Developing an e-module to improve the seventh-grade student's bump pass skills in volleyball

I Ketut Yoda[1] ✉ (iD)
Indra Kasih[2] (iD)
Taqi Ilra[3] (iD)

[1]*Department of Sport Science, Ganesha University of Education, Singaraja, Indonesia.*
[1]*Email:* yodaketut@undiksha.ac.id
[2,3]*Faculty of Sport Science, State University of Medan, Medan, Indonesia.*
[2]*Email:* indrakasih@unimed.ac.id
[3]*Email:* taqiilraa@gmail.com

(✉ Corresponding Author)

Abstract

The objective of this study is to develop e-modules for bump pass learning for seventh-grade students. This study identified the problems and needs of students in learning bump pass skills, e-module eligibility and the effect of the e-module on students' bump pass skills. Two groups of seventh grades, two teachers serving as content experts and two media experts participated in this study at State Junior High School 1 Talawi. Five steps were used in conducting this research: analysis, design, development, implementation and evaluation. The researchers collected data through questionnaires, interviews, observation, documentation, expert testing and tests. The questionnaire, interview, observation and documentation results were analyzed using an interactive data analysis model. Expert test data were analyzed using the inter-rater agreement model and test result data were analyzed using an independent t-test. There are three findings in this research. First, the reason for the students' difficulties in learning bump passes is their lack of interest in the content found in their textbooks. They need learning media that are interesting and can be accessed through smartphones. Thus, e-modules are a suitable learning medium to solve problems and meet their needs. Second, the developed e-module was confirmed to have high content validity and meet the criteria for good learning materials and media based on the feasibility test results. Third, the e-module has positively and significantly affected students' understanding and bump pass skills. Thus, it is suggested that the module be used for teaching bump pass skills at other schools.

Keywords: Bump pass, E-module, Research and development, Seventh-grade students, Sport science, Young learners.

Contents

Contribution of this paper to the literature
Previous studies on e-modules focused more on improving students' knowledge or theoretical mastery. In contrast to previous research, the focus of this study is on bump pass knowledge and skills. In other words, this study confirms that an e-module is effective for teaching conceptual and practical things.

1. Introduction

A bump pass is an essential skill for a volleyball player because it is a basic technique that must be mastered to pass the ball, build defense and organize attacks properly (Hadi & Sudijandoko, 2022; Kanca, Ginaya, & Sri Astuti, 2021). The precision of the subsequent attacks is determined by the volleyball players' bump pass skills which serve as the foundation for an attack (Hambali et al., 2022; Herman, 2019; Marzuki, Alsaudi, & Hasani, 2021). The importance of bump pass skills makes bump pass skills mandatory material to be conveyed to students in the learning process of sports education at schools.

However, mastering a good bump pass technique is not easy. Many students still experience problems mastering the bump pass technique properly (Ardiansyah, Supriatna, & Perdana, 2023; Sada, 2020). The mistakes made by students varied from initial, middle and final action errors in carrying out the bump pass (Aditya & Sari, 2020). Seventh-grade students at Talawi 1 Public Junior High School also found problems with bump pass skills. According to the researchers' first findings, a significant number of students were still struggling with practicing the bump pass technique. They do not understand the correct bump pass technique. Early observations and interviews revealed that students thought bump pass learning was uninteresting. Sports educators only use textbooks as a resource for their teaching methodology. The book is not interesting for students because it only contains black and white writing and pictures that cannot fully describe the bump pass technique. Since seventh-grade students are still young learners, they like learning media containing colorful pictures and videos. They must be given engaging learning media to keep them focused on the learning process. In addition, the brand enjoys games since children are instinctively competitive.

