

## Research and Development (R&D) Interactive Media That Is Effective, Efficient and Fun for Students

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### KEYWORDS

Development of education, interactive media, teaching materials, effectiveness, and motivation.

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### ABSTRACT

This development innovation is an effort to overcome the limitations of Islamic religious education teaching materials in schools and increase students' enthusiasm for learning by using interactive media with the help of Android forms. The approach taken in the research and development of teaching media is qualitative and quantitative. This development uses the ADDIE model (analyse, Design, Development, Implementation, and Evaluation), which consists of stages: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation as procedures and guidelines for developing teaching materials—data collection techniques by distributing surveys to test subjects and a series of formative assessments. Analysis techniques use qualitative and statistics. The results of the analysis of the development of teaching materials are in the form of software products or applications in the form of Android. Based on the validation and test results of design experts, 86% said that this product is valid and efficient; the validation results of media experts, 87% of these products are valid and efficient, and the results of material expert validation say 80% of these products are valid and efficient.

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## Introduction

The era of Education 4.0 shows us that the development of digital technology has reached the integration stage of artificial intelligence (Artificial Intelligence) and significantly influenced various digital devices and applications in education systems and learning mechanisms. Following massive technological development, it needs to be supported by qualified and reliable human resources. This is in line with the demands of educators to play an active role in developing innovative and interactive learning that is pro-learner (Cavanagh et al., 2019). This effort can be done by encouraging information and communication technology in education. Information technology developing today is expected to improve the quality of learning regarding teaching materials that are sought to run effectively and efficiently (Tampubolon et al., 2021).

The collaboration of innovation and exploration of various content and skills is now in demand due to its benefits; technology has become an idol and even a Partner for

teachers from kindergarten, elementary school, and high school to graduate programs and even doctoral level. Not only does it involve experts, but it also allows this technology to engage students in the classroom. Now, all teachers believe in the cooperation of digital technology and innovation.

Education is a basic human need. Therefore, every human being is obliged to get a proper education. For education to meet decent standards in a country, it is necessary to refer to standards set by stakeholders following the standards of their respective countries. The Indonesian government's standards refer to government regulation number 4 of 2022, an amendment to government regulation number 57 of 2021. Among others: (1) content standards, (2) process standards, (3) assessment standards, (4) graduation competency standards, (5) educator and education staff standards, (6) facilities and infrastructure standards, (7) management standards, and (8) financing standards.

Article 19 (1) of Government Regulation Number 19 of 2015 states that the learning process in educational units is designed to be interactive, stimulating, entertaining, challenging, and motivating students to play an active role and sufficient space for initiative, creative, independent, skilful, fostering demand, physical and psychological development of students.

The primary function of education is inseparable from efforts to cultivate expertise, characteristics, and advanced national civilisation in educating the people of a nation, which has the aim of growing the potential of students to become human beings who believe and fear God Almighty, have noble character, healthy, knowledgeable, capable, creative independence, and become democratic and responsible citizens. To achieve this goal, one of the fields of study that students must study is Islamic Religious Education (Daryanes et al., 2023).

The process of teaching and learning activities in the 2013 curriculum has been student-centered. This requires students to be more proactive and creative in exploring teaching materials that are currently developing, as well as trying to collect more literacy sources from various relevant sources. The 2013 curriculum has changed the role of teachers who initially presented the material in detail, becoming students looking for information in books and arranging the material themselves (Toni et al., 2024); (Septiana et al., 2023); (Suprpto et al., 2021).

Among the essential abilities of a teacher is expertise in developing teaching materials, especially teaching materials that are more interactive so that students are more excited and motivated to learn. The teaching materials listed here with methods, methodologies and learning evaluations that are structured and responsive to the expected learning objectives sufficient teaching materials, will undoubtedly change the teacher's position in learning activities. Today's 21st-century learning activities focus on student-centred learning. Student-centred learning provides opportunities for students to be proactive in completing tasks and collecting information through various literacy, where teachers function as guides, managers, facilitators, assessors and reflectors of material understanding (Wilis et al., 2023). That way, students become the main actors, while teachers only have mentoring roles.

