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A Study for Student Perception of Mathematical Physics E-Module Based on Gender

Astalini[1], Darmaji[2], Dwi Agus Kurniawan[3], Diki Chen[4], Riska Fitriani[5], Mashelin Wulandari[6], Shella Maryani[7], Nadia Natalia Simamora[8], Auliya Ramadhanti[9]

[1]*Universitas Jambi, Indonesia, astalinizakir@unja.ac.id, ORCID ID: 0000-0002-8050-0659*
[2]*Universitas Jambi, Indonesia, ORCID ID: 0000-0002-0130-2436*
[3]*Universitas Jambi, Indonesia, ORCID ID: 0000-0002-4020-3051*
[4]*Universitas Jambi, Indonesia, ORCID ID: 0000-0003-2253-7178*
[5]*Universitas Jambi, Indonesia, ORCID ID: 0000-0002-5669-0659*
[6]*Universitas Jambi, Indonesia, ORCID ID: 0000-0002-9552-6827*
[7]*Universitas Jambi, Indonesia, ORCID ID: 0000-0002-5043-4830*
[8]*Universitas Jambi, Indonesia, ORCID ID: 0000-0003-2654-6514*
[9]*Universitas Jambi, Indonesia, ORCID ID: 0000-0001-5652-2404*

ABSTRACT
The purpose of this study was to find out how the differences in perceptions and learning outcomes of physics education students of the Faculty of Teacher Training and Education Jambi University on the e-module Mathematics Physics I which were reviewed based on gender differences. The type of used research design is quantitative with survey research. The instrument used in this study was a questionnaire of perceptions and learning outcomes of the Likert type scale with 4 answer choices as a data collection tool. The data is analyzed by using descriptive statistics in terms of mean, median, mode and percentage. The data is also analyzed through statistic inferential by performing assumption tests (normality test and homogeneity test) and hypothesis testing (one-way ANOVA test followed by Tukey's further test) and simple linear regression hypothesis testing. Sampling was performed by purposive sampling technique, namely as many as 289 physics education students of the Faculty of Teacher Training and Education Jambi University. The result of this study is that there is a difference between student perceptions and learning outcomes based on gender on the E-Module Mathematics Physics I. Students with male gender are higher than female students because male students have high interest and interest in Mathematics Physics I. The results of this study are expected to contribute to educators in order to identify related perceptions and learning outcomes that students have of the learning media to further improve the quality of learning for the better.

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Introduction

Please Information and Communication Technology (ICT) is considered as one of the fastest growing modern device industries in the world today (Sakil, 2018; Wrahatnolo & Munoto, 2018; Oguguo et al., 2020). Advances in ICT have developed and penetrated so widely in various fields of life (Dadashpoor & Yousefi, 2018; Fitriyana, Wiyarsi, Ikhsan, & Sugiyarto, 2020). In fact, ICT has become a trend and is inseparable in our daily life (Kayode & Olaronke, 2014; Gustavsson, Ytterberg, Nabsen Marwaa, Tham, & Guidetti, 2018). With the rapid development of these technologies, it is necessary to realize the technology of using smartphone as a form of technological progress (Xu et al., 2018). To date, technological advances have been numerous and very complex (Haluza & Jungwirth, 2018; Li, 2018; Mora-Luis & Martin-Gutierrez, 2020). Technological advances certainly have an impact on various fields of human life. One area that is impacted by technology is education.

Education is basically a process of personal experience that is carried out consciously and can change individual behavior (Adeniji et al., 2018; Ratnasari et al., 2018; Zorluoğlu et al., 2019). The development of information technology has become popular and has become one of the main pillars of learning and development facilities in the 21st century (Chen et al., 2017; Miskiah et al., 2019; Qurat-ul-Ain et al., 2019). Achievements in educational institutions also require qualified, adaptive, and skilled human resources (eg educators) to respond to changing times (Khasanah et al., 2017; Mallart et al., 2018; Setiawan et al., 2020). In this case, the teacher plays a role in processing the use of digital technology. So that, education in an area can develop according to the times (Yetkinel & Çolak, 2017; Fransson et al., 2019; Uge et al., 2019). Because it is undeniable that significant technological developments in the field of education have affected each individual's learning style and created new difficulties for educators (Tang & Yu, 2018; Chetty et al., 2019; Mora-Luis & Martin-Gutierrez, 2020). So, it takes the use of technology that can provide new innovations in teaching and learning activities. This innovation can be accomplished in many ways, such as the use of learning media.

One of the interactive learning tools that can support the learning process is the media. Learning media are currently divided into print media (traditional) and electronic media (Zhang et al., 2018; Abed, 2019; Suparmi et al., 2020). However, the use of learning media in electronic form can help the learning process become more effective and efficient which can improve students' abilities (Qi, 2018; Asrowi et al., 2019; Septiani et al., 2020). In the development of the new media era, learning has an open and diverse environment (He, 2017; Chen et al, 2018; Huang, 2018). The use of instructional media needs to be analyzed to adjust the effectiveness of the implementation and development of students' skills (Zhalgasbekova et al, 2018; Wei et al, 2018; Anwar et al, 2019). With the advantages and benefits of media, especially in electronic form, it is hoped that students can freely express themselves through the media used by educators (Erdem & Eristi, 2018; Hussain & Cakir, 2018; Anagün, 2018). One of the media that can support the activities of the learning and teaching process is teaching materials.

