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# Mathematics physics learning e-module: Differences in perceptions and interests based on gender

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***Abstract**: This study aims to find out the differences in perception and interest of physics education students of FKIP Jambi University towards e-module Mathematics Physics reviewed based on gender differences. This research uses a type of quantitative research, namely survey research. The instrument that has been used is the perception questionnaire. Furthermore, the data obtained is analyzed using descriptive statistics, and inferential statistics, namely assumption tests (normality tests and homogeneity tests) and hypothesis tests (one-way ANOVA tests) with Scheffe advanced tests. The instrument that has been used is the perception questionnaire. Furthermore, the data obtained is analyzed using descriptive statistics, and inferential statistics, namely assumption tests (normality tests and homogeneity tests) and hypothesis tests (one-way ANOVA tests) with Scheffe advanced tests. Sampling is done using the total sampling technique because the number of samples used is equal to the population of 91 students of physics education at FKIP Jambi University. Sampling is done using the total sampling technique because the number of samples used is equal to the population of 91 students of physics education at FKIP Jambi University. The results of this study are differences in students' perceptions and interests of the Mathematics Physics e-module, namely the average student's perception of the Mathematics Physics e-module, which women in class B best own, and the average student's interest in the Mathematics e-module. The female in class B also owns the best physics.*

***Keywords**: E-Module, Gender, Perception, Interest.*

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## INTRODUCTION

Education is one of the crucial milestones in the progress of a nation that cannot be separated from the role of technology. The constantly evolving role of technology has positively impacted the increasing progress of education in the learning process so that a better generation is formed (Liao & Kachalia, 2015; Diani & Hartati, 2018; Hayati et al., 2019). Improving the quality of education can be achieved through various innovations carried out in the learning process (McClelland et al., 2014; Fatma & Partana, 2019; Sukowati et al., 2020). The innovations made can be interactive learning media to support the teaching and learning process (Tarigan & Siagian, 2015; Nurrita, 2019; Sopacua, Fadli, & Rochmat, 2020). One of the learning media that can be innovated is in the form of teaching materials.

Innovative teaching materials in the learning process can help smooth the teaching and learning process. Several interactive teaching material innovations can enable students to carry out the learning process independently (Hendri & Setiawan, 2016; Czajka & McConnell, 2019; Mardiana, Isa, & Ningsih, 2020). Interactive teaching materials are teaching materials that have been systematically designed and can be used by students for independent study (Prihantana, 2014; Ardiansyah, Corebima, & Rohman, 2017; Murtini, Zubaidah, & Listyorini, 2019). Independent learning can make students responsible in the learning process to achieve their cognitive, affective, and psychomotor aspects skills with various learning strategies that can be used (Ormrod, 2012; Malik et al. l., 2017; Rafianti,

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Setiani, & Yandari, 2018). One form of teaching material that can be innovated in the learning process is the modules.

Learning modules are teaching materials that are systematically structured and contain various materials on certain topics to achieve the expected learning skills goals (Amin et al., 2019; Ningtyas, Suarsini, & Amin, 2019; Sopacua et al., 2020). Innovative learning modules can be in the form of electronic modules. Electronic modules, called e-modules, are learning modules based on electronic media (Hafsah, Rohendi, & Purnawan, 2016; Munthe, Silaban, & Muchtar, 2019; Triwahyuningtyas, Ningtyas, & Rahayu, 2020). The use of e-modules can simplify the learning process for students because they can be accessed via laptops or smartphones, thereby reducing paper consumption in the learning process (Simamora, Sudarma, & Prabawa, 2018; Dhina, Hadisoebroto, & Mubaroq, 2019; Fitriani, Astalini, & Kurniawan, 2020). The learning process becomes more interesting and fun through the use of e-modules.

E-modules can be used in teaching and learning, including Mathematical Physics Learning. Mathematics Physics contains learning materials about the basic concepts of mathematical analysis to solve physics problems (Wahyuni, 2012; Ayu, Pratiwi & Muhardjito, 2017; Gunada et al., 2017). Students find it difficult to understand, so it is considered a difficult learning material (Ellianawati et al., 2014; Natalia, Handhika, & Huriawati, 2017; Turşucu et al., 2018). Mathematical physics is considered difficult because it uses too many complicated calculations, and not all students can understand it (Marisda & Handayani, 2020). The use of e-modules in mathematical physics is considered the right solution to help learners improve their understanding of mathematical concepts and solve various physics problems.

