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E-MODUL DEVELOPMENT FOR SPREADSHEET SUBJECTS

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Abstract: *The aim of this research is to produce an interactive e-modules for spreadsheet subjects. This research uses a research and development approach by adopting the Borg and Gall development model. The research subjects were students of class X Accounting and Finance. The results show that the flipbook-based interactive e-module is very good to use, with validation test results for media experts at 81.3%, material experts at 88%, and students at 82.8%. Apart from that, there is a significant difference in the use of interactive e-modules, as seen by an increase in the total mean score of the posttest which is higher than the pretest. Therefore, the existence of a flipbook-based e-module as a learning media is very effective and suitable for use in supporting the spreadsheet learning process.*

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INTRODUCTION

The development of ICT can be implemented in various areas of life, including of education (Oktarina et al., 2021). The existence of technology in learning creates effectiveness in the learning process, efficiency of study time, and ease of understanding the material (Kisworo et al., 2022). The education system has experienced significant developments, especially in the continuity of learning (Sumardi et al., 2021). Supporting factors for student success include learning media, materials, learning environment, learning facilities, and teacher competency (Shetu et al., 2021).

In the learning process, teachers can integrate the use of technology by switching from conventional to modern methods (Qodr et al., 2021). This is reinforced by Ghory & Ghafory (2021) stating that teachers use technology to produce the development of innovative learning media. Apart from that, it is important to choose the right teaching methods and materials according to students' interests to create a positive learning environment (Hendy, 2020; Sriwahyuni et al., 2019). Technology has an important role in supporting digital literacy because students who are able to master technology will understand learning easily (Purnama et al., 2022) so students can access information more quickly (Abdoh, 2022).

E-modul dapat diartikan bahan ajar non cetak dalam bentuk digital yang dikemas untuk mendukung tujuan pembelajaran (Panggabean et al., 2022). Keberadaan e-modul berdampak besar karena proses pembelajaran tidak hanya bergantung kepada guru sebagai perantara menyampaikan

informasi (Priantini & Widiastuti, 2021; Wijaya & Jumadi, 2021). Pemanfaatan e-modul membantu siswa berpikir kritis dan menumbuhkan kreativitas sehingga proses pembelajaran menjadi lebih aktif dan inovatif (Liu et al., 2021). E-modul interaktif merupakan pilihan yang cocok dalam memotivasi siswa karena dilengkapi dengan gambar, animasi, video, dan fitur interaktif lainnya (Linda et al., 2020; Nisa et al., 2020). Umumnya, e-modul ditampilkan dalam bentuk pdf agar lebih mudah diakses (Rahmatika et al., 2020).

E-modules can be interpreted as non-printed teaching materials in digital form that are packaged to support learning objectives (Panggabean et al., 2022). The existence of e-modules impacts the learning process as an intermediary in conveying information (Priantini & Widiastuti, 2021; Wijaya & Jumadi, 2021). The use of e-modules helps students think critically and foster creativity so that the learning process becomes more active and innovative (Liu et al., 2021). Interactive e-modules are a suitable choice for motivating students because they are equipped with images, animations, videos and other interactive features (Linda et al., 2020; Nisa et al., 2020). Generally, e-modules are displayed in pdf format to make them easier to access (Rahmatika et al., 2020).

Observation results at SMK PGRI 2 Malang show that the majority of class X AKL students have difficulty memorizing Microsoft Excel formulas. Theoretical learning is still taught to help students understand the concepts in these subjects (Noviar & Suciono, 2013). But, teacher uses conventional learning methods and printed books as a resource. This is confirmed by Fahmi et al (2019) who stated that reference teaching materials only focus on textbooks without any teacher innovation in compiling teaching materials. According to Lestari (2020), learning is increasingly developing with the availability of updates in the delivery of learning materials. Considering this, spreadsheet subjects require innovation by adapting to student learning needs. The development of e-module teaching materials is a form of innovation that makes learning easier (Lestari et al., 2022). This is reinforced by Kuncoro & Arigiyati (2020) stating that e-modules can help students learn in their own way and achieve the expected competencies, if they are packaged in comprehensive learning units.