Teaching materials are the form of implementation for using information technology that can improve the quality of education and facilitate teaching (Wang et al., 2018; Noer et al., 2021; Hendri & Anwar, 2019). Teaching materials serve as learning resources for students to get information in understanding learning concepts that can be presented in various forms (Teo et al., 2018; Chen et al., 2018; Widarti et al., 2020). In addition, some teaching materials designed by teachers can concretize abstract knowledge. So that, it is interesting and can sharpen students' skills and communication (Alhmadi, 2019; Ozdamli & Ozdal, 2018; Vural & Vural, 2020). Due to the lack of precise selection of teaching materials can affect student understanding and learning outcomes. Therefore, improvements and strategies are needed which can help the learning process to provide maximum results (Cammarata & Haley, 2018; Mutmainah, Rukayah, & Indriayu, 2019). Teacher as the main figure to be able to design alternative learning as a solution to update the form of language teaching such as electronic, 3D, video, and others (İbili et al., 2020; Karagöz & Rüzgar, 2020). One alternative that can be used to overcome this is to use teaching materials in the form of electronic modules or e-modules.

E-modules are teaching materials with media as intermediaries in delivering learning materials. Previously, e-modules were not electronic-based. So, they were called as modules. The module was designed by the authors in line with learning objectives as an alternative form of teaching to help students in understanding learning concepts (Fortner et al., 2016; Ping & Osman, 2019; Chongo et al., 2021). The module motivates students to study independently in order to improve understanding of learning (Rastowo, 2011; John et al., 2016; Hairida, 2016; Syahroni et al., 2016). Modules develop along with technological advances. So that, the module is no longer in the form of a print but an electronic based which is known as an e-module. Learning materials are packaged into e-modules as new learning resources to provide a learning experience for students (Abuhassna & Yahaya, 2018 Torbjörnsson et al., 2018; Ng, 2019). E-modules or electronic modules are newer innovations than print media or conventional media containing detailed and interesting learning materials (Voithofer, 2005; Sugihartini et al., 2017; Istuningsih et al., 2018; Risnawati et al., 2019; Sitorus et al., 2019). E-modules contain text, audio, animation, and photos or images that can motivate students to improve learning (Darmawan, 2010; Lunenburg, 2011; Khasanah & Widoretno, 2017; Yasa et al., 2018; Rasmawan, 2020). One of the lessons that uses e-modules as a medium in the learning process is the Mathematics Physics course. E-modules used in Mathematics Physics learning activities contain learning materials that are explained in detail with a clear and detailed description of the formula and contains practice questions that can train students' skills while working on questions and can improve students' abilities in understanding mathematical physics concepts.

Mathematics Physics is a combination of physics and mathematics subjects which are physics education courses. Mathematics is the mother of all sciences and the basis for all research and life subjects to understand the patterns of the world (Freeman et al., 2014; Yalçın, 2017; Hu et al., 2018; Rezeki et al., 2021). Mathematics as the core of education that crosses all sciences including teaching skills Mathematics are very important (Oyedeji, 2017; Laurens et al., 2018; Suryanti, 2021). In addition, physics is also a part of science that is closely related in how to systematically analyze natural phenomena and apply conceptual understanding in their learning (Berek et al., 2016; Gunawan et al., 2019; Wartono et al., 2018). Learning physics and mathematics are subjects with the same unit of knowledge, namely science and can be combined into mathematical physics. Mathematical physics as a subject has the aim that students have the ability to formulate various physical processes into mathematical statements (Gunada, Rokhmat, Hikmawati, & Kesipudin, 2017). Mathematics physics learning media are printed books with English language of instruction. Thus, other media are needed to overcome student difficulties, namely e-modules to improve learning outcomes. Because e-modules have the advantage of providing two-way communication, a clear, friendly, and motivating structure. So that, they can be used in distance teaching (Nirwansyah & Shalihati, 2017; Sharif et al., 2021; Kamid et al., 2021). Using e-modules in mathematical physics can help students to understand the learning material and get satisfactory learning outcomes, so student perceptions are needed.

Student perceptions can provide information stating that e-modules can help students in understanding learning materials to obtain satisfactory learning outcomes. Perception is an individual's process of receiving sensory impressions on knowledge, honesty, courage, firmness, courage to compete, hard work, and perseverance about media concepts (Kim et al., 2019; Sudirman et al., 2020; Rusydiyah et al., 2020). Generally, everyone has different perceptions. Perceptions are formed through family, close environment, media and educational institutions to achieve the desired goals (Ayvaz-tuncel & Tuncel, 2019; Osadebe & Osadebe, 2020; Chaaban et al., 2021). There is varying students' perceptions and they are expected to refer to positive perceptions. They show an increase in better knowledge and ease of learning (Dessie & Sewagegn, 2019; Leeniva, 2019; Syauqi et al., 2020). Perception is influenced by attitude which is one of the external factors in the learning process (Kincaid et al., 2009; Barber et al., 2011; Ryu & Han, 2011; Vlckova & Kubiatko, 2018; Prihadi et al., 2018). Visual perception is being to capture, recognize, organize and understand information related to student learning progress (Isnaini et al., 2016; Purwoko et al., 2017; Gonçalves et al., 2020; Hong et al., 2021; Rusydiyah et al., 2021). Student learning progress varies due to different perceptions given by each individual due to gender differences

Gender is one of the factors that can make individuals have different perceptions. Gender refers to the identity of an individual (Afif et al., 2020). In addition, gender can also be interpreted as a social construction that is being formed and structured (Xiao & Hong, 2017; Holliday, Hennebry, & Gammage, 2019). Gender can be a factor that influences the learning process (Suyatna, Maulina, Rakhmawati, & Khasanah, 2018; Fitriani, Asy'ar, Zubaidah, & Mahanal, 2019). In addition to the learning process, achievement of learning outcomes is also influenced by gender differences (Anders et al., 2012; Liu & Young, 2017; Bhagat & Chang, 2018; Chiu, 2018). Gender consists of women and men where women's ways of thinking are clearer with more regular emotions than men (Xu & Waniganayake, 2018; Umaroh & Pujiastuti, 2020). Differences in the way of thinking between women and men in the use of e-module media can affect student learning outcomes.