The electronic module I designed is a mathematics physics course module that contains partial differential material for physics education students. Electronic modules are designed to utilize supporting software, namely Flip Pdf Professional, so that the electronic modules developed are interactive and interesting. Electronic modules not only contain text but are equipped with images, videos, audio, and interactive quizzes that students in learning can use. The resulting modules are presented in EXE and HTML formats to be accessed via laptop or smartphone.

Therefore, to find out whether the electronic modules developed well or not and can be used by students in learning mathematical physics, it is necessary to see how learners' perception of this e-module by analyzing the student's perception of the e-module developed. Perception is a reaction to something by someone because it receives a stimulus felt by the senses and can also cause a different perception of the same stimulus but under different conditions (Suprihanto, Harsiwi, & Hadi, 2002; Syafriyeti & Atnur, 2020). There are two types of perception: positive perception and the second is negative perception (Sudarsono & Suharsono, 2016; Fairuz, Mohammad, & Sollah, 2019; Darmaji et al., 2020). Negative perceptions are often seen as judgments that are not good or not in harmony with the observed object, while positive perceptions are often seen as good judgments and in harmony with the observed object (Mansyur, 2016; Darmaji et al., 2020). Each individual's perception can be different from an object to be observed, where the individual can perceive objects with negative perceptions or positive perceptions.

Positive perceptions in learning can make someone feel happy in the teaching and learning process to increase interest and learning outcomes to be achieved. A positive perception can make a person enthusiastic and interested in participating in the learning process (Gani, 2015; Fitriana, Utaya, & Budijanto, 2016; Zulfa, Daharnis, & Syahniar, 2017). In contrast to positive perceptions, negative perceptions can reduce enthusiasm and interest in learning, and even a person can become lazy to follow the learning process (Gani, 2015; Anggoro, 2016; Zulfa et al., 2017). The different sex of each individual can cause differences in each person's perception. Gender differences are visible differences between women and men which can be seen in their values and behavior (Kesumadewi, 2018). Differences in perceptions based on gender differences are caused by each individual's different ways of thinking and the basic knowledge that individuals have to provide perceptions about something (Warliah, 2017).

Various studies show that e-modules in learning create a good perception of students. Such as the research conducted by Sari, Jufrida, & Pathoni in 2017 on developing the Professional 3D Page Flip-based Physics electronic module, which received a very good perception from students with a score of 74.7. Then the research conducted by Sari, Hidayat, & Kurniawan in 2019 regarding the development of an electronic module of Physics based on a scientific approach, the results of the


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research that students gave a very agreeable perception of the electronic module developed for use in learning. Unfortunately, this study was only conducted on high school physics subjects, student perceptions were not reviewed based on gender, and no student interest variables were reviewed. As for this research, the researcher intends to complement previous studies by examining more specifically and providing the latest innovations in the research conducted. Thus, new findings will be produced to improve the quality of education in the learning process.

The main objective of this study was to analyze the differences in students' perceptions and interests towards the use of electronic modules in mathematics physics courses. Although many researchers have conducted research related to student perceptions of the development and use of electronic modules, very few have reported research on student perceptions of the use of electronic modules, which were reviewed based on gender differences and added variables of interest in their research. This data is very useful in increasing the effectiveness of the learning process and attracting students' interest in doing independent learning. Gender review needs to be done as a variable studied because no previous researchers have examined gender differences in student perceptions in the e-module of mathematics physics.

The novelty of this research is the existence of a gender review between men and women to see the perceptions and interests of students towards the Mathematical Physics e-module. Gender differences can affect a person's level of ability and interest in overcoming a mathematical problem (Musriliani & Anshari, 2015). Generally, gender is interpreted as a biological difference between women and men and provides perceptions (Rahmawaty, 2015). Each individual's perception can be different with the difference in gender between women and men, and the male gender dares to take risks while women are sympathetic and sensitive to something that is observed (Sofha & Utomo, 2018). The existence of gender differences and affecting the existence of differences in perception also affect the interest that everyone has towards something owned.

Some researchers focus on the perception of the development of electronic modules alone without existing from the other side. Therefore, this study aims to analyze the differences in students' perceptions and interests in the physics-mathematics module in terms of gender. So the researcher explained that the purpose of this study is to answer the research question: RQ 1: How does the perception of female and male students of grades A, B, and C towards e-modules in physics-mathematics? RQ 2: How do female and male students' interest in grades A, B, and C towards e-modules in physics-mathematics?

