

Learning Media Development Flipbook Digital in Biotechnology Material in Class IX SMP Subject of Science

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Abstract

Technological developments are currently experiencing quite significant developments, including in the field of education. The results of a field survey using the interview method carried out at SMPN 3 Lawang explained that there are various forms of media used in learning activities. However, the role of this media is only conventional, such as worksheets and the use of printed books. The purpose of this writing is to develop and analyze learning media flipbook digital on biotechnology material in the science subject Class IX SMP. The method in this research uses RND (Research and Development) using the Sadiman model. The results obtained are products developed by researchers is flipbook digital on biotechnology material. Products that have been validated by material experts (98%), media experts (97%), individual trials (84%), small group tests (88%), and large group tests (90%), completeness of learning outcomes (87 %) so that it can be concluded as a media product flipbook digital biotechnology material for science subjects in class IX SMP, declared valid and suitable for use. In addition, student responses show a positive response in media acceptance and percentage excellent learning completion

Keywords: biotechnology; flipbook digital; instructional Media; technology

1. Introduction

Education is an effort to face or welcome the younger generation into the era of modern development. Based on this, good quality education is needed which indirectly has a function in improving quality human resources. According to Mustofa (2007), education itself is a means that can facilitate individuals to adapt to their daily lives. Entering the era of modern development, the world of education to achieve improvement requires the direct role of technology (Salsabila et al., 2021).

Technological developments are currently experiencing quite significant developments, including in the field of education. As time goes by, the development of education will also continue to develop (Maharani & Meynawati, 2024). For example, in the 90s, the learning method used was only lecture-based, where a teacher/educator only read material to students, so the use of this method would tend to increase students' passivity (Hudaa et al., 2021). This is different from the current era of education which uses more technology in learning, for example in the use of computers, the internet, LCDs, and so on (Julita & Purnasari, 2022). The benefits of using technology in the educational sector will increase the motivation and active role of students (Rimbarizki & Susilo, 2017).

In the learning process, you can utilize the role of technology as a development of learning media. Learning media is known as a tool that functions in conveying knowledge by educators to students (Zahwa & Syafi'i, 2022). The use of learning media which is balanced with technological developments itself provides benefits in suppressing misconceptions that

generally occur among students, especially in delivering abstract material. From the teacher's perspective, the use of technology-based learning media can make teaching easier in the classroom (Bunyamin et al., 2020).

Interaction patterns between students and teachers can be influenced by the presence of technology-based learning media (Habibi, 2020). However, problems are generally faced in the field of education is the teaching and learning process is weak where the use of media is still minimal, so educators still use conventional methods which causes students to get bored in teaching and learning activities (Raharjo & Pitaloka, 2020). Based on these problems, media is needed so that the boredom faced by students turns into activity in the field of learning. Own learning media is everything used in the transfer process to the recipient is sent directly by the sender (Mahadi, 2021), so that through the role of learning media it can stimulate students' interest, attention, feelings and thoughts (Husna & Supriyadi, 2023). This is in line with Nurfadhillah et al. (2021) who explained that learning media are teaching aids that are used by teachers to increase students' attention or creativity and help in the process of conveying knowledge.

The role of learning media itself will motivate students to imagine, speak and write in learning activities. Apart from that, the role of learning media itself is also quite important in facilitating students' learning. Learning media can be used independently nor along with the instructions given by the teacher. Benefits of media use is able to concretize some abstract material. At junior high school level, students have a characteristic mindset from concrete to abstract (Mauliya, 2019). Based on this, some material in the subject is presented in concrete form and other material is presented in abstract form. One of the subjects that has these characteristics is science (Natural Science) subjects (Annuuru et al., 2017).

Science is a branch of science in which investigations are organized to search for regularities or patterns found in nature (Sridadi, 2022). Science has a function in developing technological awareness, insight and skills that are related to daily life (Iskandar & Kusmayanti, 2018). According to literature studies, science is explained is a theoretical or scientific study that discusses living things, natural phenomena, objects, and discusses nature (Shobayar & Anwar, 2023). One of the science materials taught at junior high school level is biotechnology.