This paper offers an interactive e-modules based on flipbook to support the learning process. In line with research by Kusumawati et al (2022), teachers can create electronic teaching materials in the form of e-modules to create effective learning. It will motivate students to minimize the use of computers or laptops because they can be accessed via smartphones (Ramirez & Mercado, 2019). According to Daryono & Rochmadi (2020) and Marnah et al (2021), flipbook-based interactive e-modules are innovative teaching materials in the digital era. Other research by Latifah et al (2022) and Prasetya et al (2021) supports the effectiveness of e-modules in increasing students' interest in learning, with validation from media and materials experts showing high levels of validity, practicality and effectiveness. Also, Saraswati et al (2019) and Sagala & Widyastuti (2022) added that e-modules are valid and practical based on assessment of learning design, content substance, visual communication, software utilization, as well as positive responses from teachers and students.

The existence of e-modules can be used by students as a learning media. In line with constructivist learning theory which has an understanding of learning that prioritizes processes rather than results (Santosa et al., 2017). This theory is very relevant as an innovative learning method in creating more meaningful learning (Aghni, 2022). In practice, students are able to produce creative ideas, participate in expressing their opinions, and develop an interest in learning (Harefa, 2020). In constructivism theory, teachers only act as facilitators to help students increase their knowledge (Fitriasari & Ningsih, 2021; Mustafa & Roesdiyanto, 2021).

The purpose of the study is to develop an e-Modul for Spreadsheet subjecs. The contents include (1) operating a number processing program package; (2) enter and process data based on cell characteristics; (3) processing data with number processing program functions. This module is created in a comprehensive learning unit which contains a cover display, foreword, table of contents, instructions for using the module. Furthermore, chapters 1 to 3 consist of a cover containing learning objectives, materials, summaries, competency tests, remedial and enrichment questions, as well as a glossary and bibliography included at the end of each chapter.

LITERATURE REVIEW

Tecahing Materials

Teaching materials can be defined as materials that are arranged systematically and complexly used in learning by teachers and students referring to learning principles (Haftador et al., 2021; Sah et al., 2023; Sekaryanti et al., 2022). Teaching materials can also be interpreted as learning tools whose application is used by students to obtain additional knowledge according to the needs of the learning material (Darmaji et al., 2020). This is confirmed by Safitri et al (2023) who stated that packaging teaching materials in complex designs to make learning activities inside and outside school effective and efficient because learning is carried out individually and in groups. Learning objectives will be achieved by using teaching materials by teachers (Fauza et al., 2022; Sugianto et al., 2022).

The availability of teaching materials is one of the successes of learning effectiveness in education. This is confirmed by Liu et al (2021) who argue that the connection between the environment and adequate teaching materials will create more meaningful learning. Apart from that, the use of teaching materials has a very important role because it contains a set of learning materials that can create a pleasant learning atmosphere (Darmayanti et al., 2022; Efendi et al., 2020). With this teaching material, the teacher's role as a facilitator will run optimally (Asrial et al., 2021; Rasmawan, 2018). The teacher's role is important in determining the selection of teaching materials to help students understand the subject matter (Oktarina et al., 2021).

E-Modul

Electronic modules can be used to motivate student learning activities (Hamid. et al., 2020; Istiqomah et al., 2019; Noer et al., 2021). E-modules can be defined as non-printed teaching materials in digital form to help students learning (Musawi, 2020; Panggabean et al., 2022). With the e-module, the learning process does not only depend on the teacher as a mediator in conveying information (Priantini & Widiastuti, 2021; Wijaya & Jumadi, 2021). E-modules can also be interpreted as teaching materials designed in comprehensive learning units so that students can learn independently to master the expected competencies (Sirate & Ramadhana, 2017). In practice, the electronic version of the module can be accessed via laptop, computer and smartphone (Handayani et al., 2021; Ramirez & Mercado, 2019; A. Safitri et al., 2021).