## METHOD

This research method is a type of quantitative research, namely survey research. This type of survey research is used to find out how the characteristics of each sample from the population are used in research to obtain data or information according to the research objectives (Kerlinger, 2014; Subandi, Anubhakti, & Vallendito, 2017; Syaiful et al., 2020). Quantitative data is data in numerical form as information obtained to be calculated and analyzed (Walsh, 2015; Zedko et al., 2017; Perdana, Saragi, & Aribowo, 2020). Quantitative data in this study were obtained through data collection instruments.

Data collection instruments are meaningful tools used in research to collect information from respondents (Pranatawijaya, Widiatry, Priskila, & Putra, 2019). The instrument used by the researcher in this study was a questionnaire. The type of questionnaire used is a closed questionnaire so that respondents can choose an answer directly from the choices provided (Kurnia, Hendri, & Phatoni, 2016; Sultoni, Gunawan, & Sari, 2018; Fitriani et al., 2021). The perception questionnaire used by the researcher was adopted directly from Riyana's thesis (2017). Meanwhile, the interest questionnaire was adapted from Nadia Alfia Netta's thesis (2021). Questionnaires distributed to respondents were student perception questionnaires and student interest questionnaires for the Mathematical Physics e-module with 15 statement items for student perception questionnaires and 12 items for student interest questionnaires. The entire questionnaire contains positive statements using a Likert scale of 4 answer choices—the items in the student perception questionnaire statement as seen in Table 1.


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**Table 1.** Student Perception Questionnaire Statement Items

| Number | Statement |
|---|---|
| 1 | The text or writing on this e-module is easy to read |
| 2 | The size of the images, animations, videos, and simulations presented is appropriate (not too big and not too small) |
| 3 | The colors and shapes of the images displayed are clear |
| 4 | The display quality of animations, videos, and animations is good |
| 5 | Interesting pictures, animations, videos, and simulations are presented |
| 6 | The presentation of material in e-modules is detailed and easy to understand |
| 7 | The order of presentation of the material is clear |
| 8 | The sentences used in the e-module are simple and easy to understand |
| 9 | The language used is communicative and not boring |
| 10 | This e-module explains the material using appropriate examples of questions and is accompanied by their solutions |
| 11 | Pictures, animations, videos, and simulations according to the material being studied |
| 12 | This e-module is easy to use and clear |
| 13 | The concept map in this e-module can help make it easier to understand the material |
| 14 | This e-module is interesting to learn |
| 15 | This e-module can help increase learning motivation in studying physics, mathematics, partial differential material |

Table 1 shows the statement items of the student perception questionnaire used in this study with 15 statements. The student interest questionnaire is presented in Table 2 below:

**Table 2.** Student Interest Questionnaire Statement Items

| Number | Statement |
|---|---|
| 1 | I paid close attention to the material presented by the lecturer during the Mathematics Physics course |
| 2 | I read Mathematical Physics books |
| 3 | I also study Mathematical Physics when I am at home |
| 4 | I try to get the best grades in Mathematical Physics class |
| 5 | I can work with friends when studying Mathematical Physics |
| 6 | I would not say I like Mathematical Physics because the material is difficult to understand |
| 7 | I immediately finished the Mathematical Physics course assignment given by the lecturer |
| 8 | If the teacher asks a question in class, I try to answer well |
| 9 | I will ask if there is any Mathematical Physics material that I do not understand |
| 10 | I am always there on time when Mathematical Physics class starts |

Table 2 shows the statement items from the student interest questionnaire used in this study with ten statements. The population and sample in this study amounted to 91 people, all students of physics education FKIP Jambi University batch 2019 from 3 different classes. The number of class A as many as 31 people (17 women and 15 men), class B as many as 30 people (14 women and 16 men), and class C as many as 29 people (15 women and 14 men) with sampling technique used is total sampling. Total sampling is a sampling technique where the number of samples used is the same as the total population (Sugiyono, 2007; Syafriyeti & Atnur, 2020; Fitriani, Maryani, et al., 2021). The researcher uses this technique because the population is only 91 students. If the total population is less than 100, then the entire population can be used as a research sample (Sugiyono, 2007; Pakpahan, Picauly, & Mahayasa, 2015; Wahyuni & Setyowati, 2020). All samples in this study will be given a questionnaire in the form of a perception questionnaire and a student interest questionnaire for the Mathematical Physics e-module.

