. This stage consists of two steps: 1) Educator preparation for implementation, aimed at preparing all learning tools to be used by educators during the implementation phase. Prepared tools include the semester lesson plan (RPS), learning media (e-books integrated with the Qur'an), and evaluation tests. All these tools have undergone validation and have proven suitable for use. The preparation of laptops or mobile phones is also necessary to facilitate access to e-books integrated with the Qur'an. 2) Student preparation for implementation, where students participating in the implementation phase are prepared to engage effectively. They are assembled in the classroom during the implementation phase and instructed beforehand to bring laptops or mobile phones to access e-books integrated with the Qur'an.

The final stage in the development of e-books integrated with the Qur'an learning media for the nutrition and health course is evaluation, a hierarchically flexible phase. This stage aims to assess each development phase, particularly in terms of the validity and testing of the product, as well as evaluating learning outcomes. This evaluation consists of three steps: 1) Establishing evaluation criteria, encompassing validity, practicality, and effectiveness testing. 2) Selecting evaluation tools. Questionnaires

are used for validity and practicality testing, while essay-based learning outcome tests with ten questions are used for effectiveness testing. These evaluation tools have been validated before their application. 3) Evaluation is conducted flexibly across multiple stages.

Validity and practicality are assessed during the previously discussed development phases, while effectiveness is tested post-implementation of the e-books integrated with the Qur'an as the learning media.

Table 4 Results and preliminary test analysis

Interval	Description	Frequency	Percentage
$\bar{X}_1 \leq 2,0$	Not practical	0	0,00
$2,0 \leq \bar{X}_1 < 3,0$	Moderately Practical	2	8
$3,0 \leq \bar{X}_1 < 3,5$	Practical	18	72
$\bar{X}_1 > 3,5$	Highly Practical	5	20



Figure 1 Main interface of Kvisoft flipbook maker pro application

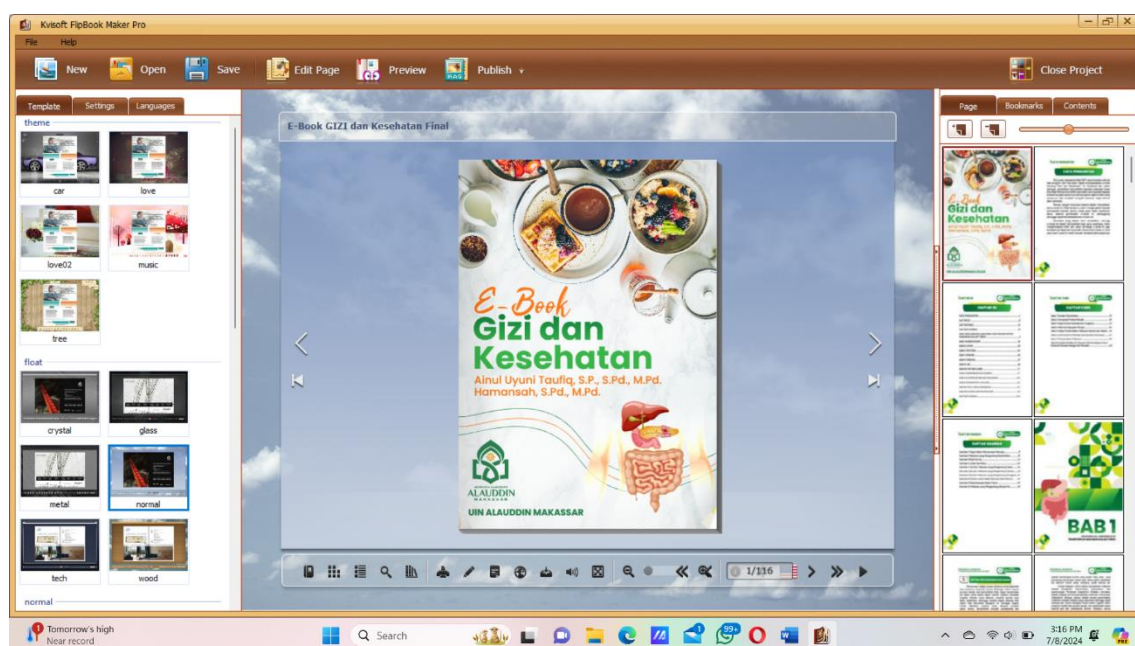


Figure 2 E-book display in Kvisoft flipbook maker pro application (in Indonesian)