E-modules can support the continuity of learning by facilitating teachers and students according to needs (Nurhasnah. et al., 2020; Yaniawati et al., 2021). E-modules are created according to needs and presented in various formats (Sriyanti et al., 2021). The advantage of e-modules is that they are equipped with various features including video, audio and other interactive features, thereby increasing their appeal for students (Linda et al., 2020; Nisa et al., 2020). To achieve learning objectives, learning can be structured through the use of e-modules which contain methods, learning materials and learning evaluation materials (Elvarita et al., 2020; Romayanti et al., 2020; Sa'diyah, 2021). A good e-module has five characteristics, namely self-instruction, self-contained, stand alone, adaptive, and user-friendly. Thus, the innovation of e-modules is seen from the presentation of complex learning material and gives a positive impression (Aufa et al., 2021).

Flipbook-based e-modules can be described as comprehensive learning units that help students carry out all learning activities (Riyanto et al., 2020; Wijaya & Jumadi, 2021). This software has the advantage of providing an attractive display like reading a printed book where you can open or turn page by page (Ladamay et al., 2021; Mertayasa et al., 2022). Flipbook maker has various interesting features where it can insert videos, images, text, audio, hyperlinks and other features to support learning material (Nufus et al., 2020; Permata et al., 2021). The existence of various interesting features will make it easier for students, which are also supported by explanatory videos and images that have been included in the e-module (Khasanah & Nurmawati, 2021). This was confirmed by Fitriyani & Hunaepi (2016) who stated that the development of e-modules that use electronic devices such as smartphones and are equipped with video and audio can facilitate students in supporting learning.

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METHOD

This research is classified as research and development using Borg and Gall's model. Borg and Gall's (1983) development model stages include (1) research and information collecting; (2) planning; (3) develop preliminary form of product; (4) preliminary field testing; (5) main product revision; (6) main field testing; (7) operational product revision; (8) operational field testing; (9) product revisions; and (10) dissemination and implementation. Researchers used 9 of the 10 steps proposed by Borg and Gall because of limited time.

The research and information collecting stage aims to collect information on needs and facts to overcome problems that occur in the field. Researchers collected information regarding the methods used by teachers in learning, student characteristics, and the use of teaching materials to support the learning process. Based on this information, researchers will identify the potential for developing flipbook-based interactive e-modules using the Borg and Gall model.The planning stage begins with reviewing the syllabus to adapt the Independent Curriculum's KI and KD, reviewing books and other relevant reference sources, designing an e-module product design framework, collecting background and images, selecting examples of questions and assessments related to KD, as well as several elements that support the creation e-module. The product development stage aims to develop products for spreadsheet subjects, especially class X AKL in the form of flipbook-based interactive e-modules. The drawing design and e-module design are guided by KD which combines all elements at the planning stage into one complete unit. Product validation involves media experts and material experts using questionnaire techniques. Responses and suggestions from the two experts are taken into consideration for product revisions. Revision activities are carried out by media and material experts, if there are discrepancies in terms of the appearance of the media and material. After being revised, the product was tested again involving students as media users.

The limited trial involved 23 class X AKL students to determine interest in the product being developed. Students are directed to access the flipbook-based e-module and then fill out the questionnaire that is distributed. Revision activities are used as a basis for improving the product according to problems that arise and suggestions submitted by students through questionnaires. The field testing aims to determine the level of effectiveness of the product developed for 23 class X AKL students. Starting with the researcher briefly presenting how to use and the contents of the e-module. Students try to use the e-module on their respective cellphones. Students get pretest questions before carrying out the learning and posttest questions in the form of a practice exam after learning. To test the feasibility of the product through validation by media experts, material experts, and students. Meanwhile, the effectiveness test using the t-test is used for pretest and posttest data. The normality test is carried out before the t-test to determine the distribution of the data. The t-test hypothesis is H_0 (there is no significant difference between learning without and with e-modules) and H_1 (there is a significant difference). The decision is taken by comparing the calculated t with the t table and the P value, the significance level is 5%. If the calculated t <t table or $P \geq 0.05$, H_0 is accepted; if t count > t table or $P \leq 0.05$, H_1 is accepted. Data were analyzed using SPSS software.