This research was conducted to complement the research that has been done by previous researchers. The research that is relevant to this research is research conducted by Darmaji et al., (2020). Regarding the use of e-modules in basic physics practicum for science process skills. The results of the study showed that students' perceptions of using Kvisoft-based e-modules were in the high category, which means that the use of e-modules was more interesting in carrying out basic physics practicum activities. So that, students' science process skills were in the high category or in the good category. It was found that the student's perception was in the good category and the mobile learning-based guide could support learning and practicum. The results showed that there was a significant relationship between the level of students' perceptions of e-modules and students' basic science process skills. Thus, the students could develop basic science process skills. Based on the research that has been done by previous researchers, there has been no research on students' perceptions of e-modules in mathematics physics courses and there has been no research that has conducted research on students' perceptions of mathematics physics e-modules based on gender differences. Therefore, the researcher conducted a study to examine students' perceptions of the mathematics physics e-module based on gender differences in order to complete the shortcomings. Based on the description, the researchers conducted research to answer the following questions:

1. What are the differences in student perceptions of the physics-mathematical e-module on learning outcomes based on gender differences?
2. How is the influence of students' perceptions of the physics-mathematical e-module on learning outcomes based on gender differences?

Methods

Please This study uses a quantitative research approach. Quantitative research focuses on object analysis when it is possible to collect measures of variables and conclusions that can be measured in a sample of a population (Akar & Çelik, 2019; Hammer & Habib, 2016; Pastore, 2017). The quantitative method commonly used to analyze the data obtained through a questionnaire instrument (Battaglia, Di Paola, & Fazio, 2017; Maison et al., 2020; Nayan, Mahat, Hashim, Saleh, & Norkhaidi, 2020). Quantitative research is conducted to investigate hypotheses by comparing one or more groups with a comparison group to see differences (Alkhateeb & Milhem, 2020; Darmaji, Kurniawan, et al., 2020; H. Wang & Chang, 2018). This study aims to determine the difference as well as the effect of student perceptions based on gender differences in the Mathematics Physics e-module on learning outcomes.

The population in this study were all students of physics education at the University of Jambi. The whole of all the facts of the data to be studied is called the population (Effendi-Hasibuan, Fuldiaratman, Dewi, Sulistiyo, & Hindarti, 2020; Hashim et al., 2021; Evi Fatimatur Rusydiyah et al., 2020). In this study the sample used by the researcher was all physics education students with a total of 289 people consisting of 3 active forces namely 2017, 2018, and 2019. In sampling there are many methods that can be used. (Erba, Ternes, Bobkowski, Logan, & Liu, 2018; McNeish, 2017; Spiller et al., 2017). The purposive sampling method used in processing the sample in this. Purposive sampling was used to select participants for this study in order to maximize the results of the gathered information

(Mosabala, 2018; Najoli, 2019; Rohmah & Sutiarso, 2018). The criteria for selecting the sample itself are physics education students who have enrolled the Mathematics Physics I course.

In this study, the data were obtained through questionnaire forms (Rintakorpi & Reunamo, 2017; Tölle et al., 2019; West, 2015). Data collection is done by distributing questionnaires or perception questionnaires through Google Forms to students who will then fill in the statements given according to their opinions. Questionnaire is a data collection to easily collect and measure all information from research samples using a rating scale (Elmendorf & Song, 2015; Lupi et al., 2017). The questionnaire is include items to measure the perceptions and learning outcomes. The grid of data collection instruments used in this study can be seen in table 1.

Table 1

Grid of Student Perception Questionnaire Instruments

Rating Indicator	Rated aspect
E-Module Display	Text clarity
	Multimedia size fit
	Clarity of color and shape
	Multimedia display quality is good
	The multimedia presented is interesting
Presentation of Material in E-Modules	Easy to understand material
	The order of the material is clear
	The sentences used are simple and easy to understand
	The language used is communicative
	The suitability of the example with the material
	Multimedia compatibility with the material
Benefits of E-Modules	Ease of use of the module
	Media can help students understand the material
	Interest in using mod mod
	Increased learning motivation

The questionnaire was designed as a Likert type scale. The Likert type scale was used measuring perceptions related to statements that focus on a person's perspective a phenomena (Caia et al., 2018; Ikeda et al., 2018; Wu & Leung, 2017). Research questionnaires given to students have different scorings; very good (VG) = 4, good (G) = 3, not good (NG) = 2, and very not good (VNG) = 1.

Table 2

Range Perception Questionnaire Instruments

Range	Criteria
15.00 – 26.25	Very Not Good
26.26 – 37.50	Not good
37.51 – 48.75	Good
48.76 – 60.00	Very good

Then, for the result, an instrument used in the form of a post-test shaped like multiple choice test with 20 questions on 6 indicators. The instrument grid can be seen in table 3.

Table 3

Grid of student learning outcomes after using the physics-mathematical e-module

Indicator	Question number
Vector	1, 2, 3, 4
Matriks	5, 6, 7
Determinant	8, 9
Partial differential	10, 11, 12, 13
Implicit differential	14, 15, 16, 17
Multiple integral	18, 19, 20

The criteria for assessing student learning outcomes on mathematical physics learning outcomes can be seen in table 3.