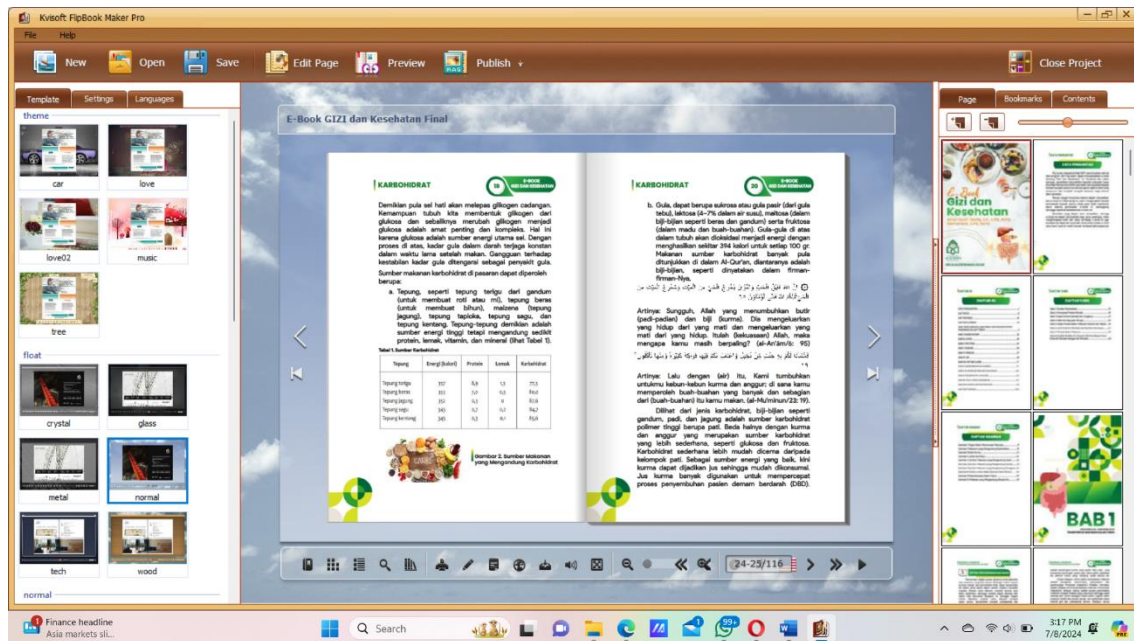


Figure 3 E-book display when opened with Kvisoft flipbook maker pro application

Table 5 Validation results of e-books integrated with the Qur'an

No.	Aspect	Indicators	Value	Mean	Remark
1	Display of e-book	1) E-book display	0,85	0,85	Highly suitable for use
		2) Teaching materials	0,76		
		3) Up-to-datedness	0,9		
		4) Scale	0,87		
		5) Technical quality	0,86		
2	Language	1) Communicative Language	0,9	0,9	Highly suitable for use
		2) Appropriateness of Terminology	0,9		
Validation means			0,86		Highly suitable for use

Table 6 Results and analysis of practicality test

No.	Mean	Description
1	3,58	Highly practical
2	3,65	Highly practical
Practical means	3,61	Highly practical

Table 7 Results and analysis of effectiveness test

Interval	Criteria	Frequency	Percentage (%)
p > 80	Highly effective	5	20
60 < p < 80	Effective	17	68
40 < p < 60	Moderately effective	3	12
20 < p < 40	Less effective	0	0,00
p < 20	Ineffective	0	0,00

The validity of this learning media was obtained during the development phase based on validator assessments, as detailed in Table 5. The developed e-book consists of 13 core topics, namely: Digestion, absorption, and transport of food in the body; carbohydrates; fats; proteins; vitamins; minerals; water; metabolism; energy balance; classification of food ingredients; application of nutrition science; balanced menu patterns; and nutrient adequacy levels. Based on the analysis in Table 5, the validity score for

instructional materials/core topics is 0.76, while the average validity score for the overall media is 0.86. According to validity criteria by Retnawati (2016), these values fall within the category of "highly suitable for use" (0.36-1.00). These scores are supported by e-book components designed in proportion to each other. The layout and language proportionally integrate color elements, font types, images, and content.

Two lecturers from the Biology Education Program at UIN Alauddin Makassar evaluated this media's practicability. Aspects assessed in this media practicability test include interface design, user-friendliness, goal attainment, and language suitability. The findings of this practicability analysis are documented in Table 6.