RESULTS AND DISCUSSION

The results of observations and interviews with teachers at SMK PGRI 2 Malang showed that students had difficulty memorizing Microsoft Excel formulas, were still limited to printed books, and there was no special module for spreadsheet subjects. Researchers reviewed that teachers were still implementing conventional learning methods seen during the Teaching Assistance program and teaching in class X AKL. Research by Siahaan et al (2023) stated that in conventional learning

methods, students only rely on teacher explanations (lectures). To overcome this problem, the Borg and Gall model was chosen as an effective integrated handling effort.

The planning stage begins with creating a product design framework using Adobe Photoshop and Canva applications. Increasing student creativity can be developed through the use of Canva and Adobe Photoshop (Bangun et al., 2024; Hapsari & Zulherman, 2021). By using Canva, students can add images, text, graphics, and so on based on the expected appearance (Tanjung & Faiza, 2019). Researchers make application planning starting from the cover display, foreword, table of contents, instructions for using the module. Furthermore, from chapters 1 to 3 consisting of material, summaries, competency tests, remedial and enrichment questions, and a glossary and bibliography are included at the end of each chapter. E-modules are designed using video tutorials, audio, images, and excel/quizizz. As explained by Tanama (2023), generally e-module components contain a cover, introduction, table of contents, videos or images, instructions, learning content design, learning objectives, descriptions of learning content, and practice questions.

At the development stage, the researcher created application components to make it easier for students to learn spreadsheet subjects. Adobe Photoshop and Canva applications are used to combine product design frameworks. Then the e-module design is saved in pdf format and the addition of video, audio, image, and excel/quizizz link features using the heyzine flipbook application. Saraswati et al (2021) stated that there are various features in the heyzine flipbook application including images, links, audio, video. The following is a display of the flipbook-based e-module:

Gambar 1. Cover

Gambar 2. Forward

Figure 1 shows the cover of the flipbook-based e-module containing 1) Logos of SMK Bisa-Hebat, SMK PGRI 2 Malang, and UM; 2) Title of the e-module; 3) Name of the e-module creator "Fara Eldina Fajjahdiyanti"; and 4) Several images to add to the appeal. Mutmainnah (2021) explains that the use of images can foster student interest. Figure 2 is a display of the foreword containing words of thanks, the purpose of creating the e-module, to the author's criticism and suggestions.

Gambar 3. Table of content

Gambar 4. Instuction

The table of contents of the e-module is shown in Figure 3, including 1) Foreword; 2) Table of contents; 3) Instructions for using the module; 4) Chapter 1 operates the numerical processing program package, chapter 2 enters and processes data based on cell characters, and chapter 3 processes data with numerical processing program functions where each chapter consists of material

content, summary, competency test, practical questions, remedial questions, and enrichment questions. At the end there is a glossary and bibliography. Figure 4 is a display of the module usage instructions containing information on the stages that need to be considered in using the e-module. Research by Ardelia et al (2022) explains that students can represent how to access the e-module in its entirety through the module usage instructions.

Gambar 5. Cover of chapter 1

Gambar 6. Cover of chapter 2

Gambar 7. Cover of chapter 3

Figures 5, 6, and 7 are the cover displays for chapters 1-3 where each chapter includes 1) Chapter title; 2) Learning objectives; and 3) Core competencies adjusted to the independent curriculum where researchers use Core competencies 3.1 to 3.10. The initial description of the contents of chapters 1-3 contains 1) Initial competencies include trigger questions to encourage students' thinking activities. According to Maulida (2022), initial competencies include knowledge and skills that are very important in supporting the learning process; 2) Sub-chapters points A, B, C and so on which are further described into points 1, 2, 3 and so on; 3) There are texts and images related to the learning material shown in figures 8,9,10.

