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Development of science flipbook to increase student learning activities

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Abstract: This research aims to find out whether learning resources in the form of science flipbooks can be valid, practical and effective in increasing student activity. With the help of this media, students are encouraged to actively participate in their own learning and gain a deeper understanding of the subject matter. Analysis, planning, development, implementation and evaluation of data collected through observation and questionnaire methods is part of the ADDIE model research development (RnD) approach. This media is "very valid" based on research results which show a media validation level of 96% and a material validation level of 82%. Both teachers and students give high marks to the media because of its usefulness; the teacher gave it 85% and the students 89%, so the combined total was 87.5%. If we look at the use of science flipbook learning media, it can be seen that the level of student activity increased from 59.18% (the "fair" level) at the beginning of class and increased to 77.56% (the "high" level) after using the flipbook. The research conclusion is that the science flipbook learning media has succeeded in making students more involved in learning.

Keywords: Flipbook, science learning, student activities, student responses

Abstrak: Penelitian ini bermaksud untuk mengetahui apakah sumber pembelajaran berupa *flipbook* IPA dapat valid, praktis dan efektif untuk meningkatkan aktivitas siswa. Dengan bantuan media tersebut, siswa didorong untuk berpartisipasi aktif dalam pembelajarannya sendiri dan mendapatkan pemahaman yang lebih mendalam terhadap materi pelajaran. Analisis, perencanaan, pengembangan, pelaksanaan, dan evaluasi data yang dikumpulkan melalui metode observasi dan kuesioner merupakan bagian dari pendekatan pengembangan penelitian (RnD) model ADDIE. Media ini "sangat valid" berdasarkan hasil penelitian yang menunjukkan tingkat validasi media sebesar 96% dan tingkat validasi materi sebesar 82%. Baik guru maupun siswa memberikan nilai tinggi pada media tersebut karena kegunaannya; guru memberikannya 85% dan siswanya 89%, sehingga total gabungannya adalah 87,5%. Jika dilihat dari kegunaan media pembelajaran *flipbook* IPA terlihat tingkat aktivitas siswa meningkat dari 59,18% (tingkat "cukup") pada keadaaan awal kelas dan meningkat menjadi 77,56% (tingkat "tinggi") setelah penggunaan flipbook. Kesimpulan penelitian adalah bahwa media pembelajaran *flipbook* IPA telah berhasil membuat siswa lebih terlibat dalam pembelajaran.

Kata kunci: Flipbook, pembelajaran sains, aktivitas siswa, respon siswa

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INTRODUCTION

The transformation of information and communication technology (ICT) into a fully digital industry is now increasingly rapid (Adiyono et al., 2024). Through education, a higher and more sophisticated civilization can emerge in the midst of society (Nurmayanti & Ferdiansyah, 2021). A good and well-implemented education system is the key to building the next generation of the nation who are intellectual, have character, and are qualified (Fausta et al., 2024). This will enable the improvement of education management in a directed, planned, and sustainable manner, as well as guarantee equal opportunities to obtain education. Students must have equal rights to learn. Therefore, an appropriate

education system can make students become useful people (Damopolii et al., 2021), and to support sustainable development (Pauw et al., 2015).

A person should take education, whether non-formal, informal, or formal education, so as not to be eroded by the development of the times (Nurmayanti et al., 2023). Improving the quality of education is very important to keep up with the times, and this can be achieved by incorporating innovative learning into the learning system (Fatmawati, 2021; Nasir et al., 2020). In addition to instructional resources, learning in schools requires a close and dynamic relationship between teachers and students (Payon et al., 2021). Teachers are responsible for not only providing material, but also for being able to motivate students, one of which is so that students can be active in learning activities (Nasir et al., 2023).

Students in learning are not only involved in conversations with friends or fellow students, but must contribute to the learning process. Student involvement in learning is indicated by the extent to which they are involved in a learning activity (Nikou, 2024). Learning activities enhance individual potential and facilitate behavioral changes in learning, requiring students to have opportunities to engage in these activities (Besare, 2020). Student motivation contributes to student activity in learning (Papavlasopoulou et al., 2019). Loss of motivation causes student performance to decline and achievement in learning is not optimal (Damopolii et al., 2018). An alternative that teachers can do is to be able to use media in the classroom to help students become more active learners (Hasanah, 2021; Setyantoko et al., 2023).