Table 4

Range Learning Outcome Instruments

Range	Criteria
0.00 – 25.00	Very Not Good
25.01 – 50.00	Not good
50.01 – 75.00	Good
75.01 – 100.00	Very good

The results of the obtained quantitative data were then analyzed using descriptive statistics and inferential statistics. The descriptive statistics used to present the mean, median, mode, standard deviation of each distribution table, while for the inferential statistics using the Anova test and linear regression (Ayçiçek & Yelken, 2018; Ismajli & Imami-Morina, 2018; Tambunan, Sinaga, & Widada, 2021). Before performing the ANOVA test and linear regression, the data first needs to be tested for assumptions. The test used examine the assumption are the normality test, homogeneity test, and linearity test which if the significance value is more than 0.05 then the data can proceed to hypothesis testing (Cheng et al., 2018; Ozdemir et al., 2018; Ong et al., 2021). The used hypothesis test is the ANOVA test and linear regression. The ANOVA test is a test used to see differences in variables that are in different environments, if a significance value is obtained below 0.05 then there are differences in the data in each class being compared (Parmaksiz, 2019; Sugiharto et al., 2019; Gómez-Arízaga et al., 2021). The ANOVA test was used in two of three different classes, the variables used were perceptions and student learning outcomes. After knowing the difference in perception of each variable in the 3 classes, the next researcher conducted a linear regression test to see the effect of perception on student learning outcomes. Linear regression is an important method used to analyze data from experimental and non-experimental models, if a significance value is obtained below 0.05 then the tested variable has an influence on other variables (Kontaş & Turan Ozpolat, 2017; Pan, 2017; Buchori & Cintang, 2018; Ertikanto et al., 2018). By determining the R square of the determining deterrence coefficient, the magnitude or percentage of the effect of these variables will be determined (Aydın Sünbül & Çekici, 2018; Kriswanto, Setijono, & Mintarto, 2019).

The first research procedure was to provide an e-module for Mathematical Physics. Then data was collected by distributing questionnaires of perceptions and questionnaires of student learning outcomes. After the data was collected, the researcher analyzed the data using descriptive statistics and inferential statistics. The data that has been analyzed is then viewed and conclusions are drawn to answer the formulated research objectives.

Findings

Please Based on the processed data using the IBM SPSS 23 program, the results of the descriptive test analysis for the 2017 2018 and 2019 classes were obtained. As for the results of the 2017 student perception descriptive test of the Mathematical Physics e-module, it can be seen in table 5.

Table 5

Descriptive Test of Student Perceptions for the Class of 2017 on the Mathematical Physics E-Module

Gender	Category	f	%	Mean	Median	Mode	Min	Max
Female	Not very good	0	0 %	47,48	48,00	47,00	34,00	54,00
	Not good	2	3,7 %					
	Good	32	59,3 %					
	Very good	20	37,0 %					
Male	Not very good	0	0 %	45,35	46,00	49,00	36,00	58,00
	Not good	4	9,8%					
	Good	24	58,5%					
	Very good	13	31,7%					

Table 5 shows that the percentage of students' perceptions of the Mathematical Physics e-module with female gender in the 2017 class is the highest in the good category, namely 59.3% with an average score in the 2017 class of 47.48 where the minimum score is 34.00 and a maximum of 54.00. The percentage of students' perceptions of the Mathematical Physics e-module with the dominant male gender in the 2017 class is also in the good category, namely 58.5% with an average score in the 2017 class of 45.35 where the minimum score is 36.00 and maximum score of 58.00.

Then for the results of the descriptive analysis of student perceptions of the Mathematical Physics e-module in the 2018 class, it can be seen in table 6.

Table 6

Descriptive Test of Student Perceptions for the Class of 2018 on the Mathematical Physics E-Module

Gender	Category	F	%	Mean	Median	Mode	Min	Max
Female	Not very good	0	0 %	45,86	46,00	46,00	36,00	54,00
	Not good	3	6,0 %					
	Good	31	62,0 %					
	Very good	16	32,0 %					
Male	Not very good	0	0 %	50,07	48,00	48,00	36,00	59,00
	Not good	5	11,1%					
	Good	18	40,0%					
	Very good	22	48,9%					

Table 6 shows that the percentage of students' perceptions of the Mathematical Physics e-module with female gender in the 2018 class being Is the highest in the good category, which is 62.0% with an average score in the 2018 class of 45.86 where the minimum score is 36.00 and a maximum of 54.00. While the percentage of students' perceptions of the Mathematical Physics e-module with the dominant male gender class 2018 being in the very good category, namely 48.9% with an average score in the 2018 class of 50.07 where the minimum score is 36.00 maximum score of 59.00.

Then for the results of the descriptive analysis of student perceptions of the Mathematical Physics e-module in the 2019 batch, it can be seen in table 7.

Table 7

Descriptive Test of Student Perceptionsfor the Class of 2019 on the Mathematical Physics E-Module

Gender	Category	f	%	mean	median	Mode	Min	max
Female	Not very good	0	0 %	45,32	46,00	46,00	38,00	54,00
	Not good	0	0 %					
	Good	42	73,7 %					
	Very good	15	26,3 %					
Male	Not very good	0	0 %	48,40	49,00	49,00	37,00	59,00
	Not good	4	9,5%					
	Good	14	33,3%					
	Very good	24	57,1%					

Table 7 shows that the percentage of students' perceptions of the Mathematical Physics e-module with the female gender in the 2019 class being is the highest in the good category, which is 73.7% with an average score in the 2019 class of 45.32 where the minimum score is 38.00 and a maximum score is 54.00. Meanwhile, the percentage of students' perceptions of the Mathematical Physics e-module with the dominant male gender class 2019 being in the very good category, which is 57.1% with an average score in the 2019 class of 48.40 where the minimum score is 37.00 and maximum score of 59.00.

Then for the analysis of the descriptive test of student learning outcomes for the Mathematical Physics e-module in the 2017 class, it can be seen in table 8.

Table 8

Descriptive Test of Student Learning Outcomes for the Class of 2017 on the Mathematical Physics E-Module

Gender	Category	f	%	Mean	Median	Mode	Min	Max
Female	Not very good	0	0 %	78,02	79,16	81,67	60,00	98,33
	Not good	0	0 %					
	Good	22	40,7 %					
	Very good	32	59,3 %					
Male	Not very good	0	0 %	78,13	80,00	85,00	63,33	95,00
	Not good	0	0%					
	Good	16	39%					
	Very good	25	61%					

Table 8 shows that the percentage of student learning outcomes for the Mathematical Physics e-module with female gender in the 2017 class is the highest in the very good category, which is 59.3% with an average score in the 2017 class of 78.02 where the minimum score is 60.00 and a maximum score of 98.33. Meanwhile, the percentage of students' perceptions of the Mathematical Physics e-module with the dominant male class of 2017 being in the very good category, which is 61% with an average score in the 2017 class of 78.13 where the minimum score is 63.33 and the maximum score of 95.00.

