



Development of Heyzine Flipbook on Regulatory System Content Integrated with the Qur'an

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Abstract: 21st-century learning is closely related to technology integrated into learning. Education and learning are expected to be able to apply technology by developing digital technology-based learning media. The national education goals and core competencies in the 2013 curriculum in Indonesia require that every learning must foster Islamic values. This study aims to produce a media flipbook, Heyzine, integrated with the Qur'an on the material of the regulatory system. The development (R&D) is adapted from the ADDIE development model, which includes five stages: Analysis, Design, Development, Implementation, and Evaluation. The analysis was conducted by examining students' and teachers' needs for learning media for biology content considered difficult. Design included designing media objects and content. Development included creating learning media using the Heyzine application in flipbook format. Implementation included testing the media on students after validation by experts and revisions. Evaluation was conducted to determine the feasibility of the developed media. Assessment validation was carried out by media experts, material experts, linguists, and Qur'anic commentators using questionnaires. The media that had been validated by experts was then tested on Muslim students in grade 11 science, which was divided into two stages, namely a small scale with 29 students and a large scale with 145 students, using questionnaires and interviews as validated by empiricism. It was found that media experts gave a score of 90%, material experts 86.1%, linguists 94.2%, and Qur'anic commentators 94%. The small-scale trial achieved a score of 85.6%, and the large-scale trial achieved a score of 90.5%. Therefore, the flipbook learning media on the Integrated Al-Quranic Regulatory System was declared highly suitable for use as a learning medium. By producing a flipbook Heyzine integrated with the Al-Quran on the regulatory system content, it is hoped that this technology-based learning will continue to prioritize comprehensive Islamic values in biology learning.

Keywords: Biology; Digital learning media; Heyzine flipbook; Islamic value

Introduction

21st-century learning expects learners to have skills in knowledge, technology, media, information, learning, and innovation, as well as life and career skills (Ayuwardini, 2022). Education and learning in the 21st century must be able to utilize and apply digital technology to learning media (Mulyono & Ampo, 2021). This is because the creation of quality learning begins with quality learning media as well (Cholik, 2017; Moto, 2019). The use of learning media is also expected to

improve student learning achievement. (Wardani et al., 2024).

The integration of Islamic values in education and teaching is a process of guidance through good examples that are educative to instill life values that include the values of belief, culture, morals, and beauty to form students who have spiritual intelligence, charisma, and skills (Hastini & Tanjung, 2022; Meliani et al., 2021). Law Number 20 of 2003 concerning the National Education System Article 3 states that the purpose of national education is to develop the potential of students to become human beings who believe and

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fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Mualimin, 2020). The government also seeks to realize it in the 2013 curriculum, which expects the teaching and learning process to improve religious (spiritual) education and character contained in the Core Competencies for spiritual aspects (KI 1) (Yuliawati et al., 2022). To realize religious (spiritual) strengthening, learning media can be integrated with character education related to developing values, ethics, and habits so that students are not easily influenced by bad mindsets and behaviors (Wulandari & Fauzi, 2021). One method of implementing character education in learning can be integrated with the Qur'an through the developed character dimensions, leading to akhlakul karimah sourced from the Qur'an (Aprizan & Oktarina, 2018; Sari, 2017).

The purpose of providing Islamic values in the module is to instill Islamic values, namely providing provisions to students in the form of Islamic teachings as guidelines in their lives, with the hope that students, in addition to learning biological material, also have a solid religious foundation by knowing the relationship between the material and Islamic values (Ahmad et al., 2020; Larasati et al., 2020). Learning integrated with religious values can provide value instillation to students with divinity through the concept of science (Anggoro et al., 2019). Biology is also a branch of science related to natural sciences that studies living organisms and the surrounding environment, closely related to the Qur'an (Suryaningsih, 2018). In addition, biology is one of the lessons that mostly contains material with its difficulties for educators and students. The amount of rote, abstract, and difficult-to-understand material and many textbooks that have not been able to present a more real and memorable learning experience for students makes biology one of the most difficult lessons (Devega et al., 2022).