The efforts made by teachers to participate in the development of digital technology 4.0-based learning, which is evolving so quickly and has a significant impact on human existence, especially students' lives, are why researchers concentrate on using interactive learning media. Researchers are also encouraged to address this topic since teachers are still not well-versed in using Android-based interactive media teaching resources, which motivates them to offer interactive media learning in the classroom and anywhere else

students are. It is hoped that educators will be inspired and motivated to attempt creating their interactive teaching materials in the form of Android apps as demand grows for engaging and dynamic learning experiences. Teachers use traditional teaching techniques and learning materials when not encouraged to innovate in the classroom (Veselinovska et al., 2010). Interactive media is two-way learning that delivers information to recipients using computers or the newest Android apps. Compared to traditional education, this is more fascinating. Interactive media is seen by many as a valuable tool for teaching theory and practice to students.

Interactive media teaching materials are a delivery method that has changed the position of a teacher, which was initially a teacher as the primary source of information. However, with interactive media teaching materials, teachers are no longer the primary source of information (Pozdeeva & Obskov, 2015). Interactive media teaching materials in the learning process stimulate students' enthusiasm for learning and will undoubtedly be a motivation to receive material in class actively (Mayer & Schwemmler, 2023). Interactive teaching materials are intended to facilitate the delivery of the content offered and improve the quality of learning.

Interactive teaching media that can be used on laptops or mobile phones is needed to provide opportunities for students to understand more easily the material delivered so that students can construct or build their knowledge, be directly and actively involved in the learning process, collaborate with them, solve problems and be able to display their full potential (Badri et al., 2019); (Zaim, 2020). With instructional media, it is hoped that students can learn the material provided by themselves and repeat the learning material independently at their respective homes.

However, it is unlikely that these methods and techniques alone have contributed to our understanding of the fundamentals of R&D from a long-term perspective or about potential effects on future generations. When imagining future scenarios and backcasting, the preferences and benefits of future generations are not explicitly addressed. A growing emphasis on productivity, speed, and quantity has defined the education culture.

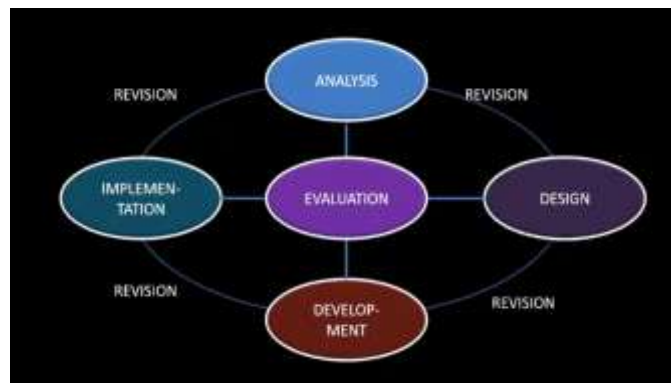
The software researchers use to develop Islamic religious education teaching materials is Articulate Storyline Software. Pros: This software is famous for creating interesting independent online learning teaching materials and can be used to create multimedia content and various other exciting animations. This software can mix various types of media (slides, videos, photos, sounds, text), compile navigation flows, simulated interactions, and compile tests. With this software's help, Interactive media teaching materials can be disseminated in various ways: on HTML-based web, mobile devices or installed on LMS. This software is also consistent across multiple desktops and multiple smartphones. Therefore, making some PAI teaching materials using this software will help deliver teaching materials effectively and even efficiently.

Undoubtedly, app-based learning is much more interesting than traditional methods. Learners can effectively and efficiently study subjects independently using smartphones, computers, or laptops. Based on the various literacy and empirical experiences above, researchers are interested in examining the transformation of Islamic religious education teaching materials into interactive educational media assisted by Articulate Storyline software.