The media and pedagogical approaches used by educators play a role in determining the level of student involvement with the subject matter (Edu et al., 2021; Harso et al., 2021). The level of learning achievement increases with student activity and vice versa. Learning media is used to explain or illustrate concepts that are difficult to understand if communicated verbally or in writing only (Sari, 2022). Media that is appropriate for students, subject matter, classroom environment, and technological capabilities are very important for efficient education (Syamsunir & Agussalim, 2021). Providing easily accessible learning resources based on Android is one approach to overcoming this problem (Amalia, 2022). One form of Android media that can be used in learning is a flipbook (Yomaki et al., 2023).

Flipbook learning media is a tool or method that functions as an intermediary to help teachers teach students about subjects other than printed books and encourage students to view materials anytime and anywhere (Nurwidiyanti & Sari, 2022; Yomaki et al., 2023). Flipbook is a type of electronic media that combines text, video, photos, music, animation, and instructional features to create an interactive display (Nisrina et al., 2022). There is writing that attracts students' attention, the unique value of flipbook learning materials is a feature that is similar to opening a physical book (Sirait et al., 2024). The flipbook learning products that can be accessed on laptops, computers, or smartphones online with a web learning system.

Research by Setiadi et al. (2021) shows that the use of flipbooks in learning has succeeded in increasing student activity. Nurdiansah (2022) in research revealed that the use of flipbooks increases students' reading activities. Reading activity is characterized by increasing length, number of books, and understanding of reading content. Amalia et al. (2023) in their development research shows that the flipbook that has been developed meets practical criteria because it can increase student activity. Students' enthusiastic

reactions show that they will include flipbooks in their learning activities (Yomaki et al., 2023). Thus, it is necessary to develop flipbook learning media to improve student activities. This research aims to develop a science flipbook to increase student learning activities.

METHOD

This study applies the methodology used in the R&D process for Research to produce innovative learning media. The development model used is the ADDIE model which consists of the following levels: analysis, design, development, implementation, evaluation. From the results of this research, a valid, practical and effective type of flipbook learning media has been developed to increase student activity. This research was not carried out at the implementation stage. Meanwhile, the evaluation stage is carried out at each stage of ADDIE. Centered in Salomallori Village, Duapitue District, Sidenreng Rappang Regency, South Sulawesi, MTS Negeri 3 Sidrap is the location of the study. In the even semester of the 2023/2024 academic year, this study aims to examine the use of flipbooks as learning media in class VII Sciences at MTS Negeri 3 Sidrap. The participants were students of VII B MTS Negeri Sidrap, scientific instructors, and media and material validators. Questionnaires and participant observations provided data for this study. Furthermore, descriptive analysis using percentages was applied to the data collected. According to Tegeh et al. (2014), the percentage of validity and practicality of flipbook learning materials can be calculated using the following formula.

$$\text{Percentage} = \frac{\sum x}{\text{SMI}} 100 \quad (1)$$

Description:
$\sum x$ = Total score
SMI = Ideal Maximum Score
100% = Constant

Based on the results of the media and material validation assessment percentage, the determination of validation conclusions can be seen in Table 1, while practicality can be seen in Table 2.

Table 1. Practicality criteria

Criteria	Level of Practicality	Description
81.00% - 100.00%	Very Practical	No improvement
61.00% - 80.00%	Practical	Minor improvements
41.00% - 60.00%	Less Practical	big improvement
21.00% - 40.00%	Not Practical	Not allowed to use
00.00% - 20.00%	Very Not Practical	Not allowed to use

Source: (Wandani & Nasution, 2017)

Table 2. Validity criteria

Criteria	Level of Validity	Description
81.00% - 100.00%	Very Practical	No improvement
61.00% - 80.00%	Practical	Minor improvements
41.00% - 60.00%	Less Practical	big improvement
21.00% - 40.00%	Not Practical	Not allowed to use
00.00% - 20.00%	Very Not Practical	Not allowed to use

Source: (Wandani & Nasution, 2017)

Valid and practical learning devices are those where the minimum level of validity and practicality of the devices obtained are "valid" and "practical" (Ibrahim et al., 2023; Permatasari et al., 2022). According to the percentage calculation in the study Aini et al. (2022) to determine the percentage of student learning activity, the following formula can be used.

$$\text{percentage } (\%) = \frac{\text{n}}{\text{N}} 100 \quad (2)$$

Description:

n = score for each indicator (number of students who demonstrate behavior according to the activity indicator

N = total number of students

Determination of conclusions about student learning activity based on the results of calculating the percentage of activity values in Table 3.