A special effort is needed to help students understand and practice bump pass skills properly. This research attempts to create an electronic module for bump pass learning considering the issues faced by seventh grade students at Talawi 1 Public Junior High School and their attributes. The selection of electronic modules to solve the problem of bump pass skills is based on several reasons. First, e-modules create attractive instruction (Nurmasyitah, Lubis, & Derlina, 2022; Wahyuni & Arnyana, 2022). The electronic module can have attractive images, audio and video (Erniwati, Hunaidah, Nurhidayat, & Fayanto, 2022; Ruslan & Rauddin, 2022). Students will be more motivated and focused when they are learning through engaging content (Haleem, Javaid, Qadri, & Suman, 2022; Knaus, 2023; Natarajan et al., 2022; Xia, Ke, & Zheng, 2022). Second, electronic e-modules have also been proven to help increase students' knowledge and skills (Choirunnisya & Sudira, 2022; Nazifah, 2022; Ruehter, Lindsey, Graham, & Garavalia, 2012; Uz & Wardani, 2019). As students' learning motivation increases, students' understanding and skills also increase (Erten, 2014; Tuncel, Sadikoglu, & Memmedova, 2016; Yang, Zhang, Pi, & Xie, 2021). Third, electronic modules that can be equipped with electronic quizzes will be able to meet the competitive character of young learners (Eriksson, Kenward, Poom, & Stenberg, 2021; Priewasser, Roessler, & Perner, 2013). Furthermore, seventh-grade students can be categorized as generation Z (the generation that learns better with the help of technology) (Altmiller & Pepe, 2022; Culp-Roche et al., 2020). Thus, electronic modules that can be accessed through electronic devices such as laptops, tablets and smartphones can make them learn better. For this reason, the electronic module developed in this study provides pictures, videos and electronic quizzes tailored to students' needs and characteristics.

2. Literature Review

Some researchers have conducted studies to develop e-modules for teaching sports science. Rosyida, Rahayu, and Rahayu (2022) developed an e-module for teaching physical fitness to eleventh-grade students. Their study found that the developed e-module effectively improved students' physical fitness knowledge. Rosmawati et al. (2022) developed an e-module for teaching sports modifications and small games. They found that their developed e-module was valid for teaching sports modifications and small games. Alnedral, Umar, Mario, Aldani, and Sari (2023) also conducted a similar study and developed an e-module for learning Tarung Drajat martial arts. Their study found that the developed e-module was effective for learning basic skills in Tarung Drajat martial arts.

Furthermore, Priambodo, Kartiko, Ardha, Al, and Rohman (2023) also developed an e-module to improve students' motivation and learning effectiveness in sports and health education. They found that using an e-module could improve students' learning effectiveness. These studies demonstrate that e-modules have numerous advantages for sports education. Thus, the researchers developed an e-module to improve students' bump pass skills considering the benefits of implementing an e-module and the seventh-grade students' problems with bump pass skills in volleyball.

An electronic module is essentially a printed module that has been modified using information technology to incorporate multimedia elements such as audio, video and photos that can be viewed online directly from the e-module website (Trilestari & Almunawaroh, 2021; Wahidah, Ibrahim, & Muslim, 2019). The use of multimedia resources may enhance the educational process and increase students' motivation and concentration (Gilakjani, 2012; Silalahi, Hutabarat, Tarigan, & Chandra, 2018). The bump pass skill is one of the basic techniques in the game of volleyball. A player attempts to pass the ball to a teammate by using the side of the forearm (Astuti & Zulbahri, 2021).

3. Materials and Methods

3.1. Research Design

In developing the e-module-based volleyball bump pass learning medium, the ADDIE approach was used. This ADDIE approach consists of five steps: analysis, design, development, implementation and evaluation (Branch, 2009). The stages of the ADDIE model in this study can be explained as follows:

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3.1.1. Analysis

The analysis phase consists of two stages: job analysis and needs analysis. The first stage is analyzing the actions taken to classify and identify the issues schools are having with the current teaching materials after which they can seek remedies by creating and enhancing the resources. The method used at this stage is to conduct interviews and observe the learning process of volleyball bump passes at school. The second stage needs analysis to determine the teaching materials needed to produce quality instruction.

3.1.2. Design

The initial design of the volleyball bump pass e-module product consisted of a volleyball bump pass e-module cover, a short description of the volleyball bump pass e-module, basic competencies and core competencies, namely this display contains basic competencies and core competencies in the material, explanation regarding the learning objectives of the volleyball bump pass and instruction. This display contains a menu of instructions for using the e-module, volleyball bump pass activity material consisting of pictures and videos and questions for a quiz about bump pass material.

3.1.3. Develop

The steps that researchers will take in developing the volley ball bump pass e-module are to make learning media using Canva, Flipbook and Heyzine software, validate the contents of the e-module and revise the product as many times as needed according to the results of the validation.