## **Research Methods**

The research method used in this study is research and development (R&D). (Kimbrough & Hutcheson, 1998) The name research and Development/R&D can be

translated into research and development. (Kawasaki et al., 2009) Use Design and Development Research, which can be translated into Planning and Development Research. The 4D Model defines, designs, develops, and disseminates. Use the terms ADDIE (Analyze et al., Evaluation) and Development Research, which can be translated into development research. Of the several existing models, this study uses ADDIE (*Analysis et al., and Evaluation*) to develop interactive teaching media (Nadiyah & Faaizah, 2015); (Setyosari, 2016).



*Figure 1. ADDIE Model*

The analysis is related to analysis activities on work situations and the environment so that what products need to be developed can be found. Design is a product design activity following what is needed. Development is the activity of making and testing products. Implementation is using the product, and evaluation is assessing whether every step of the activity and product meets the specifications.

The product developed is a grade 11 Islamic Religious Education subject package book. The development results in interactive media teaching materials in the form of Android applications. Observation, interviews, and sampling were conducted at SMA Negeri 12 Berau. For this product to be valid, reliable, and objective, it must be tested in several stages.

First, the expert validation test of the content of the field of study review is needed to obtain data in the form of assessments, opinions, and corrections to the content of teaching materials. Second, a design expert validation test review is needed to obtain assessment data on the development model, learning media content and components of teaching material content. Third, the Learning media expert validation test review is needed to obtain assessment data on the development model, learning media content and components of teaching material content. Fourth, Individual Trials: This trial aims to identify errors that may occur while manufacturing teaching materials, including typos, punctuation, and so on. Fifth, Small Group Trials, this experiment aims to look at errors missed in individual experiments. It helps investigate improvements made according to the experiment results.

Data were obtained from product testing of Islamic religious education teaching materials with qualitative and quantitative interactive media. Data were collected using survey distribution techniques for test subjects and a series of formative assessments. The assessment is carried out in three stages. The first level contains factual reviews, the second is individual, small group, and teacher assessments, and the third is field tests. Researchers use qualitative and statistical data analysis techniques to process and

interpret expert reviews and try out teaching material development products for Islamic religious education courses with interactive media (Supriadi et al., 2020).

## **Results and Discussions**

In addition to overcoming the limitations of teaching materials in schools, interactive learning media can also make abstract teaching materials concrete, and objects that cannot be visited directly to the location can be shown directly through interactive media in the classroom. Utilising interactive learning media in Islamic religious subjects is very helpful for teachers to increase the enthusiasm and motivation of learning students. This aligns with research from (Mayer et al., 2024), saying that using learning media can increase student motivation and learning outcomes. Similar results are also described by (Sabil et al., 2021). Technological developments demand learning in the 21st century using relevant media and teaching materials by student development.

### **Product Development Process Analysis**

Several steps are taken to conduct product analysis to be developed. Among them are the following:

#### **Results of previous research**

This phase is carried out to analyse the need to develop teaching materials for Islamic religious education. Which Islamic religious education teaching materials will be developed. This development aims to close the gap between ideal conditions and the requirements that must be met for the teaching and learning process. (1) the availability of teaching materials that are updated synchronously with current technological developments, (2) the availability of teaching materials for Islamic religious education subjects through interactive media, and (3) overcoming the learning requirements of Islamic religious education can increase the attractiveness and effectiveness of Islamic Religious Education learning.

#### **Analysis of Teaching Material Availability**

Based on the researchers' observations about the availability of teaching materials used by Islamic religious education teachers at SMAN 12 Berau, only Islamic religious education teaching materials are in the form of package books in minimal quantities and cannot be distributed to all students to take home. The Islamic religious education package book is only distributed during the teaching and learning process in the classroom. After completing the learning activity, the books are collected and returned to the library so that other classes can use them. Because the package book is minimal, it is not allowed for all Muslim students to bring the Islamic religious education package book home.