Biotechnology is the use of living systems and organisms to develop and create new products to produce or modify products or processes with the aim of obtaining products that are better in terms of quality and quantity and short in production time (Khazalina, 2020). In the teaching and learning process on biotechnology material, the role of the media is needed, so that the process of delivering biotechnology material can run effectively. According to literature studies, it is clear that the use of media in junior high school science learning is able to stimulate students' desire to learn, generate motivation, interest and desire to learn (Syarifah et al., 2022).

The results of a field survey using the interview method carried out at SMPN 3 Lawang explained that there are various forms of media used in learning activities. However, the role of this media is only conventional, such as worksheets and the use of printed books. Based on these interviews, it is known that science teachers still do not use technology as a science learning medium. The results of interviews and observations with students found that students' learning success in science was still relatively low. This is proven by incomplete science scores and low interest in learning science.

In increasing the success of science learning, the role of electronic media-based media is needed to support learning activities, for example the use of computers, LCD projectors, and so on. As a teacher, you have the authority and obligation to create creative and active learning media considering that the facilities and infrastructure provided by the school and government are also adequate. Apart from that, in learning activities teachers must also be able to accommodate the use of various learning media that are adapted to the characteristics of the material and the students. Therefore, researchers assume that developing learning uses flipbook digital and can help in learning activities.

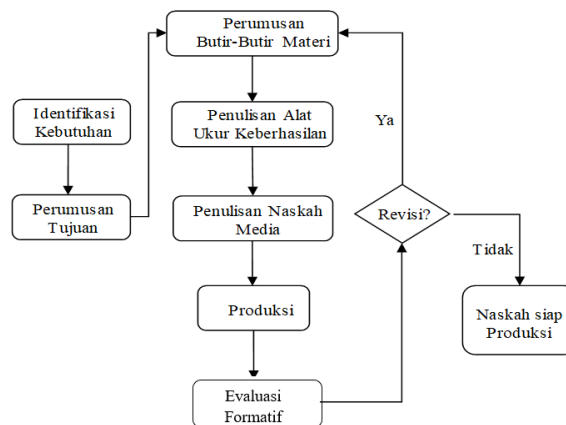
Flipbook digital is a type of digital media that contains various forms of electronic book-based learning materials which aim to attract students' attention in learning activities (Hadiyanti, 2021). Media flipbook digital can be presented through a combination of videos, animations, images, text, and so on (Sukarini & Manuaba, 2021). Research by Zahra et al. (2024) describes the use flipbook digital whose validity has been proven to increase understanding of science material and increase student interest.

Based on the explanation above, the author wrote the title "Learning Media Development Flipbook digital "On Biotechnology Material for Science Subjects in Class IX Middle School". The purpose of this writing is to develop and analyze learning media flipbook digital on biotechnology material in the science subject Class IX SMP.

2. Method

The type of research used by researchers is development using the RND (Research and Development) method. This development research refers to the development model developed by Sadiman (2018). Sadiman's development flow can be explained as follows

Figure 1. Sadiman Development Model



The development stages developed in the development model according to Sadiman include identifying needs, formulating instructional objectives, formulating material items, writing success measuring tools, writing media scripts, production, formative evaluation.

The product of this development is a digital flipbook which will be tested for feasibility by material experts, media experts, as well as student trials through three stages, namely the one to one stage or individual stage by taking a sample of 3 students in class IXC SMPN 3 Lawang, then the small group stage or small group by taking a sample of 7 students, and finally the field group stage or large group (field) by taking a sample of 20 students with the aim of finding out the suitability of the media presented.