Based on the explanation above, researchers conducted pre-research through interviews with biology teachers related to learning media and opinion questionnaires with a Google form to find out difficult biology material for grade X and XI students, and teachers in three high schools in Bekasi City, namely SMAN 12 Bekasi, SMAN 4 Bekasi, and SMAS Taman Harapan 2 Bekasi. The interview activity showed that the three schools had not integrated biology learning with Islamic values/the Qur'an (Patranita et al., 2022). Most schools still use conventional learning media such as VCD, Charta, PPT (PowerPoint), LKS, and textbooks. In the questionnaire filling activity, the total number of respondents who filled out the questionnaire from class X, XI students, and biology teachers was 444. 27.3% said that the regulatory system material was one of the

materials that was difficult to understand because there were many Latin terms or foreign languages. The selection of this regulatory system material is strengthened by research by Raida (2018) regarding the identification of high school biology material, which is difficult according to the views of high school students and teachers in Salatiga City. It was found that the regulatory system material became difficult material with a percentage of 59.07% because the material was too much and difficult to understand.

One of the learning media that can be an option to integrate technology and the Qur'an is the heyzine flipbook because the heyzine flipbook has the advantage of displaying images and videos that can help students understand the material and provide students with a more authentic learning experience (Anam & Bakar, 2018). The selection of this flipbook is based on the findings of Hamid & Alberida (2021), who stated that 92% of students want learning resources that contain videos and animations, such as e-modules in the form of flipbooks, because they can be used as one of the media that can be accessed independently, practically, and efficiently. Based on various considerations such as the existence of 21st-century learning that is closely related to technology, the need for the application of Islamic values by national education objectives and core competencies, pre-research results related to the absence of integrated learning media with technology and Islamic values (the Qur'an), and the existence of difficult biological material so that this research is needed to develop media that can integrate between studies science and Islam in learning Biology (Supriyadi, 2020). Suryaningsih's research (2018) has also implemented biology content learning that can be integrated with character values from the Al-Quran, but has not been widely combined with media or learning resources that have adequate Al-Quran studies.

Method

Research Design

The method used in this study is the R&D Method (Research and Development) ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) developed by Dick and Carry in 1996 (Mursidi et al., 2022; Wibawa et al., 2017). Analysis relates to the analysis of a situation to identify products that need to be developed. Design is the activity of designing a product. Development is the activity of making and testing the product. Implementation is the activity of using the product. Evaluation is the evaluation activity at each stage that has been carried out previously, called formative evaluation, and the activity of assessing the effectiveness of the developed media, called summative evaluation (Manzil et al., 2022). However, this research

is limited to the evaluation stage in the formative evaluation section, namely the evaluation that has been carried out in the previous stage, due to the need for revision, because this development research only assesses the feasibility of the developed media, not its effectiveness.

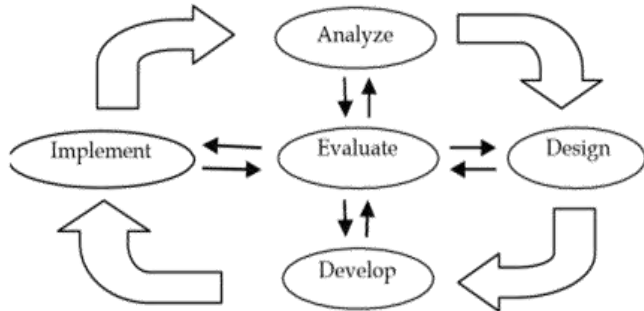


Figure 1. Stages of the ADDIE Model

Research Procedures

The research procedure follows the ADDIE model in five stages.

- a. Analyze stage, exploring the needs of students and schools for learning media and difficult biology materials.
- b. Design stage, collecting learning material objects in the form of material content, images, learning videos, practice questions, and interpretations of the Qur'an from various sources and references for flipbook media design materials.
- c. Development stage, the flipbook is developed as attractively as possible using the Canva Pro design application, from the front to the back, complete with materials, images, verses, translations, and interpretations of the Quran. It is then downloaded in a predetermined PDF format and converted to Heyzine software to be converted into a flipbook and supplemented with instructional videos. At this stage, the media needs to be validated and revised according to expert advice.
- d. Implementation stage, After the media was validated by experts and revised, the media was tested on class XI IPA students who were Muslim as a form of empirical validation.
- e. Evaluation stage, The process of seeing whether the product being developed is successful and meets initial expectations. However, this research is limited to the evaluation stage in the formative evaluation section, namely the evaluation that has been carried out in the previous stage for revision purposes, because this development research only assesses the feasibility of the media being developed, not the effectiveness of this media.