Then for the analysis of the descriptive test of student learning outcomes for the Mathematical Physics e-module in the 2018 class, it can be seen in table 9.

Table 9

Descriptive Test of Student Learning Outcomes for the Class of 2018 on the Mathematical Physics E-Module

Gender	Category	f	%	Mean	Median	Mode	Min	Max
Female	Not very good	0	0 %	73,40	75,00	58,33	56,67	88,33
	Not good	0	0 %					
	Good	26	52,0 %					
	Very good	24	48,0 %					
Male	Not very good	0	0 %	75,18	76,67	61,67	60,00	90,00
	Not good	0	0%					
	Good	6	40%					
	Very good	9	60%					

Table 9 shows that the percentage of student learning outcomes for the Mathematical Physics e-module with female gender in the 2018 class is the highest in the good category, namely 52.0% with an average score in the 2018 batch of 73.40 where the minimum score is 56.67 and maximum score of 88.33. While the percentage of students' perceptions of the Mathematical Physics e-module with the dominant male gender class 2018 being in the very good category, namely 60% with an average score in the 2018 class of 75.18 where the minimum score is 60.00 and the maximum score of 90.00.

Then for the analysis of the descriptive test of student learning outcomes for the Mathematical Physics e-module in the 2019 batch, it can be seen in table 10.

Tabel 10

Descriptive Test of Student Learning Outcomes for the Class of 2019 on the Mathematical Physics E-Module

Gender	Category	f	%	Mean	Median	Mode	Min	Max
Female	Not very good	0	0 %	75,20	75,00	76,67	61,67	90,00
	Not good	0	0 %					
	Good	29	50,9 %					
	Very good	28	49,1 %					
Male	Not very good	0	0 %	83,17	80,00	80,00	60,00	98,33
	Not good	0	0%					
	Good	9	21,4%					
	Very good	33	78,6%					

Table 10 shows that the percentage of student learning outcomes for the Mathematical Physics e-module with the female gender in the 2019 class is the highest in the good category, which is 50.9% with an average score in the 2019 batch of 75.20 where the minimum score is 61.67 and maximum score of 90.00. Meanwhile, the percentage of student perceptions of the Mathematical Physics e-module with the dominant male gender in the 2019 class being in the very good category, which is 78.6% with an average score in the 2019 class of 83.17 where the minimum score is 80.00 and maximum score of 98.33.

After doing a descriptive test using the SPSS program, then it is necessary to test assumptions. The first assumption test is the normality test to find out whether the data that has been obtained is normal or not. The results of the normality test of student perceptions on the Mathematical Physics e-module on Mathematical Physics learning outcomes can be seen in table 11.

Table 11

Student Perception Normality Test on Mathematical Physics E-Module on Mathematical Physics Learning Outcomes

		2017 period	2018 period	2019 period	Gender
N		54	50	57	Female
Normal Parameters	Mean	,0000000	,0000000	,0000000	
	Std. Deviation	8,80443878	4,00667525	2,87323407	
Most Extreme Differences	Absolute	,102	,090	,088	
	Positive	,065	,082	,088	
	Negative	-,102	-,090	-,078	
Kolmogorov-Smirnove Z		,102	,090	,088	
Asymp. Sig. (2-tailed)		,200[c,d]	,200[c,d]	,200[c,d]	
N		41	45	42	Male
Normal Parameters	Mean	,0000000	,0000000	,0000000	
	Std. Deviation	4,54289062	10,89637973	11,09587702	
Most Extreme Differences	Absolute	,110	,115	,109	
	Positive	,110	,115	,084	
	Negative	-,108	-,108	-,109	
Kolmogorov-Smirnove Z		,110	,115	,109	
Asymp. Sig. (2-tailed)		,200[c,d]	,163[c]	,200[c,d]	

Based on table 11, it has been explained that the results of the normality test of student perceptions on the Mathematical Physics e-module on Mathematical Physics learning outcomes with female gender are normally distributed with the acquisition of a significance value of 0.200 for each batch, namely in the 2017 class, 2018 and 2019 class. The data is said to be normally distributed because the significance value obtained is greater than the constant significance value of 0.05. As for the results of the normality test of student perceptions in the Mathematical Physics e-module on Mathematical Physics learning outcomes with male gender also normally distributed with a significance value of 0.200 for the 2017 and 2019 batches, while the significance value for the 2018 class is 0.163.

After the normality test, the next step is to test the second assumption, namely the homogeneous test to determine the homogeneity of the data that has been obtained. The results of the homogeneous test of student perceptions on the Mathematical Physics e-module on Mathematical Physics learning outcomes can be seen in table 12.

Table 12

Homogeneous Test of Student Perceptions on the Mathematical Physics E-Module on Mathematical Physics Learning Outcomes

Variable	Levene Statistic	df1	df2	Sig.	Gender
Perception on the Mathematical physics E-Module	2,188	2	158	,116	Female
	2,697	2	58	,070	Male
Mathematical Physics Study Results	2,430	2	25	,092	Female
	,916	2	25	,403	Male

Based on table 12, it can be seen that the acquisition of the significance value of female students' perceptions is 0.116 and the significance value of male students' perceptions is 0.070. The significance value of Mathematical Physics learning outcomes for female students is 0.092 and the significance value of male students' perceptions is 0.403. There can be said that all of these data are homogeneous, because the acquisition of the significance value is greater than the significance value used, which is 0.05.