The developed e-book falls under the category of highly practical. Firstly, its appealing interface maintains consistency in theme, as excessive visual variation can detract focus (Nielsen, 1994; Van den Bosch et al., 2006). Secondly, it is user-friendly as it can be stored in multiple files and accessed quickly by students. This e-book adheres to the principles of user control and freedom in interactive design, as Nielsen (1994) outlined. Thirdly, the e-book achieves its learning objectives by specifying learning outcomes, enabling students to focus on their studies. According to Sukmadinata (2002), learning objectives aid in conveying the purpose of instructional activities to students and facilitating independent learning. Fourthly, the language used conforms to the General Guidelines for Indonesian Spelling (PUEBI) and maintains consistency in terminology usage, enhancing comprehension.

The effectiveness of this media was assessed during the implementation phase by conducting post-learning tests. The effectiveness test utilized a 10-item essay-based assessment of learning outcomes. Based on the results and analysis of the effectiveness test in Table 7, 22 out of 25 participants (88%) achieved at least the "effective" category. The result indicates that the e-book is effective in enhancing learning. Imansari & Sunaryantiningsih (2017), in their study on the impact of e-books on learning outcomes, found that interactive e-books can enhance learning proficiency.

According to Slavin (2009), the effectiveness of learning media is influenced by several factors: quality, appropriateness, intensity, and time. Quality of learning pertains to the availability of suitable media for use. Appropriateness concerns the alignment between learning objectives and the presented content and assessments. Intensity relates to the student's motivation to use the learning media. Time refers to the allocation required for the learning process by students. As a flexible medium, e-books can be utilized more effectively.

Developing integrated e-books with Al-Quran in the nutrition and health course within the Biology Education Program at UIN Alauddin Makassar demonstrates significant potential in improving learning methods and expanding scholarly dimensions. Using these e-books contributes positively to understanding nutrition and health concepts while also opening opportunities to strengthen educational foundations with a technology-integrated approach incorporating religious values. This study aligns with research by Sholikhah & Anissaturofiah (2024), who developed Quran-integrated e-modules using H5p,

showing that the developed e-book effectively enhances students' spiritual competencies. Other relevant studies include research by Isma et al. (2023), who developed a flipbook-style e-module on the circulatory system integrated with Islamic teachings. Their findings indicate that the flipbook e-module is highly suitable and beneficial for school learning.

Similarly, research by Azhari et al. (2023) on e-magazines covering the excretory system integrated with Islamic values demonstrates that the e-magazine is highly suitable and practical for teachers to implement in teaching. Another study by Rodiyah et al. (2023) on biology e-modules covering the reproductive system integrated with the paradigm of *wahdatul 'ulum* it also yielded positive results. The e-module was deemed valid, practical, and effective for use in the learning process.

This research adopts a slightly different approach from previous studies regarding the developed product. While prior research also developed digital learning media and resources, the primary focus of this study is on developing an e-book. Additionally, the scope of the content used differs, with this research emphasizing nutrition and health concepts integrated with Quranic values. Meanwhile, previous studies focused more on different topics, such as the circulatory or excretory systems, which are also integrated with Islamic values. In terms of utility, whether e-books, e-modules, or e-magazines, all have proven effective in supporting the learning process.

The use of Quran-integrated e-books is a crucial foundation for developing more innovative learning methods. Findings from Hanikah et al. (2022) indicate that using e-books introduces variation in learning, which can significantly enhance students' understanding. Another study by Alam (2019) emphasizes that Quran-integrated biology e-books serve as engaging learning tools, effectively support content comprehension, and foster active student participation in independent learning processes.

The development and implementation process of this e-book can serve as a model for other courses within the Biology Education Program and other courses at UIN Alauddin Makassar and other educational institutions. This initiative significantly positively impacts educational quality by integrating religious and spiritual dimensions as integral parts of the learning process.

D. Conclusion

The Quran-integrated e-book learning media to support nutrition and health courses in the Biology Education Program at UIN Alauddin Makassar was developed using the ADDIE development model, comprising five stages: analysis, design, development, implementation, and evaluation. The validity of this e-book reached an average score of 3.86, indicating it is categorized as "highly suitable for use." Meanwhile, the practicality level of this media achieved an average

score of 3.61, categorized as "highly practical," and its effectiveness level consisted of 20% categorized as "highly effective," 68% as "effective," and 12% as "moderately effective." Classically, 88% of students achieved at least the minimum score for the "effective" category. Therefore, based on validity, practicality, and effectiveness criteria, this e-book is deemed highly suitable for use in the learning process. This research contributes to developing holistic learning resources aligned with religious values, enhancing understanding, and applying nutrition and health concepts in higher education contexts.

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