Tabel 3. Criteria for effectiveness of learning activity

Criteria	Activity Level	Predicate
>75%	High	A
61% -75%	Good	B
55% - 60%	Enough	C
55%	Less	D

Source: (Aini et al., 2022)

Based on these criteria, student learning activity is said to increase if more students listen attentively, ask questions, answer teacher questions, and complete assignments on time (Aini et al., 2022). This analysis was obtained through a questionnaire on student learning activities which were assessed based on their behavior according to activity indicators.

RESULTS AND DISCUSSION

The development of science flipbook learning media is carried out through several stages based on the ADDIE development model. The results of the development are in the form of flipbook learning media on Android devices using a web browser.

Analysis of development objectives

Based on the problems found by researchers when conducting initial observations at MTS Negeri 3 Sidrap, it can be seen that teachers are still using conventional teaching methods and have not used interesting media, especially in class VII in science subjects where students are still required to use textbooks that are only available during class hours, so that by presenting flipbook learning media, it can help teachers deliver lesson materials and students become interested in learning.

Competency analysis

Competency analysis is carried out by identifying the learning outcomes (LO) of the independent curriculum, especially in the ecology and biodiversity material of the science subject for grade VII MTS. The content of the LO specifically, students learn about the interaction between organisms and their natural habitats, how to combat pollution and climate change through design, and how to trace the inheritance of features and use biotechnology in everyday life.

Characteristic analysis

What was found from students was that students were happier when faced with digital tools, especially smartphones. In addition, teachers need learning media that can overcome students' tendencies towards smartphone activities so that the presence of Android-based media is needed to support student learning. By presenting science flipbook learning media as a means for teachers in the innovative learning process.

Material analysis

In 2021, the Curriculum and Bookkeeping Center, Research and Development, Ministry of Education and Culture published a science textbook for grade VII for junior high school students.

At the design stage, create a flowchart and storyboard. A flowchart is an outline or layout brought into a storyboard with more apparent graphic elements. A storyboard can also be considered a visual narrative that serves as an outline of the product.

(a) Main menu display (b) Material menu display (c) Material display

Fig. 1. Storyboard for science flipbook learning media.