Then we can test the third assumption, namely the linearity test which aims to determine the linearity of the data that has been obtained. The results of the linearity test of student perceptions on the Mathematical Physics e-module on Mathematical Physics learning outcomes can be seen in table 13.

Table 13

Linearity Test Results of Student Perceptions on Mathematical Physics Learning Outcomes

Tiers	Variable	Sum of Squares	df	Mean Square	F	Sig.	Gender
2017	Learning outcomes * Perception	3271,678	21	155,794	1,78	,056	Female
		1723,910	18	95,773	1,629	,060	Male

Based on table 13, it can be seen that the significance value for female students is 0.056 while the significance value for male students is 0.060. The acquisition of the significance value indicates that the data is linear between perceptions and learning outcomes. There can be said that the data is linear because the acquisition of the significance value is greater than the significance value used, which is 0.05.

The next step is to perform the ANOVA test through the help of the IBM SPSS 23 program. The ANOVA test is carried out after previously being tested for assumptions as initial conditions that must be met, namely normality test and homogeneous test. The results of the ANOVA test can be seen in table 13.

Table 14

Output Results of ANOVA Test Perception Questionnaire for Physics Education Students, Jambi University

Gender		Sum of Squares	df	Mean Square	F	Sig.
Female	Between Groups	386,118	2	193,059	3,680	,027
	Within Groups	8288,381	158	52,458		
	Total	8674,500	160			
Male	Between Groups	1372,786	2	686,393	7,684	,001
	Within Groups	11166,103	125	89,329		
	Total	12538,889	127			

Based on table 14, it can be seen that the significance value of female students' perceptions is 0.027 and the significance value of male students' perceptions is 0.001. Because the significance value is less than 0.05 (Sig. > 0.05), the obtained data have significant differences in the perceptions of both female and male students towards the Mathematics Physics e-module. As for the output results of the ANOVA test, student learning outcomes can be seen in table 15.

Table 15

ANOVA Test Output Results of Jambi University Physics Education Students' learning outcomes

Gender		Sum of Squares	df	Mean Square	F	Sig.
Female	Between Groups	568,365	2	284,182	3,334	,038
	Within Groups	13467,246	158	85,236		
	Total					
Male	Between Groups	1409,851	2	704,925	7,523	,001
	Within Groups	11712,371	125	93,699		
	Total					

Based on table 15, it can be seen that the significance value of female student learning outcomes is 0.038 and the significance value of male student learning outcomes is 0.001. Because the significance value is less than 0.05 (Sig. > 0.05), theobtained data have significant differences in the learning outcomes of both female and male students on the Mathematics Physics e-module. After it is known that the perception data and student learning outcomes have significant differences, then further testing can be carried out.

The further test used by the researcher was the Tukey follow-up test. Tukey's further test results can be seen in table 16.

Table 16

Results of the Tukey Advanced Test for Physics Education Students in Jambi University

Gender	Variable			Subset for alpha = 0.05	
		Period	N	1	2
Female	Perception	2019	57	75,5263	
		2018	50	76,4333	76,4333
		2017	54		79,1358
		Sig.		,794	,134
	learning outcomes	2018	50	73,4000	
		2019	57	75,2047	75,2047
		2017	54	78,0247	78,0247
		Sig.		,571	,571
Male	Perception	2017	41	75,5285	
		2019	42		80,6746
		2018	45		83,4444
		Sig.		1,000	,369
	learning outcomes	2018	45	75,1852	
		2017	41	78,1301	
		2019	42		83,1746
		Sig.		,342	1,000

Based on table 15, it appears that for female students in the perception variable that does not have a significant difference in average perception, namely in the 2018 and 2019 classes which can be seen in subset 1, as well as for the learning outcomes variable in the 2018 and 2019 batches it also does not. have a significant difference in the average learning outcomes. Then in the subset of the two generations that did not have a significant difference in average perceptions and learning outcomes, those were the 2017 class and the 2019 class. As for the male students, the perception variable did not have a significant difference in the average perception, namely in the class 2018 and 2019 which can be seen in subset 2, while for the learning outcomes variable in the 2017 and 2018 batches, which do not have a significant difference in average learning outcomes. The class pairs with female gender who have a significant difference in average perceptions are in the 2017 and 2019 classes because they are in different subset columns, while for class pairs that have significant differences in average learning outcomes are in the 2018 and 2019 batches. As for the male gender pairs who have a significant difference in average perceptions and learning outcomes, they are in the 2017 and 2019 batch pairs and the 2017 and 2018 batch pairs..

After knowing which class pairs have significant differences, the next step is to perform a regression test to determine whether there is an influence between perceptions and student learning outcomes on the Mathematical Physics e-module. Regression test is carried out after fulfilling the initial requirements, namely the assumption test in the form of normality test and linearity test. Because the data has been normally distributed and has been linear, the researcher can perform a regression test. The results of the regression test of student perceptions of Mathematical Physics learning outcomes can be seen in table 17.

Table 17

Results of Variants of Student Perception Regression Test on Mathematical Physics

Gender	Model	Sum of Squares	Mean Square	F	Sig.
Female	Regression	4020,331	4020,331	63,826	,000[b]
	Residual	10015,279	62,989		
	Total	14035,611			
Male	Regression	2325,570	2325,570	109,868	,000[b]
	Residual	825,514	21,167		
	Total	3151,084			

Based on table 16, it appears that for female students, a significance value of 0.000 is obtained, which means that there is a perception effect on Mathematical Physics learning outcomes. Likewise, male students also obtained a significance value of 0.000, which means that there is also a perception effect on Mathematical Physics learning outcomes. Furthermore, to find out the regression test coefficients of students' perceptions of Mathematical Physics learning outcomes can be seen in table 18.