3.1.4. Implementation

This e-module was implemented in the seventh-grade groups of Talawi State Junior High School 1, Batubara regency. The steps in the implementation phase are as follows: Inviting the teacher as a partner for implementation, entering the group room or gathering outside the group room, asking the students to open the volleyball bump passes e-module and explaining the use of the volleyball bump pass e-module.

3.1.5. Evaluation

A final review of the developed product is carried out at this stage. The researchers looked at the effect of the e-module on students' understanding and bump pass skills. If no other revision is available, this medium is suitable for a wider range of uses.

3.2. Data Collection Technique

The researchers used questionnaires, interviews, observation, documentation, expert testing and test distribution to collect data regarding the problems and needs of students in learning the bump pass technique. The expert judgement technique was conducted to determine the validity of e-module content and the test was used to determine the effect of the e-module on students' understanding and bump pass skills.

3.3. Research Instruments

Several instruments were used along with the collection technique to obtain the necessary data. These instruments include questionnaires, interview guides, observation sheets and documentation tools in the form of cameras and recorders to collect data on problems faced by students and students' needs in learning bump pass skills. Furthermore, expert judgement was used to assess the viability of the e-module using the questionnaire. The questionnaire was made with a Likert scale of 4 answers, namely strongly agree, agree, disagree and strongly disagree. These answers are then converted into 4, 3, 2, and 1 scores. The content expert judgment questionnaire comprises 20 items covering content feasibility, linguistics and presentation aspects. The questionnaire used by media experts to assess the quality of the e-module has 25 items covering appearance, ease of use, consistency, usability and graphical aspects. Tests and rubrics for bump pass skill evaluation are used to determine the impact of implementing the e-module on comprehension and skills.

3.4. Data Analysis Technique

The data type and study objectives were modified by the researchers before analysis. Interactive data analysis models were used to qualitatively analyse data collected through surveys, interviews, observation and documentation to identify issues experienced by students and their needs in learning bump pass skills. The analysis using an interactive data analysis model was carried out in three stages: data reduction, data display and conclusion drawing or verification (Miles, Huberman, & Saldana, 2014).

Four Likert scales were used to categorize the questionnaire results for the expert tests used to evaluate eligibility for e-modules (see Table 1).

Table 1. Category interval based on a 4 point-Likert scale.

Interval score	Category
$X \geq (\bar{X} + 1.SBi)$	Very good
$(\bar{X} + 1.SBi) > X \geq \bar{X}$	Good
$\bar{X} > X \geq (\bar{X} - 1.SBi)$	Poor
$X < (\bar{X} - 1.SBi)$	Very poor

Note: X = mean score of the questionnaire.
$\bar{X} = 1/2$ (maximum ideal score + minimum ideal score).
$SBi = 1/$ (maximum ideal score - minimum ideal score).

Furthermore, the data obtained from the test results to measure the effectiveness of the e-module on understanding and bump pass skills were analyzed using an independent t-test. In this effectiveness test, two groups of students were selected from two seventh graders in Negeri 1 Talawi using statistical matching

techniques to ensure that the two groups did not significantly differ in learning achievement in volleyball. The researchers conducted a preliminary test to make sure the data were homogeneous and normally distributed before testing the test result data using the independent t-test. Using the Statistical Package for the Social Sciences (SPSS) version 20 for Windows applications, tests for normality, homogeneity and independent t-tests were performed. SPSS has statistical analysis capabilities as well as a data management system and it is commonly used for processing and analyzing quantitative data. Furthermore, the researchers also did an effect size test using Cohen's d formula to determine the magnitude of the e-module effect on students' understanding and reading skills.

Cohen's $d = (M_2 - M_1) / SD_{pooled}$
where
$SD_{pooled} = \sqrt{((SD_1{}^2 + SD_2{}^2)/2)}$

The criteria presented in Table 2 were used to categorize Cohen's d computation in order to calculate the effect. size.

Table 2. Effect size category.