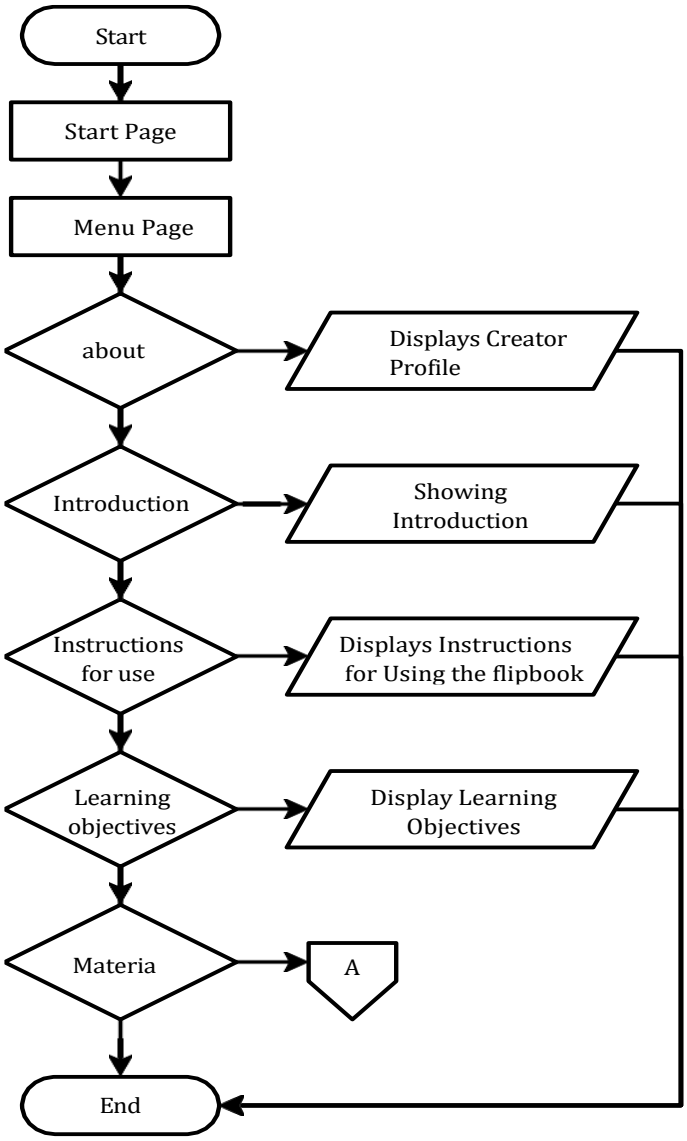
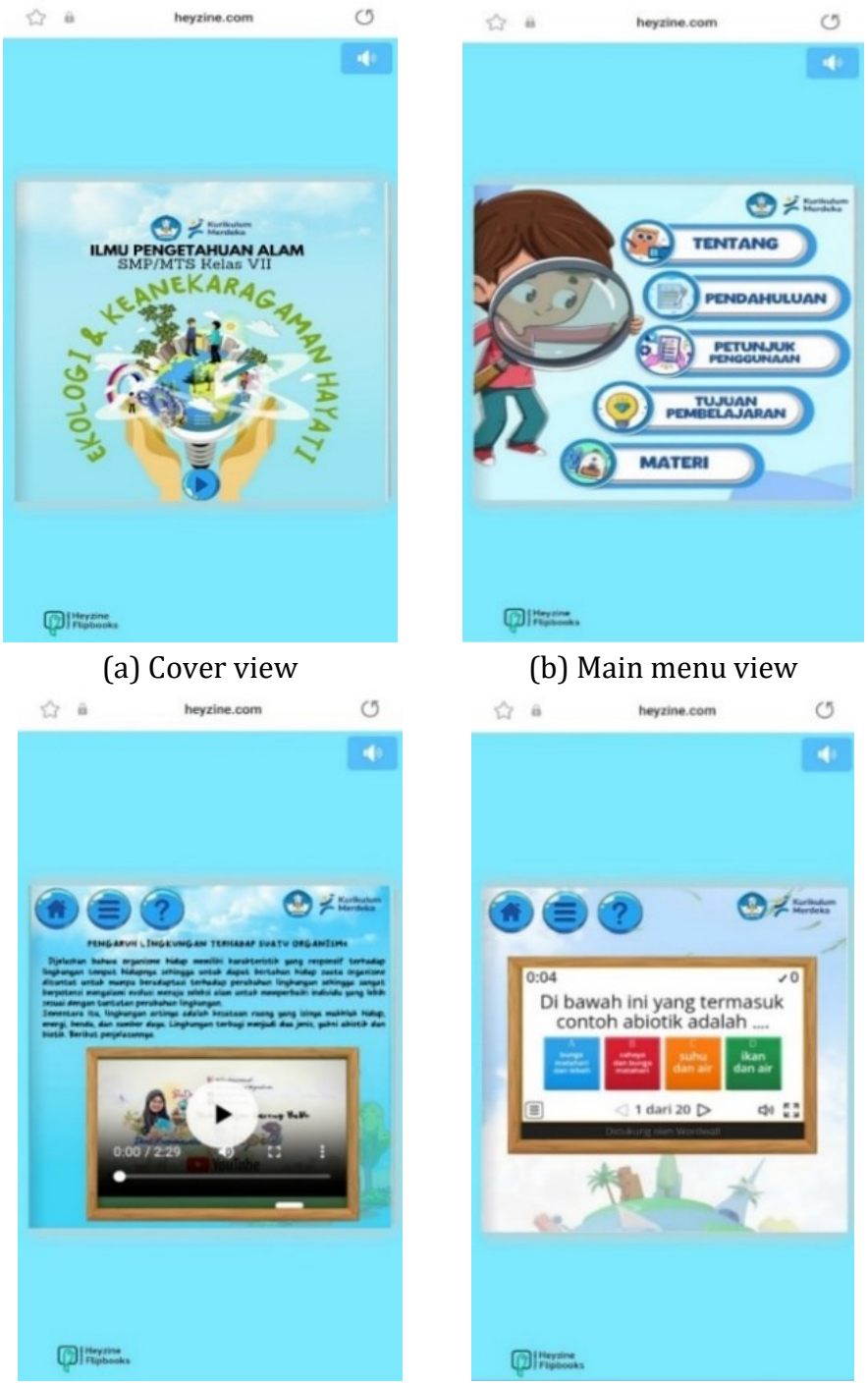


Fig. 2. Flowchart of flipbook learning media.