Gambar 11. Tutorial video

Figure 11 is a display of images and video tutorials taken as an example in chapter 1, where each stage of the spreadsheet is supported by images related to the learning material and video tutorials which when clicked are integrated with YouTube. Students can access videos without time

limits (synchronous) through the YouTube platform (Imawan et al., 2021; Kusumandyoko et al., 2020). Users can practice each step explained in the video easily because it is accompanied by audio explanations.

Gambar 12. Summary

Gambar 13. Competence test

Figure 12 shows a brief summary of all the material described by making points to make it easier for students to understand the learning material, the image is taken as an example from chapter 1. Figure 13 is a display of a competency test containing practice questions in the form of 10 multiple-choice questions. Students can use multiple-choice questions to assess the cognitive ability domain (Aspriyanti et al., 2022). The questions are taken from books and reference sources relevant to the chapter, with five answer choices a, b, c, d, and e.

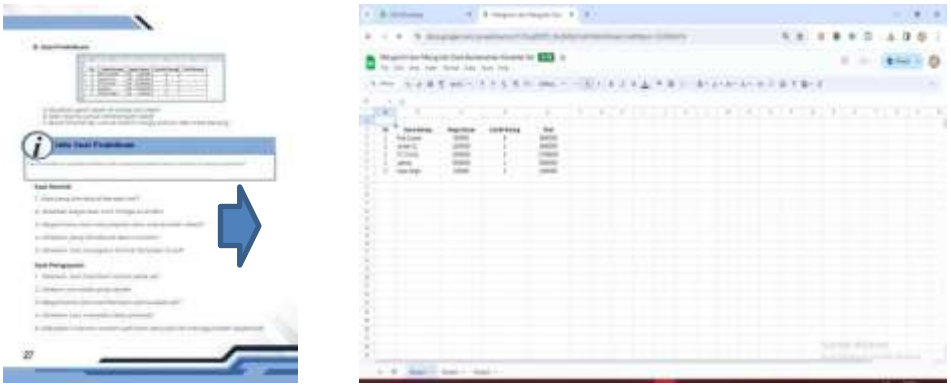
Gambar 14. Remidial qustions

Figure 14 is a display of remedial and enrichment questions taken as an example of chapter 1 containing 5 essay questions each. Remedial questions are intended for students who have not reached the minimum required standard. Meanwhile, enrichment questions are intended for students who have achieved completeness and above average scores (Apriansyah et al., 2023).

Gambar 15. Tampilan *Quizizz*

Figure 15 is a display of quizizz where when the user clicks on the empty part of the competency test box in figure 14, it is integrated into quizizz. At the bottom it says waiting for players

to join the game. The system will display the names of students who join if there are students who join. Students can access the quizizz link if all students have logged in. Teachers can start the quiz by clicking the start button (Fazriyah et al., 2020). Multiple-choice quizizz questions are considered more objective and representative of the content of the material (Zaenal, 2016).



Gambar 16. Practical questions

Figure 16 is a display of practical question info taken from chapter 2 containing practice questions in excel format that emphasize practical learning. In the practical question info box, there is an empty section, so when clicked, it is integrated into excel which contains practice questions related to the learning material. Users can work on practice questions according to the instructions in the practical questions. The advantage of Microsoft Excel is that it makes it easier to manage data so that it becomes more effective (Kania & Irawan, 2021).