Based on the analysis of the conditions above, it is considered necessary to develop Islamic religious education teaching materials so that the needs of student teaching materials can be met, not only at school but also when they study independently at home. In addition to meeting the independent learning needs of students, the development of interactive media teaching materials will increase the motivation and enthusiasm of students to learn independently. With this interactive media teaching material, students hope to optimise their time for more positive activities with their gadgets. Of course, this condition is still not in line with expectations. Teaching materials with interactive media can be used anywhere.

#### **Product Design**

Making sketches is a preliminary step in designing and developing Islamic religious education teaching materials. Then, create a storyboard. After creating the storyboard, then proceed with creating a design appearance. Before it could be used, researchers created a display design consisting of an intro scene with a title, logo, Muslim cartoon animation, and a start button. The intro is made to attract students interested in reading and continue to the following view. The following display design was obtained after the teaching materials for class XI Islamic religious education books were developed into interactive media teaching materials as an Android application.

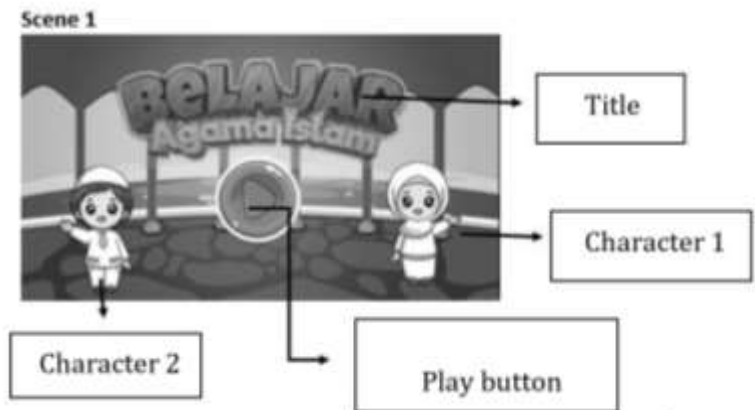


Figure 2. Book cover design on Android

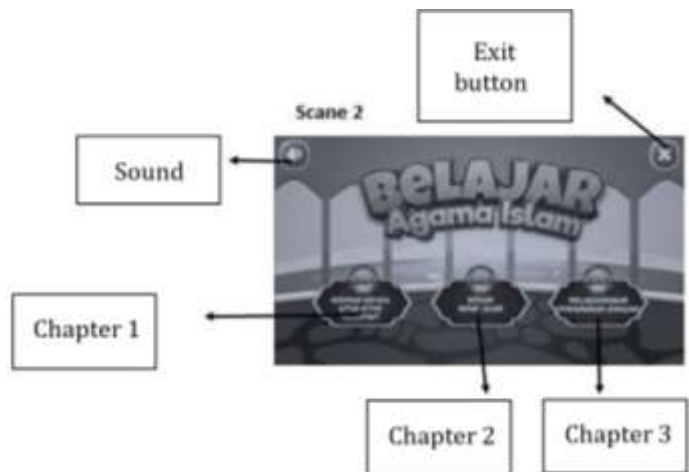
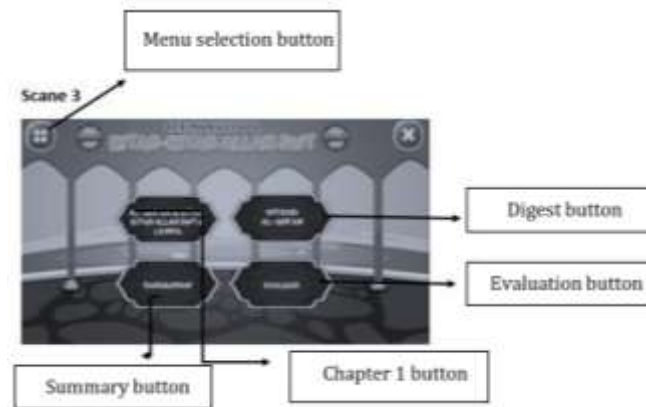
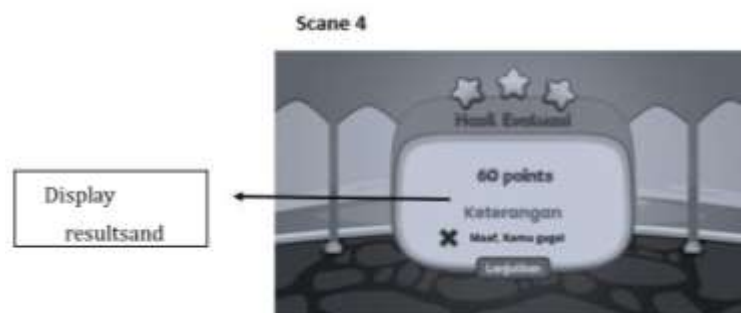