The flipbook learning media is the result of the design implementation process using the Canva application with the heyzine feature from Canva. The results of the development are shared in the form of a web that can be accessed by students online on the android browser. The following is a display of the science flipbook learning media.



(a) Cover view (b) Main menu view

(c) Material display (e) Evaluation question display

Fig. 3. Flipbook display

The learning media produced is then tested for validity through media and material validation tests. This is done to get feedback and ideas in perfecting the learning media produced. Table 4 shows the results of the validator's assessment of the science flipbook learning media.

Table 4. Validator validation results

Validation	Percentage Score	Description
Media Expert	96%	Very valid
Material Expert	82%	Very valid

The Table 4 shows the results of the validation assessment indicators, namely the media aspect consisting of utility/functionality and quality and the material aspect, namely material/content and language. It can be seen that the validation of the media obtained a percentage score of 96%, and the material expert obtained a percentage score of 82% and was stated in the "very valid" category.

The learning media was tested with a sample of respondents including students of class VII MTS Negeri 3 Sidrap and subject teachers (science). Educators and students both have the opportunity to provide feedback on the learning materials developed at this trial stage. This stage is carried out by providing a questionnaire containing instruments to teachers after using the flipbook learning media so that the results of the respondents of class VII science teachers of MTS Negeri 3 Sidrap obtained 85% with the criteria of "very practical".

In addition, 26 class VII B students received a questionnaire equipped with an instrument to determine their feelings about the science flipbook learning media. The results of the student questionnaire are displayed in the form of a diagram in Figure 4.

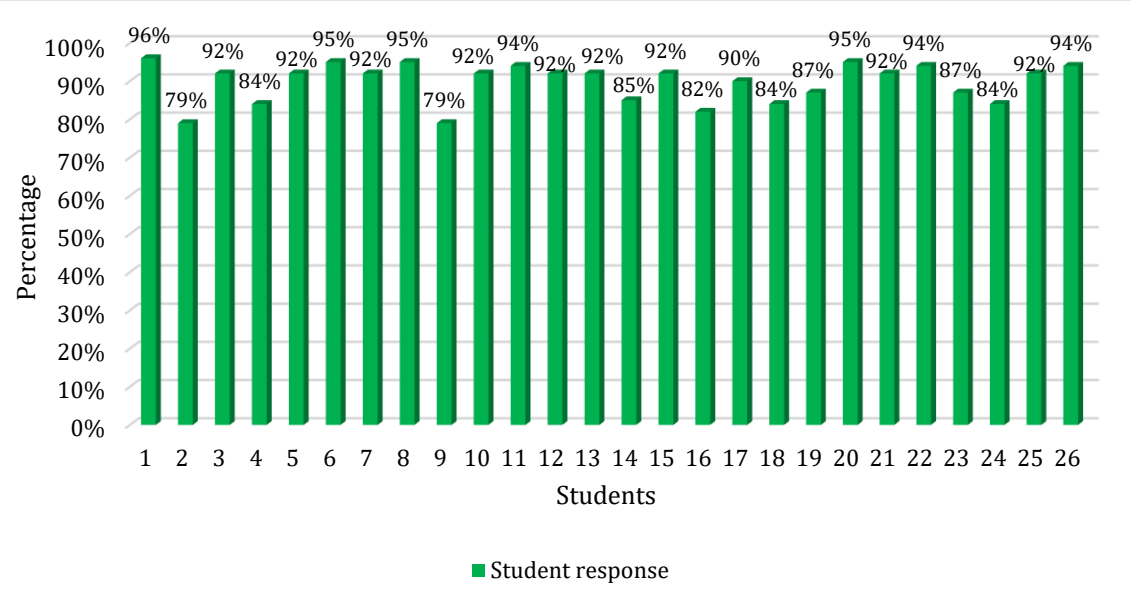


Fig. 4. Grade VII student response questionnaire

Figure 4 is the percentage of the questionnaire response score obtained by 26 class VII students using the science flipbook learning media obtained from each student. The average percentage of student questionnaire results is 90% and is included in the "very

practical" criteria. The results of the practicality of the flipbook learning media when the student response assessment output and the teacher response assessment findings are combined, the average percentage is 87.5%. This is included in the "very practical" criteria and can be applied to the learning process. A good response shows that students are motivated to learn when the teacher uses flipbooks (Zaman et al., 2024).