The types of data applied are numerical data and descriptive data. Numerical data is obtained through percentage scores from questionnaire results by material experts, media experts and students. Furthermore, descriptive data was obtained through criticism and suggestions received from material experts and media experts and students. In this research, several types of questionnaires were used, namely expert validation questionnaires and student response questionnaires. Questionnaires are used by researchers to collect data in the form of assessment scores, criticism and suggestions related to validating the products that have been made. After the data is obtained then data analysis techniques are carried out. Data analysis was carried out using a Likert scale score consisting of 5 answers, namely:

Table 1. Likert scale

Criteria	Score
Strongly agree	5
Agree	4
Simply Agree	3
Don't agree	2
Very Not Good	1

Source: (Widoyoko, 2012)

In concluding to determine *flipbook digital* is eligible if it meets the eligibility criteria. These criteria are determined as a guideline for assessing the suitability of the product for use. For validity criteria outlined as follows:

Table 2. Eligibility Level Criteria

Percentage	Information
80%-100%	Valid
60%-79%	Fairly Valid
50%-59%	Less Valid
0%-49%	Invalid

Source: (Arikunto, 2012)

Table 3. Criteria for Learning Completion

$$E = \frac{n}{N} \times 100\%$$

Keterangan :

E = persentase ketuntasan belajar siswa

n = jumlah siswa yang tuntas belajar

N = jumlah seluruh siswa

Tabel 3.2 Kriteria persentase hasil belajar siswa

Persentase	Kriteria
$80\% \leq P \leq 100$	Sangat Baik
$70\% \leq P < 79\%$	Baik
$60\% \leq P < 69\%$	Cukup Baik
$P < 59\%$	Tidak Baik

3. Results and Discussion

3.1 Result

The learning process can utilize the role of technology as a development of learning media. Learning media is known as a tool that functions in conveying knowledge by educators to students (Zahwa & Syafi'i, 2022). Science has a function in developing technological awareness, insight and skills that are related to daily life (Iskandar & Kusmayanti, 2018). The following is an image that presents related product development *flipbook digital* which have been developed by researchers, namely:



Figure 2. Menu display

Based on Figure 2 presented with a menu display *button* which can be pressed to immediately open the page you want to go to, apart from that there are various navigation buttons such as *next*, *back*, *zoom out*, *zoom in*, *music* which is located in the corner of the screen. This button is used to make it easier for students to regulate their wishes in using this media. Apart from that, there are animated images to increase students' interest in learning. On the menu display there is categories of instructions, KI/KD, Objectives, Material, Quiz, Closing.



Figure 3. Material display

Based on Figure 3 there is biotechnology material which is added with images, animation, audio and video to clarify students' understanding apart from just writing. Every *slide* accompanied by a home button which will automatically switch to the menu so you can open other menus as desired and this digital flipbook media can be repeated according to student needs. Apart from that, in the video there is also a button that can do it *play/pause*. Likewise, the audio button makes it easier for students to understand biotechnology material.



Figure 4. Quiz display

Based on Figure 4, there is a quiz that can be accessed directly by: *scan barcode* Then you will immediately open an interactive web quiz to train students' understanding with several questions that will be provided *feedback* Answer directly and then bonuses and assistance will appear such as games and scores that can be ranked directly.

The product was developed and tested on material experts, media experts and students using a Likert scale questionnaire. Furthermore, for the eligibility level criteria according to Arikunto (2012), if the value is in the percentage range of 80%-100% then it is included in the valid or suitable criteria for use.

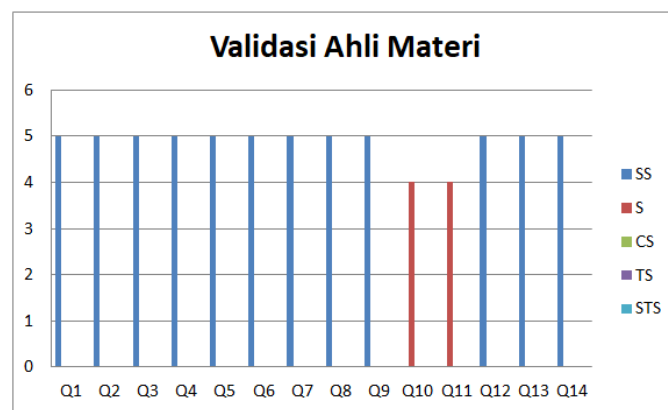


Figure 5. Diagram of Material Expert Validation Results

Figure 5 shows that the material expert validation results obtained a percentage of 98%, among the 14 aspects of the question, 12 statement items were in the "strongly agree" category and 2 statement items were in the "agree" category. It explains the material contained in the learning media *flipbook digital* get positive responses from material experts with notes of suggestions and comments from material experts to improve the content in the material so that it can be even better, so that *flipbook digital* has a feasible and valid category.