Data Collection

This study uses questionnaires and interviews as data collection instruments.

- a. The instrument questionnaires were made in the form of an assessment questionnaire (expert validation) and opinion (empirical validation). The assessment questionnaire was presented to media experts, language experts, material experts, and Al-Qur'an interpreters as expert validators, while the opinion questionnaire was presented to respondents of grade XI IPA students who are Muslim as empirical validators. This validation aims to identify the shortcomings of the media designed by the researcher. The assessment and opinion questionnaires used a checklist (√) answer type. The questionnaire used a rating scale with five assessment categories, from the highest to the lowest, namely: 5, 4, 3, 2, and 1.
- b. Interviews were conducted to determine the media needs of students and teachers, as well as the content they considered difficult to learn. Interviews were also conducted with students who had already been tested using the media to confirm their responses to the questionnaire.

Data Analysis

Qualitative data consisted of interviews with students using the flipbook, along with criticism and suggestions from media experts, content experts, language experts, and Quranic commentators. These data were analyzed, taking into account the criticism and suggestions regarding the designed media, and then used to revise it.

Quantitative data analysis for the media feasibility validation test questionnaire is closed in nature, where the questionnaire already contains questions and four answer choices presented in the numbers 5, 4, 3, 2, 1 using a Likert scale (Syofian et al., 2015).

Table 1. Likert Scale Criteria (Syofian et al., 2015)

Score	Criteria
5	Very Good
4	Good
3	Good Enough
2	Not Good
1	Not Very Good

The data obtained is processed with the average percentage of respondents' answers, which can be calculated using the formula (Wardani et al., 2022).

$$Percentage = \frac{F}{N} \times 100\% \tag{1}$$

F = Respondents' score
 N = Highest score

The resulting percentage is the average of the respondents' assessments, which will be used to determine the suitability category for the media that has been designed (Wardani et al., 2022).

Table 2. Feasibility Criteria (Wardani et al., 2022)

Interval (%)	Criteria
0 - 20	Not Feasible
21 - 40	Less Feasible
41 - 60	Feasible Enough
61 - 80	Feasible
81 - 100	Very Feasible

Result and Discussion

Analysis Stage

Based on the results of the investigation with biology teachers, it was found that learning still focuses on using traditional tools like VCD, Charta, PPT, and Modules, but lacks a biological unit integrated with Islamic/Al-Qur'an teaching. Students' opinions were also collected regarding the biology material that was considered difficult. As many as 27.3% of students said that the regulatory system material was one of the materials that was difficult to understand because of the many Latin or foreign language terms. This was confirmed by Raida's research (2018) that the regulatory system material was difficult, with a percentage of 59.07%, because the material was difficult to understand.

Heyzine flipbook-based learning media is an option for combining technology with the Qur'an, so that it will provide variation in the learning process in the regulatory system material. The use of flipbooks as a learning tool can provide motivation and engage students through games, videos, and self-examination. The media can be easily accessible online or through a website (Ayuardini, 2022).





Design Stage

The project aims to develop flipbook-based learning media to make learning more effective by providing valid teaching materials, games, and instruction. Materials include Campbell's 3rd edition e-book, e-books from various authors, and quizzes from Campbell's 3rd edition e-book and website on Flipbook. YouTube learning videos are links to materials such as human anatomy, nerves, hormones, and the human body. The audio content includes studies on each sub-language and evaluations on the final subject matter, created on the Canva Pro website and accessed via QR codes. Interactive multimedia is a solution to increase learning activities and provide a clear visualization of the content (Armansyah et al., 2019).