The product validation stage involves media and material experts to determine the feasibility of the product (Yuberti et al., 2021). Mr. Farit Mahmudi, S. Kom, Teacher of SMK TI Pelita Nusantara as media validation is measured from the assessment of media experts (table 1), where the media developed has advantages in 3 aspects including: 1) The technical quality aspect has a clear background, object size and font, cover and relevance of the material, and the usefulness of the e-module features; 2) The image and video aspects have color harmony, verbal information, clarity of image content and navigation buttons, and ease of video access; 3) The media usage aspect has ease of operating the e-module, is interactive, has varied designs, clear instructions for use, and media benefits. This is supported by comments from the media expert validator "By using the Flipbook format, learning becomes more interactive and interesting, increasing student engagement. This suitability reflects a positive effort in utilizing technology to enrich the learning experience in spreadsheet subjects."

Table 1. Validation of media

No	Assessment aspects	Presentase	Category
1	Technical Quality Aspects	80%	Valid
2	Image and Video Aspects	84%	Very Valid
3	Media Usage Aspects	80%	Valid
	Total (%)	**81,3 %**	**Very Valid**

Resource : Data of research (2024)

As stated by Akbar (2017) that with a validation score above 61.00%, the developed product is said to be feasible. The results of media validation are shown in table 1 which shows a percentage of 81.3%. This shows that the interactive e-module based on flipbooks for spreadsheet subjects is very effective in helping the spreadsheet learning process. Validation of the material by Mrs. Pratiwi, S. Pd, a spreadsheet subject teacher at SMK PGRI 2 Malang has advantages in 3 aspects including: 1) The aspect of the feasibility of content and objectives has material relevance to the curriculum, the material is relevant to CP, the learning objectives are appropriate, the material is coherent, and the excel practice questions are relevant to the material and learning objectives; 2) The technical quality

aspect has clear image content, relevance between video and CP, ease of language, clarity of material, and easy to read; 3) The aspect of the feasibility of the display has a clear background, object size and font, cover and relevance of the material, and the usefulness of the e-module features:

Table 2. Validation of materials

No	Aspek penilaian	Presentase	Kategori
1	Aspects of Content	80%	Valid
2	Technical Quality Aspects	100%	Very Valid
3	Display Eligibility Aspect	84%	Very Valid
	Total (%)	**88%**	**Very Valid**

Resource: Research (2024)

In table 2, the results of the material validation obtained a percentage of 88%. Thus, the interactive e-module based on flipbooks on spreadsheet subjects is very valid to be implemented in supporting the spreadsheet learning process.

The revision activity was carried out based on comments from the material expert validator stating that "The flipbook-based e-module media provides an interesting nuance for spreadsheet learning among students. However, the term KD was changed to CP."

Before	After
	
	

The limited trial stage involved 23 students of class X AKL SMK PGRI 2 Malang in order to obtain responses from students on the use of interactive e-modules based on flipbooks. In table 3, the results of the student response questionnaire obtained a percentage of 82.8% indicating that the e-module is very valid to be implemented in supporting the spreadsheet learning process.

Tabel 3. Hasil Angket Respon Siswa untuk E-Modul Interaktif Berbasis Flipbook

No	Assessment aspects	Presentase	Kategori
1	Aspects of Material Presentation	80%	Valid
2	Aspect of Interest	85%	Very Valid
3	Technical Quality Aspects	84%	Very Valid
4	Instructional and Interactive Aspects	82%	Very Valid
Total (%)		**82,8%**	**Very Valid**

Resource: Data of research (2024)

Before	After
Give an example for chapter 2 page 20	
	

The effectiveness test was conducted on 23 students of class X AKL. The aim was to obtain the difference in value between e-module-based learning and without e-modules. Using a one-sample t-test, the effectiveness test was conducted to compare the pretest and posttest values (Pujiyanti et al., 2021). The instruments tested in the pretest and posttest were in the form of practical exams that included learning outcomes. The researcher took an example of chapter 1 in KD 3.1 Implementing a number processing program package which began with the stage of starting a spreadsheet where

students were asked to practice according to the stages explained in the module. To make it easier to do it, students can study the material through the video tutorials that have been provided.