To determine students' learning activeness in class, observations were made based on several indicators for assessing learning activities. Grouping of student activity indicators according to Paul D. Deirich in the research of Karimah et al. (2022) namely student attention, student response and discipline in learning. The comparison of student learning activity based on class conditions and after using the science flipbook learning media can be seen in Figure 5.

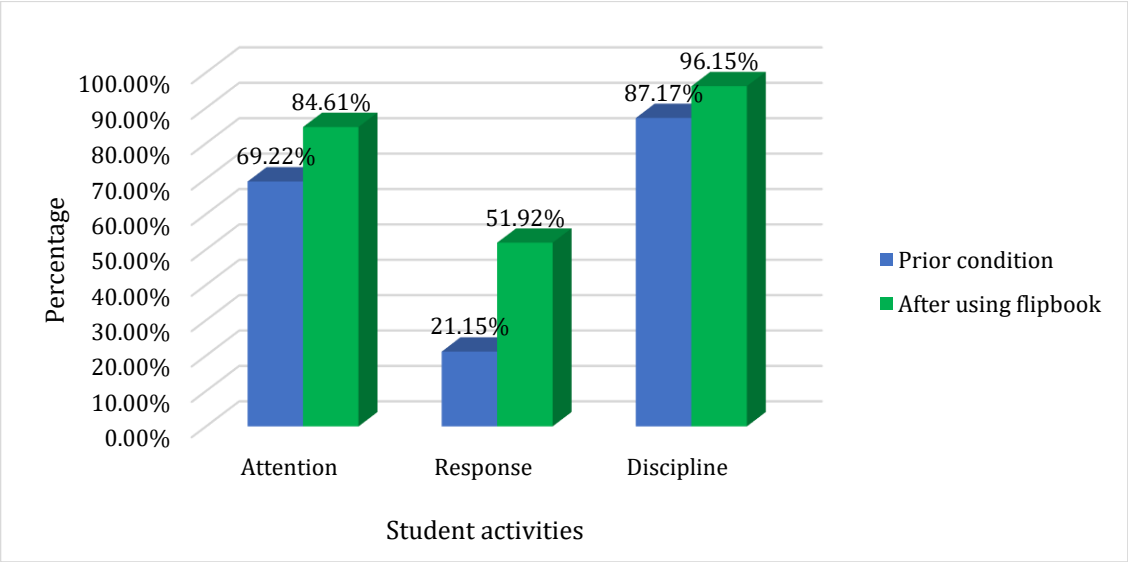


Fig. 5. Learning activity graph

Figure 6 obtained during the learning process using a questionnaire conducted by the researcher shows the average score of all indicators at the beginning of the class obtained a criterion of 59.18% with a level of activity "sufficient" while after using flipbook learning media there was an increase in activity, namely obtaining a criterion of 77.56% with a level of activity "high". This study is also supported by previous research, one of which is research conducted by Arisandhi et al. (2023), student learning actions obtained were 90.73% "very good" after receiving treatment using flipbook learning media. This clarifies that students whose learning activities are influenced by flipbook learning media are at a higher level than students whose learning activities are not influenced by flipbook learning media.

This research has succeeded in developing science flipbooks to improve student activities in learning. The flipbook used in this research can support student learning by making their learning activities better. In this research, students' attention, response and discipline during learning became better. This is proven by the percentage of their activity during learning which is very good. Amalia et al., (2023) research demonstrates that the developed flipbook meets practical criteria by enhancing student activity.

CONCLUSION

The conclusion in this research is that the science flipbook that has been developed meets the criteria of being valid, practical and effective in improving student activities. Students' attention, response and discipline in learning can be improved when using flipbooks. In an effort to increase student learning activity in the classroom, the flipbook learning resource used in this study is very appropriate for use in the learning process.

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