The content of the regulatory system integrated with the Qur'an can be obtained from various scientific

studies by many researchers who have examined this relationship. The Qur'an, hadith, and science are closely integrated, interconnected, and have a tremendous impact on those who wish to study the regulatory system when connected to Islam, namely the Qur'an. (Siregar et al., 2021).

Table 3. Design of Flipbook by Heyzine

Design flipbook	Description
	The front cover consists of the university logo, the independent campus logo, the education logo, and the K13 logo, as well as the author's identity on the next page.
	Foreword, table of contents, KI and KD, and how to use the Heyzine flipbook
	The concept map contains the material that will be studied in the Heyzine flipbook.
	In each sub-topic, it always begins with learning objectives and apperception.

The text is equipped with images, videos, Al-Qur'an verses, and interpretations, as well as fun facts.

Basic Competencies (KD), how to use the flipbook, and concept map. The content component includes teaching and perception on each sub-bundle of material and apperception related to everyday life, making it easier for students to learn about the regulatory system. Content components include games, videos, Qur'an integration, and glossaries to provide ease of use for students with missing information, cover types, and colors (Table 3).

Just like what was done by Hastini & Tanjung (2022), at this stage, the media needs to be validated and revised according to expert advice (Table 4). The validation instruction consists of two parts: the expert validation instruction and the opinion validation instruction. Expert validation instructions are created using a grid with 16 pages, material with 13 pages, a language with 14 pages, and a Qur'anic text with 10 pages. The opinion validation instruction has a total of 23 pages and 8 questions. Construction validators then validate expert instructions and opinions.

Individual assignments for each sub-topic.

Table 4. Validator Assessment Result

Expert	Percentage	Criteria
Media	90%	Very Feasible
Material	86,1%	Very Feasible
Linguist	94,28%	Very Feasible
Al-Qur'an Tafsir	94%	Very Feasible

Implementation Stage

Learning media assessed by experts and revised will then be tested for feasibility by grade XI science students at the high school through opinion questionnaires and interviews. This questionnaire is carried out in two trials, namely small-scale testing and large-scale testing (Table 5).

Table 5. Student Response Result

Trial	Percentage	Criteria
Small scale	85,6%	Very Feasible
Large scale	90,5%	Very Feasible

Interviews were conducted directly using a voice recorder. Comments, criticisms, and suggestions on a small scale concluded that the media that has been made is interesting in terms of visualization and easy to understand, the use of links also makes it very easy for students because it is easy to access and does not require downloading any applications so that this flipbook can be used for independent learning, the content of the material is very complete and concise and the integration of the material with the verses of the Qur'an is very interesting because it can foster a sense of faith in Allah SWT. This is in accordance with Sari's study (2017) that the Qur'an is able to foster character education for every individual who wants to study it.



Glosarium

Bibliography

Development Stage

Developing a flipbook learning media heyzine consists of three components: display, content, and cover. The display components include the front cover, foreword, table of contents, Core Competencies (KI) and

On a large scale, it can be concluded that the design and accessories are attractive, simple and easy to understand, easy to access, the content is complete with pictures, learning videos and fun facts, the size and type of font chosen are also quite appropriate so that it is easy to read and the integration of the material with the verses of the Qur'an placed in the right corner is appropriate because it does not interfere with the material to be conveyed.

Evaluation Stage

The evaluation stage in this study was limited to formative evaluation in the form of revisions that had been carried out in the previous stage. In the development stage, revisions were made based on comments and suggestions from experts (expert review) on the media developed before being tested on students. Furthermore, in the implementation stage, revisions were made based on comments and suggestions from students in small-scale and large-scale trials.

Heyzine flipbook learning media that has been developed will be assessed for feasibility by experts (Manzil et al., 2022; Wardani et al., 2022). Flipbook media is easy to use because it does not require paper or printing (paperless) and is more responsive (Nufus & Sakti, 2021; Ramadhina & Pranata, 2022). Media experts stated that this heyzine flipbook learning media is very feasible to use. So it can be said that the media developed has the criteria of "very good" because in aspects of appearance and presentation, such as cover design, instructions for use, programs, images, videos, and layouts are considered very good, and in aspects of ease, such as access and feasibility, are considered very good. Mulyono & Ampo (2021) stated that by utilizing digital learning resources, both offline and online, it can increase students' potential in terms of information and communication technology, which is a 21st-century learning model. Suggestions and comments from media experts include typos, source links, the size of the picture, and the bibliography.