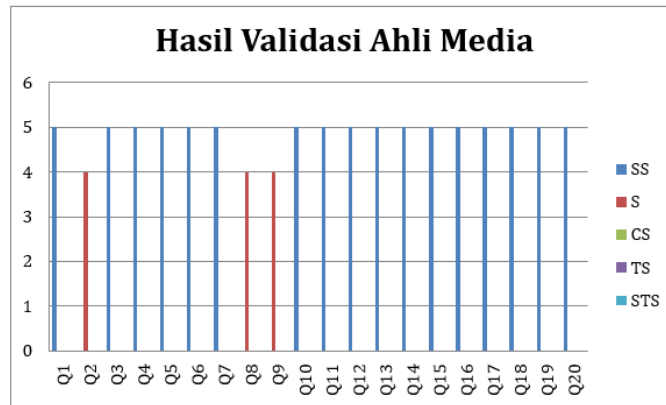


Figure 6. Diagram of Media Expert Validation Results

Figure 6 shows that the media expert validation results obtained a percentage of 97%, which indicates that the quality of this media meets the standards. Of the 20 aspects of the statement, 17 items are in the "strongly agree" category and 3 statement items are in the "agree" category. This explains the learning media *flipbook digital* get positive responses from media experts with notes of suggestions and comments to make improvements in the media so that it can be even better. Based on this, the media explained *flipbook digital* in biotechnology material, namely having a valid and feasible category.

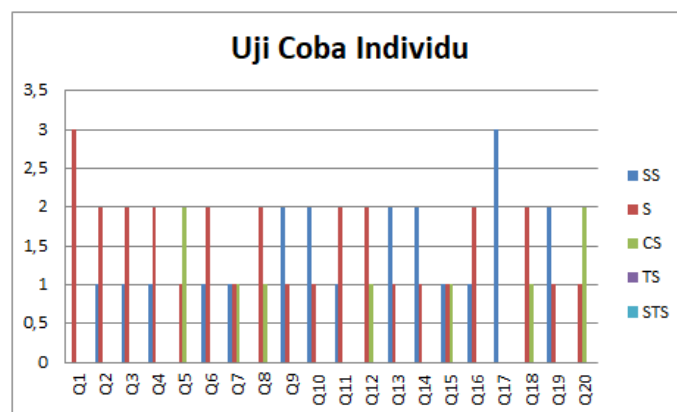


Figure 7. Diagram of Individual Trial Results

At the individual trial stage the researcher took a sample of 3 students. At this stage it shows a percentage level of 84%. This is evidenced by Figure 7 which shows that in the individual trial results diagram, respondents gave more ratings of "strongly agree" and "agree" but there was a "fair" rating. *relatively* small. This proves that learning media *flipbook digital* received positive responses from students and was able to be designated as a valid and suitable learning medium for use.

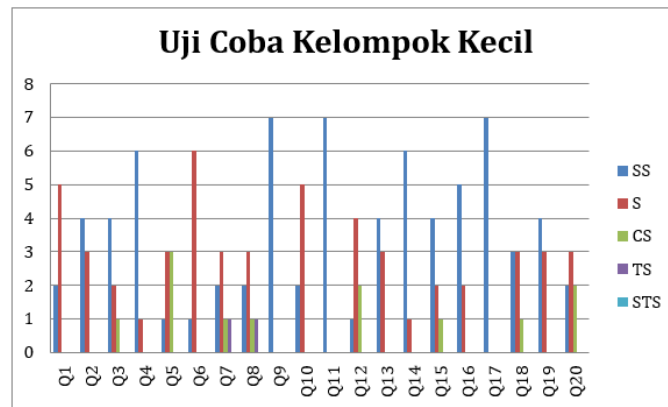


Figure 8. Diagram of Small Group Trial Results

At this small group trial stage the researcher took a sample of 7 students. At this stage it shows a percentage level of 88%. It can be seen in Figure 8 which shows that the results of the trial results diagram show that many respondents gave the ratings "Strongly Agree" and "Agree". There were also several respondents who gave a relatively small number of "Enough" and "Disagree" ratings. This proves that learning media *flipbook digital* received positive responses from students and according to the established criteria, this learning media is valid and suitable for use by considering several suggestions and input from students so that the product can be revised even better.