Size	Cohen's d
Small	0.2
Medium	0.5
Large	0.8

4. Findings and Discussion

The research findings are organised in accordance with the stages in which the study was conducted. The five stages of the study were analyzed i.e. design, develop, implement and evaluate. The results are presented in a manner consistent with these stages. The findings at each stage of the study are as follows:

4.1. Analyze

The researchers identified the problems and requirements of seventh-grade students in order to boost their learning after completing the analysis stage's objectives. The results of distributing the questionnaire showed that the students were less interested in the available teaching materials regarding bump passes. Their teaching materials are only in the form of printed books and contain only a few explanations about the bump pass. The findings of the interviews in which students stated that they were unable to read printed books because they were unattractive supported the data. Videos or vibrant images are their preferred formats for instructional content because watching engaging films and viewing eye-catching images helps them comprehend the bump pass's skills more thoroughly than reading an explanation text. In addition, they also prefer to learn through their smartphones. They also said that they preferred to practice their understanding through electronic quizzes that could be accessed directly from their smartphones so that they could immediately find out the results of their quizzes and even compete with their friends. This is supported by the results of observations and documentation which show that students look very passive when learning to use the available printed materials. So, it can be said that students are not interested in the available printed teaching materials. They need electronic teaching materials that can be accessed through smartphones equipped with colorful pictures.

These findings are supported by theories regarding the characteristics of learners since they prefer colorful material in video form to printed material especially if it is not colorful and only filled with text (Jakovljević et al., 2021; Stern-Ellran, Zilcha-Mano, Sebba, & Levit Binnun, 2016; Treiman, 2016). In addition, colorful media can also help young learners memorize better (Diachenko, Kalishchuk, Zhylin, Kyyko, & Volkova, 2022). Additionally, they enjoy games and other activities where students must compete (Houser, Roach, Stone, Turner, & Kirk, 2016; Nery, Sequeira, Neto, & Rosado, 2023; Rondon, Sassi, & Furquim de Andrade, 2013). Thus, live electronic quizzes can meet the needs of these competitive children. Furthermore, seventh-grade students are members of the Z generation. It is natural that they choose to learn through cellphones (Safdar Bajwa, Abdullah, Zaremohzzabieh, Wan Jaafar, & Abu Samah, 2022). The z generation is a digital generation that cannot be separated from digital devices and learns better with the help of digital devices (Ratan, Parrish, Alotaibi, & Hosseinzadeh, 2022).

4.2. Design

The product was designed based on the results of the analysis phase. As a result, the researchers created the e-module to have an appealing appearance with colorful photos, movies and electronic quizzes. In addition, the e-module design for bump pass learning is also adjusted to the criteria of a module. First, the researchers collected the information to be available in volleyball learning media from various sources such as books. There are also photos and videos. Second, the researchers developed a learning media framework. The preparation of the volleyball learning media framework generally consists of five main parts: the instructions section, basic competencies, learning materials, videos and profiles. The instructions section contains instructions and steps for using the media. The core competencies and basic competencies consist of things that students must achieve. The material section consists of 6 topics discussed in text and images. Furthermore, there are also electronic quizzes that can be accessed online and live.

4.3. Develop

The development stage consists of developing volleyball learning media and product validation. The results of the development stage of the volleyball learning media material for learning the basic attitudes of volleyball are as follows:

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4.3.1. Developing Volleyball Learning Media

The researchers compiled the materials for the e-module by using the Canva application. The researcher made the background and cover of the e-module by using the Adobe Photoshop CS6 application. Researchers used the Cap-cut application to create or edit video and audio. Furthermore, merging covers material files, video, audio and images into one file in the .exe or .apk format is carried out using the facilities provided on the Heyzine Flipp Book web.

4.3.2. Assessment of Volleyball Bump Pass Learning Media

The researchers involved two content experts and media experts to validate the volleyball learning media. Those experts evaluated the e-module by filling out the questionnaire that had been made before.

Table 3. Material expert validation stage 1.

No	Aspect	Mean score	Percentage	Category
1	Content	3.5	88%	Very good
2	Language	3.3	83%	Very good
3	Appearance	3.3	83%	Very good
Mean score		3.4	85%	Very good

According to Table 3, the assessment of volleyball learning media by content experts based on the information provided on volleyball learning media shows a mean score of 3.4 with a percentage score of 85%. This score confirms that the e-module is in a very good category. However, experts provided some suggestions to increase the quality of e-modules. The suggestions or input received by researchers from material experts are as follows: The use of the material is expanded. After revising the draft material, draft revision 1 was produced from the volleyball learning media which was then re-tested. The results were obtained after being revised and re-tested by experts as shown in Table 4.