Figure 3. BAB design, after being developed



**Figure 4 Design summary and evaluation**



**Figure 5 Evaluation design**

## **Product Development**

### **1) Before Development**

This research focuses on the Islamic Religious Education textbook for Grade 11 Senior High School. This student textbook was created by the government to be implemented, designed, and evaluated by various stakeholders under the coordination of the Ministry of Education and Culture.

### **2) Development Stage**

This teaching material is developed using the following stages. (1) Determine goals, (2) make material points, (3) create success standards, (4) write scripts, and (5) test manuscripts.

### **3) Formulating goals**

Core competency standards, essential curriculum competencies, and metrics created by the Ministry of Education and Culture are used as learning outcomes. Interactive teaching media was developed using the ADDIE model.

### **4) Formulate material items**

Learning objectives are based on the formulation of substantive items, which results in detailed learning material that supports those objectives.

### **5) Develop measuring tools for success**

The goals and indicators of the material given to students become a measure of success. The benchmark aspect is the student competence shown in the essential competencies, which measure student achievement results. The tool used to measure student achievement was created using applicable curriculum standards. These include evaluation standards, tools, methods, components that can be analysed, and evaluation value calculations.

### **6) Screenwriting**

Teaching materials were compiled from primary sources, namely high school Islamic education subjects from the Ministry of Education and Culture in 2013.

#### 7) Script Testing

This script test determines whether this manuscript is suitable for production. Interactive media teaching materials for prototypes begin after the review is complete and declared feasible to continue.

#### 8) Post Development

After developing teaching materials, there will be very significant changes between them before and after they are developed. Previously, in the form of textbooks, after being developed with the help of Articulate Storyline software, the resulting product can be downloaded and opened on a smartphone as an Android application. The front cover is much different. The display in the Android application consists of titles, logos, and animated Islamic cartoons in the form of animations with buttons for stars. The introduction aims to attract and arouse students' interest in reading and working on the developed teaching materials.

The following display was obtained after the teaching materials for grade 11 Islamic religious education books were developed into interactive media in the form of Android applications.



**Figure 6. Front cover**

After pressing the play button, it will appear on the chapter page of teaching materials. Students only need to press the button of one of the chapters if they want to open it.



**Figure 7. Chapter display**



After pressing one of the chapters of the teaching material you want to open, a sub-chapter of the opened teaching material will appear, and a summary and evaluation button will also appear.