Material experts assess heyzine flipbook-based learning media from the learning and content aspects of the material (S & Rohani, 2018). Material experts stated that this heyzine flipbook learning media was "very good". So it can be said that the media developed has the criteria of "very good" because learning aspects such as Basic Competencies (KD), learning objectives, and conformity with the concept of the 2013 curriculum are considered "very good" and in aspects of material content such as concepts, material content, examples, fun facts, images, videos, and practice questions that are considered "very good". The 2013 Curriculum applies thematic learning that links one lesson with another so that students gain complete skills and knowledge,

making learning more meaningful (Kumalasan & Eilmelda, 2022).

The suggestions and comments from media experts, including adding goals and material about the mechanism of impulse propagation and the mechanism of the hormonal system, should not only include the learning video but also complete the material because the questions used are not yet contextual and are not included in the cognitive level of HOTS (High Order Thinking Skill) with the realm of analysing ((Larasati et al., 2020).

Linguists will assess in terms of language. Linguists stated that the heyzine flipbook learning medium was "very feasible". So it can be said that the media development has the criteria of "very good". As for suggestions and comments from media experts, some paragraphs still need to be improved because they only use one sentence and also use greeting words that can make this flipbook heyzine feel more engaging with the reader, for example, the use of the word "You" to replace the word "children". Learning media functions as a communication tool to activate students' five senses, such as sight, so that language that is easy to understand will help activate a clear and real learning process (Isnaeni & Hildayah, 2020).

Assessed in terms of Qur'an interpretation, which will be assessed by Qur'an exegesis experts, namely the principals of Kuttab School and Madrasah Al-Himmah Bekasi. Qur'anic exegetes state that this heyzine flipbook learning medium is "very good". So it can be said that the media developed has the criteria of "very good" because in aspects of conformity with the Qur'an such as accuracy and study of verses, the usefulness of integrated Qur'anic verses which are considered "very good" and in aspects of writing accuracy such as the accuracy and accuracy of writing verses, translations, and interpretations of the Qur'an and the layout of writing which is considered "very good". As for suggestions and comments from media experts, among them are basic hadiths and writing the sentence ta'dhim to Allah the Exalted, it is better to write it completely and not abbreviated (Pratiwi et al., 2023).

Ardiyanti (2020) has revealed that the Quran, in addition to being a guide to life, also contains scientific aspects of the universe, including the nervous system, which is part of the regulatory system. Research on this concept has been proven through various studies. The alignment of information in the Quran with the results of these studies indicates that religion and science are integrated and interconnected (Anwar, 2021).

Conclusion

The validation results of the learning media feasibility test obtained an assessment from media

experts with a value of 90% (very feasible), material experts 86.1% (very feasible), language experts 94.28% (very feasible), and from Al-Qur'an interpretation experts 94% (very feasible). In the media feasibility test from students, on a small scale, it got a value of 85.6% (very feasible), and on a large scale, 90.5% (very feasible). Thus, it can be concluded that the Heyzine Flipbook Integrated Al-Qur'an Learning Media on the Regulatory System Material is declared very feasible to be used as a learning medium. These results, supported by insightful feedback from interviews, confirm that the flipbook is not only feasible but also a valuable tool for enhancing the learning experience.

For further research, this media can be applied to classroom learning to improve student achievement across a broader range of cognitive, affective, and psychomotor domains, particularly in the regulatory system. Furthermore, because this media is integrated with the Quran, learning can foster Islamic values or religious attitudes related to the regulatory system.

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Author Contributions

All authors contributed significantly to the development of this manuscript. Ayu Fadila conceptualized the research, designed the methodology, and supervised the project. Ranti An Nisaa performed the data collection and analysis. Rizkia Suciati assisted with the literature review and contributed to the writing and editing of the manuscript. All authors reviewed and approved the final version of the manuscript for submission.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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