Table 4. Material expert validation stage 2.

No	Aspect	Mean score	Percentage	Category
1	Content	3.6	91%	Very good
2	Language	3.5	88%	Very good
3	Appearance	4	100%	Very good
Mean score		3.7	93%	Very good

Furthermore, since the e-module was in electronic media, the validation process was also conducted by involving two media experts. Validation by media experts aims to obtain information, criticism and suggestions so that the volleyball learning media developed becomes a good product in terms of appearance, ease of use, consistency, usability and graphics.

Table 5. Media expert validation stage 1.

No	Aspect	Mean score	Percentage	Category
1	Screen design appearance	3	75%	Good
2	Ease of use	3.7	92%	Very good
3	Consistency	3.3	83%	Very good
4	Usability	3	75%	Good
5	Graphic	3.2	80%	Very good
Mean score		3.2	81%	Very good

Table 5 shows the evaluation result of volleyball learning media conducted by media experts on the developed volleyball learning media which shows a mean score of 3.2 with a percentage value of 81%, making the e-modules categorized as a very good product or feasible to use with revision. The revision found by the researchers is letter writing on the E-module especially in the title section which must be the same size. The placement of the circle element on the profiled slide should be more aesthetically pleasing or beautified. After revising the volleyball learning media product, the revision 1 (first) learning media application product was produced which was then tested for validation by media experts again.

Table 6. Media expert validation stage 2.

No	Aspect	Mean score	Percentage	Category
1	Screen design appearance	3.7	93%	Very good
2	Ease of use	3.8	96%	Very good
3	Consistency	3.7	92%	Very good
4	Usability	3.3	81%	Very good
5	Graphic	4	100%	Very good
Mean score		3.7	92%	Very good

Table 6 shows media expert validation at stage 2. Based on Table 6, the assessment of volleyball learning media conducted by media experts on the e-module shows a mean score of 3.7 with a percentage value of 92%. It means that the e-module can be categorized as a very good product suitable for use after revision.

4.4. Implementation

After the volleyball learning media was finished and validated by the experts. Then volleyball learning media was implemented in the real teaching process for teaching the seventh-grade students of Talawi 1 Public Junior High School which consists of 29 students. Students responded to the e-module based on the presentation of

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content feasibility, linguistic usability and graphical aspects. According to the findings of the distributed questionnaire, students gave highly positive assessments of the constructed e-modules as shown in Table 7.

Table 7. Student responses after the trial.

No	Aspect	Mean score	Percentage	Category
1	Screen design appearance	3.5	86 %	Very good
2	Ease of use	3.4	87 %	Very good
3	Consistency	3.3	87 %	Very good
4	Usability	3.3	85 %	Very good
Mean score		3.4	86 %	Very good

4.5. Evaluation

The researchers evaluated the effectiveness of the e-module on students' understanding and bump pass skills. The evaluation was conducted using quasi-experimental research with a post-test-only control group design. The researchers selected two seventh-grade students using a statistical matching technique. The control group was taught using printed materials owned by the school while the experimental group was taught using the developed e-module. After four meetings, the researchers gave a post-test to the two groups to measure the understanding and skills of the bump pass in each group of students.

4.5.1. Descriptive Statistics Results

The descriptive statistical test results between the two groups showed differences whereas the experimental group had higher results than the control group. This can be seen from the mean scores of students in the experimental group which were higher than students in the control group. In addition, the minimum and maximum scores' results also show that the experimental group's value was higher than that of the control group. The comparison of the descriptive statistical test results from the control and experimental groups can be seen in Table 8.

Table 8. Descriptive statistics results.

Descriptive	Control	Experiment
Mean	69.04	72.53
Median	69.00	72.50
Mode	65.00	75.00
Std. deviation	5.51	6.99
Variance	30.39	48.95
Range	18.00	23.00
Minimum	60.00	62.00
Maximum	78.00	85.00
Sum	2002.00	2176.00

An independent t-test was used to examine whether the differences in students' knowledge and bump pass skills between the control and experimental groups were significant. The researchers conducted normality and homogeneity tests before conducting the independent t-test. The results are explained below.