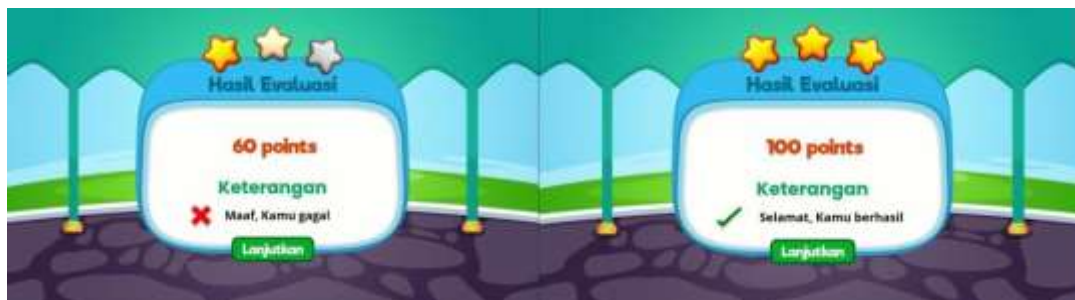


Figure 8. Display of summary and evaluation



Figure 9. Evaluation display

#### 9) Study of Product Development Trial Results

Learning using teaching materials tailored to students' characteristics is expected to foster students' enthusiasm and encouragement to explore deeper information about the material presented. In addition, it is expected that the teaching materials designed will be able to solve the problem of the availability of adequate and relevant teaching materials for students.

On the other hand, the unavailability of contextual teaching materials to the characteristics and needs of students impacts the results of learning acquisition in the subjects taught, especially Islamic religious education subjects. Therefore, to improve the learning outcomes of these subjects, especially for grade 11 high school students. The author feels the need to design and develop teaching materials that meet the needs of students in order to improve student achievement in the future.

The product of developing teaching materials for the Islamic Religious Education class 11, the subject of SMA Negeri 12 Berau, has interactive media entitled Islamic Religious Education and Ethics, which consists of a Teacher Guide and a Student Guide.

Articulate Storyline is a program that provides interactive practice questions in a student guide. Grade 11 students of SMA Negeri 12 Berau, who are accustomed to using information technology, are expected to enjoy learning, which is also packaged by adding interactive learning practices. Students who have access to the internet are not only used for things that are not useful but can use the internet as a source of learning to foster their talents, creativity, and interest in information technology on student gadgets.

After being tested and discussed with material/content experts, designers, and

learning media experts, teaching materials are changed periodically. It is intended to achieve ideal conditions as the primary reference for Islamic religious education subjects for high school students in the eleventh grade.

The model used in this development is the ADDIE model, which is based on the fact that this model has high flexibility in each stage, especially when conducting evaluations (Khozin et al., 2023). Evaluation can be done at each stage partially without waiting for the product to be completed. In addition, this development model is characterised by dynamic learners who always try to innovate, develop and deepen the material through various learning sources. Thus, the resulting product can meet the needs of students. In this product development activity for teaching materials, individual, small group, and field trials were carried out on grade 11 students totalling 20 randomly determined students.

The results of field tests using questionnaires show that material products are developed according to student needs and learning problems, mainly because the educational materials developed are interactive and relevant. Although possible, revision still needs to be done because information and knowledge development occurs very quickly. From the whole series of product development processes, the author can conclude the use of this product as follows:

- 1) Almost all SMA Negeri 12 Berau grade 11 students care and appreciate this development because they have been directly involved in making the teaching materials they dream of. Each material presented is according to their needs and can be understood by students. This can be seen from a) students are given the freedom to choose learning materials that suit their interests, cognitive abilities, and learning needs and b) the freedom to choose and establish learning strategies that suit their learning styles and needs.
- 2) Students can carry out learning activities independently and construct shared knowledge. They can find a more comprehensive understanding of the learning material built into collaborative learning. Thus, developers can conclude that this teaching material can provide additional new knowledge and make them more active and dynamic in participating in learning activities.
- 3) Some tips are given to provide additional information about Islamic Religious Education materials that can be accessed online. For example, concept maps. Concept map of what material will be studied. Students can use these concept maps as a guide and to correlate material with each other. With the concept map, the author intends to motivate and stimulate curiosity in learning the material to be delivered, including the relationship between one material and another.
- 4) Learning guides contain guides for teachers and students designed to provide information about teaching materials, including the scope of the materials and how they are used. This guide should be given to assist teachers and students in the learning process. It can also improve communication between teachers and students so that learning activities run well and learning objectives can be achieved quickly.
- 5) Students directly involved in development activities feel happy because almost all their wishes are fulfilled. They hope the material presented results from their ideas but within the limits and scope set by the Ministry of National Education and the Ministry of Religious Affairs. Therefore, they are also responsible for the materials incorporated into the teaching materials. This encourages them to go deeper and try their best to help understand friends with difficulty studying. This sense of motivation can be felt individually or in groups. Individuals are very proud to be able to tell their