Table 18

Results of Student Perception Regression Test Coefficients on Mathematical Physics

Gender	Model	B	Std.Error	Beta	T	Sig.
Female	(Constant)	23,157	6,593		3,512	,001
	Perception	,681	,085	,535	7,989	,000
Male	(Constant)	63,751	7,221		8,829	,000
	Perception	,187	,090	,183	2,093	,038

The general equation for simple linear regression is Y = a+bX. Based on table 16 by looking at column B for female students, the value of a (constant number of unstandardized coefficients) is equal to 23,157 and the value of b (regression coefficient number) is equal to 0.681. Because the value of the regression coefficient is not minus (-), it can be concluded that the perception of female students (X) has a positive effect on Mathematical Physics learning outcomes (Y). So that the regression equation can be written as Y = 23.157 and X = 0.681. The significance value obtained is 0.000 which means that ha (alternative hypothesis) is accepted (there is a perception effect on learning outcomes) because the obtained significance value is less than the significance value used, which is 0.05 (Sig. <0.05). Meanwhile for male students, the value of a (constant number of unstandardized coefficients) is equal to 63.751 and the value of b (regression coefficient number) is equal to 0.187. Because the value of the regression coefficient is not minus (-), it can be concluded that the perception of male students (X) has a positive effect on mathematical physics learning outcomes (Y). So that the regression equation can be written as Y = 63.751 and X = 0.187. The significance value obtained is 0.038, which means that ha is accepted.

Meanwhile, to determine the magnitude of the effect of perception on learning outcomes in simple linear regression analysis, it can be seen in table 19.

Table 19

The Result of the Determinant Coefficient of Regression Test of Students' Perceptions of Mathematical Physics Learning Outcomes

Gender	R	R Squares	Adjusted R Square	Std.Error of the Estimate
Female	,826[a]	,682	,282	7,93657
Male	,857[a]	,734	,026	10,03221

Based on table 19 based on the R square table, the R square value for female students is 0.682, which means that the effect of female perception on Mathematical Physics learning outcomes is 68.2%. As for the male students, the value of R square is 0.734, which means that the effect of perception on Mathematical Physics learning outcomes is 73.4%.

Discussion

Please There has been previous research on the development of e-modules that has been carried out by Katti, (1978). In his research revealing the development of electronic-based areas makes analytical instruments up-to-date and versatile. Another opinion expressed by Pombo, Smith, Abelha, Caixinha, & Costa (2012) stated that the results of the implementation of the module in the professional development of teachers were recognized by the trainees that the use of the e-module had an impact on classroom practice, therefore the development of the e-module in Mathematics Physics I using the Flip PDF application, the professional Flip pdf, was different from other pdfs, it can combine material in the form of pdf files with images, animations and learning videos that are still rarely used in physics learning. So that it will make learning more interesting and students become interactive.

Based on the descriptive test of student perceptions of the E-Modul in Class 2017, Class 2018, and Class 2019 by comparing the percentage based on the student's criteria assessment of the E-Modul, it was obtained. In the class of 2017 students, it was found that for female students, 3.7% of female students had a poor perception of e-modules, 59.3% of female students had good perceptions of e-modules and 37.0% of female students have a very good perception of the e-module. In the 2017 class, 9.8% of male students had a poor perception of the E-module, 58.5% of male students had a good perception of the e-module, and 31.7% of male students have a very good perception of the e-

module. In the class of 2018 students, female students obtained 3.0% of female students had a poor perception of E-modules, 62.0% of female students had good perceptions of e-modules and 32.0% of female students had very poor perceptions of e-modules. It was obtained that 11.1% of male students had a poor perception of the e-module, 40.0% of male students had a good perception of the e-module, and as many as 48.9% of male students had a positive perception of the E-module. Meanwhile, in the 2019 batch of female students, 73.7% of female students had a good perception of e-modules and 26.3% of female students had very good perceptions of e-modules. With male gender, 9.5% male students have a poor perception of the e-module, 33.3% male students have a good perception of the e-module, and 57.1% male students have a positive perception of the e-module. Based on the results of the percentage of student perceptions, it was concluded that most students with male and female gender had very good perceptions of the Mathematics Physics e-module I. Next, the researcher will see how the student learning outcomes in Class 2017, 2018 and 2019.

By looking at student learning outcomes in Mathematics Physics I, it will be illustrated how the relationship between student perceptions and learning outcomes. With a descriptive test to describe the percentage of student learning outcomes in the 2017 class, it was found that 40.7% of female students had good learning outcomes using e-modules and as many as 59.3% of female students had very good learning outcomes using e-modules. 39.0% of the male students having good learning outcomes in using e-modules while 61% of the male students had very good learning outcomes using e-modules. In the class of 2018 students, it was found that 52.0% of the female students had good learning outcomes using e-modules and 48.0% of the female students had very good learning outcomes using e-modules, with students with gender 40.0% of male students have good learning outcomes using e-modules and 60% of male students have very good learning outcomes using e-modules. According to the student learning outcomes of the Class of 2019, it was found that, 50.9% female students had good learning outcomes using e-modules and 49.1% of the female students had very good learning outcomes using e-modules. with male gender, 21.4% have good learning outcomes using e-modules and 78.6% male students have very good learning outcomes using e-modules. Based on this analysis, it was concluded that the 2017 2018 and 2019 class students obtained good and very good learning outcomes when using the e-Module in Mathematics Physics I.

To obtain the difference between students' perceptions of the e-module Mathematics Physics I by using the ANOVA Test and the Linear Test, the data must be tested first using the Normality Test and Homogeneous Test as a requirement of the Advanced Test. The data was then tested for normality and a Sign tailed significance value was obtained for students with female gender class 2017, 2018, and 2019 getting a significance value of 0.200 where the significance value is 0.200>0.05. So that, it can be concluded that the student perception data is normally distributed. While the homogeneity test for students with male gender obtained a significance value of 0.200 for the 2017 and 2019 batches, while the significance value for the 2018 batch was 0.163. where the significance value is > 0.05. So that, it can be concluded that the perception data is normally distributed. After confirming the data is normally distributed. The data was tested for homogeneity by obtaining the significance value of mathematical physics learning outcomes for female students of 0.092 and the significance value of male students' perceptions of 0.403. All of these data are homogeneous since the acquisition of the significance value is greater than the significance value used, which is 0.05.