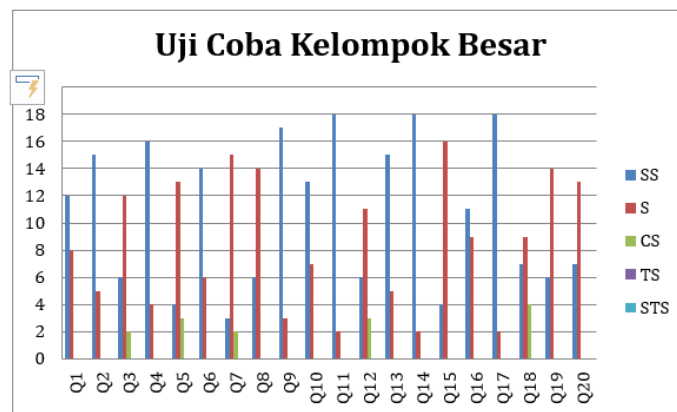


Figure 9. Diagram of Large Group Trial Results

In the large group trial stage, researchers took a sample of 20 students. At this stage it shows a percentage level of 90%. It can be seen in Figure 9 which shows that in the trial results diagram, many respondents gave the ratings "Strongly Agree" and "Agree". There were also several respondents who gave the rating "Enough" with a large amount *relatively* small. This proves that learning media *flipbook digital* received positive responses from students and according to the established criteria, this learning media is valid and suitable for use by carrying out final revisions based on student suggestions and input.

So, the results of trials with 30 class IX students through individual trials with 3 students, small groups with 7 students, and large groups with 20 students obtained a recapitulation score of 91%. According to the results of the data processing above, it can be concluded that the digital flipbook learning media product on biotechnology material for science

subjects in class XI SMP is declared valid and suitable for use. Apart from that, student responses showed a positive response so that this media can also increase students' interest in learning.

Furthermore, the development of learning media is carried out by assessing learning outcomes through test results. The learning outcome data can be obtained through quizzes after the learning activities have been carried out and calculated based on the calculation formula so that it is obtained percentage achieving the minimum completeness criteria score, the following is a table of student learning outcomes

Table 7. Learning Results

Student scores	Many Students	MOH	Information
0 - 75	4 students	75	Not Completed
75 - 100	26 students	75	Complete

From the Learning Results Table, it is known that as many as 4 students got scores below the KKM and 26 students got scores just past the KKM or above the KKM. percentage 87% of students who completed the study success and according to the criteria percentage learning outcomes are categorized as very good

3.2 Discussion

The results of this development are: flipbook digital which contains material on "Biotechnology" in science subjects with research subjects namely 30 class IX students at SMPN 3 Lawang. In the manufacturing process, the interface/display design was created using the Canva application to include several elements such as colors, images and writing fonts. After designing in Canva, the results are then downloaded in PDF format and then uploaded to a website called heyzine to turn paper designs into books that can be read flip by online, Heyzine used to make previously created design elements into interactive media by adding audio, video, quizzes. Through this feature, navigation buttons such as: back, next also for zoom out, zoom in, search and also settings backsound. What is highlighted in this media is that an online book does not only contain writing but a combination of images, audio, video, animation, music and quizzes. Media elements which include images, audio and video are applied to enrich the material, and help students understand illustrations in more real material. Accessing this digital flipbook can not only be via laptop/computer but can also be accessed directly by cellphone by students.

This development applies several of Mayer's principles (Mayer, 2009), which emphasizes that students tend to understand material better when it is presented in the form of words and images rather than words alone. Although not all of Mayer's principles are applied in this medium, some principles such as the principle of spatial proximity are applied, where students tend to understand material better when words and related images are presented in close proximity to each other, rather than when presented separately in page or screen. The principle of temporal proximity is also emphasized, where students tend to understand material better when words and related pictures are presented simultaneously rather than alternately. Furthermore, the principle of coherence emphasizes the importance of eliminating irrelevant material so as not to interfere with student understanding. The principle of modality is that students tend to understand material better through animation and narration than

animation and on-screen text, with spoken words being more effective than displayed text. In multimedia applications, text is not displayed at the same time as the video used. The principle of interactivity is also emphasized, where students tend to understand the material better when they have control over their own learning process. In the resulting media, users can select the material they want to study without having to follow a specific order.