- friends that the material they are learning is the material used in their proposal. Proof of their pride by boldly explaining the material to students who do not yet understand.
- 6) Students actively participate and interact with teaching materials during the learning process. This is evident in field trials involving students from different grades. Given that the material is proposed material and most of it has been studied by students, they are easier to understand. Many questions are very relevant material submitted. In the end, students can solve problems based on the findings of discussions with students in groups. The author argues that subject matter created using the ADDIE model can help students become more active in thinking and acting. They also believe that they will enjoy learning more.
  - 7) Product development of teaching materials using the ADDIE model has characteristics and uniqueness that other development models do not have. This distinctiveness begins by analysing the characteristics of students at SMA Negeri 12 Berau. This is important so that the teaching materials developed truly reflect the needs of students. After conducting an in-depth analysis, the author designed the teaching materials by considering several aspects, such as determining and choosing images, colouring, fonts, layouts and other elements that can support and attract students' attention. In addition, this teaching material is also equipped with interactive practice questions assisted by Articulate Storyline software, which is also the hallmark of this teaching material. After getting the ideal design, the author began to develop teaching materials by considering some of the materials proposed by students. This needs to be done so that the teaching materials can accommodate the needs of students and learning can be partial.
  - 8) Overall, the author also concludes that this teaching material development product has advantages that meet students' expectations, desires and needs. So, all products that contain student guides and learning modules are excellent as the primary reference for Islamic religious education learning activities, especially in grade 11 of SMA Negeri 12 Berau. However, it does not rule out the possibility of making improvements and adjustments so that these teaching materials are still relevant for use by students in other schools.

The author also encountered technical obstacles, including a minimum of knowledge and skills regarding design and graphic science or software such as Corel Draw and Adobe Photoshop. Therefore, only use Microsoft Word, PowerPoint, and Articulate Storyline software. Regarding structure, teaching materials and visual appearance are far from ideal.

In addition, there are significant obstacles between the author and the author's partner, the Islamic Education teacher of SMA Negeri 12 Berau, because not all problems that arise can be resolved quickly. However, with the development of today's communication technology, problems can be solved more quickly and efficiently by using facilities such as Telegram, WhatsApp, and so on.

## Conclusion

The teaching material product developed by the researcher is entitled Islamic Religious Education and Grade 11 High School Ethics. This teaching material is a development of the Electronic Student Book (BSE), which has been modified in such a way as to suit the socio-cultural context and conditions of students. Product revision of teaching materials is carried out continuously after intensive trials and discussions with

material/content experts, design, and learning media experts. It is intended to achieve ideal conditions as the primary reference for Islamic Religious Education subjects.

Overall, researchers concluded that this teaching material is appropriate for students to use as literacy and teaching materials. Based on validation tests and the results of data analysis, expert designs state that this product is suitable for use. Design experts give a percentage of 86%, meaning the product is worth using. Media experts give a percentage of 87%, which means this product is worth using. Material experts give a percentage of 80%, meaning the product is worth using.

Based on the results of this study, the authors recommend that teachers and students use learning media. They also recommend testing the effectiveness of learning media on student learning outcomes and other variables related to their cognitive abilities. In addition, the authors recommend conducting more extensive research, for example, in all high schools throughout the Berau district.

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