After testing the normality of the data, the researcher conducted a t-test. The results of the pretest and posttest data normality tests were normally distributed, with a sig value of 2.00 greater than 0.05 shown in table 4. Thus, the tabulated data showed a normal data distribution.

Table 4. ***One-Sample Kolmogorov-Smirnov Test***

		Pretest	Posttest
N		23	23
Normal Parame	Mean	56.1304	79.2609
	Std. Deviation	6.51086	6.85046
Most Extrem Differe	Absolute	0.107	0.09
	Positive	0.107	0.074
	Negative	-0.048	-0.09
Test Statistic		0.107	0.09
Asymp. Sig. (2-tailed)		**.200**[c,d]	**.200**[c,d]

The t-test obtained a sig value of .000 less than 0.05. The data is stated as significant, indicating that there is a real difference between the pretest and posttest values. The increase can be calculated by comparing the total average value between the pretest and posttest.

Table 5. *One-Sample T-Test*

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pretest	41.345	22	0	56.13043	53.3149	58.9459
Posttest	55.488	22	0	79.26087	76.2985	82.2232

The interactive e-module based on flipbook has been tested for validity and stated that there was no improvement after the product was revised. This is indicated by the percentage of media validation of 81.3%, material expert validation of 88%, and student validation of 82.8%.

Media and material experts have provided positive validation to support the development of interactive e-modules based on flipbooks for spreadsheet subjects. Ease of access to learning materials for teachers and students through user-friendly e-module designs (Haftador et al., 2021). To analyze pretest and posttest data, researchers used a one sample t-test obtained a significance value of .000 less than 0.05. This shows that there is a significant difference in the use of e-modules. The increase is also seen from the average total posttest score (79.2) which is higher than the pretest (56.1). In spreadsheet learning, the existence of interactive e-modules based on flipbooks offers many advantages. E-modules have a flexibility aspect which ensures that all students can learn anytime and anywhere (Sekaryanti et al., 2022). E-modules cover all the material that must be achieved by students to ensure that all competencies and learning objectives are met comprehensively. The use of e-modules also supports the development of critical thinking skills and student creativity, and facilitates the use of technology in supporting digital literacy (Belia et al., 2022). Overall, the e-module contributes to a more innovative and meaningful learning environment, in line with the principles of constructivism that emphasize students' active learning process (Lubis et al., 2022; Wijaya & Jumadi, 2021). Constructivism theory emphasizes the learning process where students build knowledge through experience and interaction with the environment (Riyanto et al., 2020).

The interactive flipbook-based e-module for class X Accounting and Finance of the Institution supports the principles of constructivism by providing a learning environment that allows students to become active, independent learners, and able to develop knowledge through interaction with learning materials presented digitally and interactively. Thus, this e-module is able to facilitate independent learning in accordance with the principles of constructivism that emphasize problem solving

CONCLUSION

This e-module is designed to increase student interest by being packaged attractively and easily accessible in digital format, as well as a user-friendly interface. The material presented in the e-module is in accordance with the expected competencies and supports student independent learning in accordance with the principles of constructivism. The use of e-modules also supports the development of critical thinking skills and student creativity, and facilitates the use of technology in supporting digital literacy. Overall, e-modules contribute to a more innovative and meaningful learning environment.

The results of research and development conducted at SMK PGRI 2 Malang show that interactive e-modules based on flipbooks for spreadsheet subjects have proven effective and are very feasible to use. This is indicated by the percentage of media validation results of 81.3%, material expert validation of 88%, and student validation of 82.8%. In addition, there was an increase in student learning outcomes in terms of pretest (56.1) and posttest (79.2) values using the t-test, there was a significant difference.

Research and development of interactive e-modules based on flipbooks on spreadsheet subjects are still limited to basic materials such as operating numerical processing program packages, entering and processing data based on cell characters, and processing data with numerical processing program functions due to time constraints. Further researchers are expected to be able to present more complex materials ranging from basic materials to accounting cycle applications through the development of interactive e-modules based on flipbooks.

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