Furthermore, the data will be analyzed in depth using the linearity test. This linearity test aims to see the linear relationship between student perceptions of the e-module and student learning outcomes in using the e-module. Based on the linearity test, it was found that the significance value for female students was 0.056 while the significance value for male students was 0.060. The acquisition of the significance value indicates that the data is linear between perceptions and learning outcomes because the obtained significance value is greater than the used significance value, which is 0.05. This linearity test is a prerequisite of the regression test which will be used as an analysis to determine the relationship or whether there is an influence of student perceptions on learning outcomes.

After testing the assumptions in the form of normality test, homogeneity test and linearity test, then the first hypothesis test is carried out, namely the ANOVA test. The ANOVA test is used to reveal whether there are any differences or similarities in students' perception values with learning outcomes based on gender in the e-module of Mathematics Physics. Based on the ANOVA test, it was obtained that the significance value of female students' perceptions was 0.027 and the significance value of male students' perceptions was 0.001. Meanwhile, the significance value of mathematical physics learning outcomes for female students was 0.038 and the significance value of male students' perceptions was 0.001. Because the significance value was less than 0.05 (Sig. > 0.05), the obtained data had significant differences both in perceptions and in student learning outcomes for the Mathematical Physics e-module.

In the Anova test, it was found that there was a difference between students' perceptions of learning outcomes in the e-module Mathematics Physics I based on gender. The difference was also seen from the average score of male and female students in each class of 2017, 2018 and 2019. It was concluded that in terms of grades, the average and distribution of male students' scores is greater than the average and distribution of female students' scores. This difference makes researchers conduct a literature study to analyze more deeply about this matter, while the researchers' assumptions regarding perceptions and student learning outcomes are greater because male students have a greater interest in learning Mathematics Physics I. Meanwhile, according to the literature study on research conducted by Skaalvik, Brandell, & Staberg, E. (2008) and Rankin, RJ (1994) suggested that mathematics is considered as male dominant field. This research is supported by the recent update which is conducted by Samuelsson, & Samuelsson (2016) stating that male students pay more attention and listen when the process occurs. classroom learning, as an aspect that offers more communication with the teacher, affects the sense of participation which has a certain influence or is at least involved in decision making. Meanwhile, the perception of female students has a lower perception based on the literature study that has been carried out by Gudyanga, & Kurup (2017) and Ortega, Treviño, & Gelber, D. (2020) said that female students perceive e-modules to be too involved or demanding, requires logical reasoning, but very interesting, very important and can be applied practically to everyday life, another reason states that female students have less interaction with their mathematics teachers related to patterns of interaction, learning and learning media.

After conducting the Anova test, the researchers conducted a more in-depth analysis using the regression test. This regression test aims to reveal whether or not there is an influence of student perceptions on student learning outcomes in using e-modules. After being tested, it was found that the significance value for female students was 0.000, which means that there is an influence of perception on mathematical physics learning outcomes. Likewise, male students also obtained a significance value of 0.000, which means that there is also a perception effect on mathematics physics learning outcomes. Table 18 shows that female students obtained an R square value of 0.682, which means that the effect of female perceptions on mathematical physics learning outcomes is 68.2% and 31.8% is influenced by other factors. As for the male students, the R square value of 0.734 was obtained, which means that the effect of perception on Mathematical Physics learning outcomes is 73.4% and 26.6% is influenced by other factors.

In addition, another analysis was carried out regarding the factors that influence the presence of students who gave responses in the poor category, after being reviewed, it turned out that there were several things that influenced the use of e-modules, including smartphones or learning hardware that were less supportive and internet networks or connections of students who are experiencing problems hamper the maximum use of e-modules. Perception is a process of students interpreting, evaluating, receiving, giving opinions, and testing the data and sensory responses which are the basis for implementing modifications, besides that perception is also used as a critical dimension that determines student satisfaction. The importance of student perceptions is used as a reference for the suitability of teachers in providing teaching materials, as well as a more focused educational assessment. Therefore, it is necessary to assess students' perceptions of the e-module in Mathematics

Physics I. So it will provide an evaluation of the teacher to make the learning process more effective. As for recommendations for further research regarding a more in-depth analysis of gender relations on the perceptions of lecturers who teach Mathematics Physics I courses, lecturers' perceptions are needed to see the effectiveness of the e-module when used during learning.

Conclusion and Recommendations

Please The conclusion of this study is that there is a difference between student perceptions and learning outcomes based on gender on the e-module Mathematics Physics I. This difference is seen from the Anova test which obtained a significance value of female students' perceptions of 0.027 and the significance value of student perceptions with male gender is equal to 0.001. Meanwhile, the significance value of Mathematical Physics learning outcomes for female students was 0.038 and the significance value of male students' perceptions was 0.001. Because the significance value was less than 0.05 (Sig. > 0.05), the obtained data had significant differences both in perceptions and in student learning outcomes for the Mathematical Physics e-module. Students with male gender are higher than female students because male students have a high interest in Mathematics Physics I. This will also be proven by further hypothesis testing through regression test to see the effect, the results of the significance value are found for the students with female gender of 0.000 which means that there is a perception effect on Mathematical Physics learning outcomes. Likewise, male students also obtained a significance value of 0.000, which means that there is also a perception effect on Mathematical Physics learning outcomes.

The results of this study are expected to contribute to educators in improving the quality of learning in an educational institution. So reducing the ineffectiveness of the media used in learning will increase and the quality of learning in Indonesian educational institutionsss.

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