4.5.2. Normality Test

The normality test is a prerequisite test that must be carried out before conducting an independent t-test. The researchers conducted a normality test using Kolmogorov-Smirnov and Shapiro-Wilk calculations. The data is normally distributed if the value of Sig. for Kolmogorov-Smirnov and Shapiro-Wilk calculations is > 0.05 (Pallant, 2011). According to the normality test results, the data from the control and experimental groups are normally distributed (see Table 9). This can be seen from the Sig. from the Kolmogorov-Smirnov and Shapiro-Wilk calculations for the control and experimental groups. It is proven to be > 0.05.

Table 9. Normality test results.

Group	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Experiment	0.083	29	0.200	0.956	29	0.261
Control	0.113	29	0.200	0.945	29	0.132

4.5.3. Homogeneity Test

Furthermore, the researchers continued the test with the homogeneity test. The homogeneity test used Levene statistics where the data is assumed to be normally distributed if the sig. > 0.05 (Pallant, 2011). It can be inferred that there was homogeneity between the control and experimental groups due to a sig. from the Levene statistic greater than 0.05 based on the data presented in Table 10.

Table 10. Homogeneity test results.

Levene statistic	df1	df2	Sig.
2.531	1	57	0.117

4.5.4. Independent T-Test

The researchers continued the analysis using an independent t-test. The data is statistically different if the sig. from the independent t-test is < 0.05 (Pallant, 2011).It was found that the sig. (two-tailed) < 0.05 based on the results of the independent t-test conducted for data from the control group and experimental group. The result of the analysis shows that the difference in understanding and bump pass skills between the control and experimental groups was significantly different. In other words, the experimental group had significantly higher bump pass ability than the control group after they were taught using the e-module. The results of the independent t-test can be seen in Table 11.

Table 11. Independent t-test results.

Dependent variable		t-test for equality of means						
		t	Df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
							Lower	Upper
Passing skill	Equal variances assumed	-2.129	57	0.038	-3.499	1.644	-6.790	-.208
	Equal variances not assumed	-2.137	54.802	0.037	-3.499	1.637	-6.780	-.218

4.5.5. Effect Size

The researchers carried out further analysis to determine the effect size which shows how much the e-module has affected seventh-grade students' comprehension and boost bump pass skills. Researchers used Cohen's d formula to calculate the effect size in this study. The calculation of the effect size using the Cohen's d formula found that the Cohen's d of the data analyzed was 0.56. Therefore, the effect size of the e-module on comprehension and bump pass skills falls into a moderate category based on Cohen (1988) criterion (see Table 2).

$$\text{Cohen's } d = (M_2 - M_1) / SD_{pooled}$$
$$= (72.5333 - 69.0345) / 6.298362$$
$$= 0.55551$$

It is clear from the preceding independent t-test and descriptive statistics results that the e-module has a beneficial impact on students' comprehension and improves bump pass abilities. This finding is supported by the results of previous studies which also show that using e-modules can increase student understanding. Research conducted by Logan, Johnson, and Worsham (2021) found that e-modules were proven to help students learn more effectively and improve student achievement. In addition to increasing understanding and learning achievement, the application of e-modules can also help students improve their skills in doing specific jobs (Ruehter et al., 2012; Winatha & Abubakar, 2018) due to the advantages of e-modules which can be equipped with various facilities that make it easier for students to learn, such as audio, video tutorials and quizzes (Dewi, Zaim, & Rozimela, 2022). The availability of these diverse resources makes education more engaging which increases student motivation to learn and improves student learning results (Liao & Wu, 2023; Saed, Haider, Al-Salman, & Hussein, 2021; Yenny, Delita, Sidauruk, Elfayetti, & Herdi, 2022).

5. Conclusion

According to the study's findings, seventh-graders at Talawi State Junior High School 1 had difficulty acquiring the bump pass skill as the only available teaching resource was a printed book which made it unappealing. They need learning media with colorful pictures, videos, and electronic quizzes that can be played live through smartphones. Thus, e-modules are the right choice to solve students' problems and meet their needs. The results of the e-module feasibility test show that the e-module has high eligibility to be used as a bump pass learning medium. In addition, e-modules have also proven to help students understand and improve their bump pass skills. However, it is essential to perform additional research with larger samples because this study was limited to one school and two groups. This is important to ensure the results of this study can be generalized to a larger population and are ready for mass use.

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