Products that have been validated by material experts show a percentage value of 98%. This shows that the material developed has a valid category for use in learning. This is in line with Purwanto & Risdianto (2022) who explained that in developing learning media you must pay attention to the validity of the material. Because, this will have an influence on students' misconceptions. Material that has been tested for validity will minimize student misconceptions, and vice versa.

The results and media expert tests show a percentage value of 97%. This shows that the media developed has a valid category for use in learning. The research results are similar to Istiqomah et al. (2020) which explains that media use flipbook in science learning shows valid results. The role of electronics in education is able to provide improvements in student learning outcomes. The media presented in flipbook presented by paying attention to color contrast, use of animation, suitability of images, and so on.

Next, the researcher carried out trials on students to determine student responses to find out whether this learning media could be well received by students. Trials on students are carried out in 3 stages, namely: individual stage, small group stage and large group stage. Through the individual stage it can help researchers understand how individuals respond to the use of the product as well as suggestions and improvements. At the small group stage it can help understand the response of small groups/individuals to the acceptance of the product as a learning medium and revise it according to existing suggestions for improvement. At this stage large group to find out student responses consisting of the majority of students after experiencing several improvements from the previous group's suggestions, final trials to create more comprehensive results and provide a stronger basis for further development efforts or final improvements to the product that has been developed.

In individual trials, a percentage score of 84% was obtained, which means that the product being developed has a valid category. This is in line with Purwanto & Risdianto (2022) who explained that the level of testing carried out by individuals must be in the valid category. Because, when an individual himself has confidence that the product he is developing is valid, he will have a sufficient chance that in small and large group tests the product he is developing will be in the valid category.

In the small group test, the percentage obtained was 88%, which means that the product being developed has a valid category. The research results are similar to Maghfirah et al. (2022) which explains that media use flipbook tested valid in the small group test carried out. Technology in education can be seen in changes in teaching aids or as learning media, namely becoming completely digital and relying on the internet and the power of software on a personal computer or smartphone.

In the large group test, the percentage obtained was 90%, which means that the product developed has a valid category. The research results are similar to the research results are similar to Maghfirah et al. (2022) which explains that media use flipbook tested valid in the

large group test carried out. In responding to technological developments, educators are expected to act as agents of change and not be stumped or left behind with technology.

So, the results of trials with 30 class IX students through individual trials with 3 students, small groups with 7 students, and large groups with 20 students obtained a recapitulation score of 91%. According to the results of the data processing above, it can be concluded that the digital flipbook learning media product on biotechnology material for science subjects in class XI SMP is declared valid and suitable for use. Apart from that, student responses showed a positive response so that this media can also increase students' interest in learning.

In the learning results through tests carried out at the end of the learning, the percentage was 87% and according to the criteria it was declared very good. Based on the implementation of the teaching and learning process, the Ministry of Education and Culture (in Trianto, 2011: 241) has criteria for learning completeness if in the class there are $\geq 85\%$ of students who have completed their learning outcomes."

4. Conclusion

The conclusions drawn are based on the explanation above is products developed by researchers is flipbook digital on biotechnology material. Products that have been validated by material experts (98%), media experts (97%), individual trials (84%), small group tests (88%), and large group tests (90%), complete learning outcomes (87%). % so it is concluded media products flipbook digital biotechnology material for science subjects in class XI SMP, declared valid and suitable for use. Apart from that, student responses showed positive responses and a very good percentage of learning outcomes.

Suggestions are addressed to IPA teachers for apply learning by utilizing educational technology, such as electronic-based learning media. Thus, learning activities will be more meaningful and the knowledge transfer process will be easier. It is also recommended for students to use educational technology to deepen knowledge.

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