Researchers take samples with a total sampling technique with several criteria that researchers set according to the needs and goals of the researcher. Researchers set criteria for students with physics education who have contracted mathematics physics courses and have studied the partial differential matter. Based on these criteria, the students who fit the researcher's criteria to be sampled are physics education students in the class of 2018 who have just finished contracting mathematics physics I and have completed learning on partial differential materials. Because all students in the


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class of 2019 only numbered 91 students, the researchers took all to be used as research samples to reduce later errors in the data.

Researchers used three classes because they sampled all students in the class of 2019 in the physics education study program of FKIP Jambi University, which only amounted to 91 students. Researchers wanted to see how students perceived and were interested in all three classes by reviewing the sex differences between men and women. Which gender has the highest perceptions and interests comes from what class of students has the highest perceptions and interests. Researchers conducted gender review as one of the innovations provided in this study because no previous researcher conducted research to look at perceptions and interests by linking to gender. However, gender is one factor that determines the difference in perceptions and interests owned by a person. Differences in perceptions based on gender differences are caused by each individual's different ways of thinking and the basic knowledge that individuals have to provide perceptions about something (Warliah, 2017). So with interest, of course, gender also affects why everyone's interests are different. As we know, women are more diligent than men, so women have a higher interest than men.

The perception and interest questionnaire was given to all FKIP UNJA physics education students through the google form link on Monday, May 3, 2021. After the data is collected, the researchers create a range of scales to determine the categories of data obtained, whether very bad, not good, good, or very good. The scale range is created after the magnitude of the interval is known. The equation of determining intervals, according to Nisa & Nugraheni (2021), is as follows:

$$I = \frac{x_{\max} - x_{\min}}{N}$$

where $I$ is interval, $x_{\max}$ is maximum score, $x_{\min}$ is minimum score, an $N$ number of the item.

Using the equation, the classification of the results of the perception and interest of students, who are further categorized into interval ranges, is obtained. The categorization of perception questionnaires can be seen in Table 3 below.

**Table 3.** Questionnaire category on student perceptions of the Mathematical Physics e-module

| Number | Interval | Category |
|---|---|---|
| 1 | 15,00 – 26,25 | Not very good |
| 2 | 26,26 – 37,50 | Not good |
| 3 | 37,51 – 48,75 | Good |
| 4 | 48,76 – 60,00 | Very good |

Table 3. Show that the categories of students' perceptions of the Mathematical Physics e-module are categorized into four categories, namely very good category, good category, not good category, and very not good category, according to the calculation of the interval obtained. The categorization of the interest questionnaire used in this study can be guided by Table 4 below.

**Tabel 4.** Questionnaire category of student interest in the Mathematical Physics e-module

| Number | Interval | Category |
|---|---|---|
| 1 | 12,0 – 21,0 | Not very good |
| 2 | 21,1– 30,0 | Not good |
| 3 | 30,1 – 39,0 | Good |
| 4 | 39,1 – 48,0 | Very good |

The data collected will then be analyzed using descriptive and inferential statistics. Descriptive statistics is a quantitative analysis technique that describes the data obtained for analysis by calculating the average value, median, minimum value, maximum value, and so on (Lasmawan, 2015; Paramitha & Gede, 2019; Hartianti & Ghufron, 2020). Inferential Statistics is a quantitative analysis technique by conducting two types of tests, namely the assumption test (normality test and homogeneity test) and hypothesis testing, to then conclude after it is obtained that the data are normal and homogeneous (Agung, 2014; Diantari, Suniasih, & Ardana, 2017). In this study, data analysis testing was carried out using the help of IBM SPSS 23 to test assumptions and test hypotheses.


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The provisions of the hypothesis test, namely the normality test and homogeneity test, are if the significance value is less than 0.05 (Sig. < 0.05), then the data is not normally distributed and not homogeneous, whereas if the significance value is more than 0.05 (Sig. > 0). 0.05) then, the data is normally distributed and homogeneous. After the data is of normality and homogeneity, we can continue by testing the hypothesis, namely the ANOVA test, to find out the difference in the average perception and the average difference in the interests of female students from 3 different classes and to find out the difference in the average perception and interest of male students of 3 different classes towards the physics math e-module. If the significance value of the ANOVA test is Ha is accepted, it is necessary to carry out further testing, namely the Scheffe test. Scheffe's further test was chosen because the number of sample members from each class was different and homogeneous.

The basis for decision-making on the ANOVA test is that if the significance value is less than 0.05, the average data is different, while if the significance value is greater than 0.05, the average data is the same. Meanwhile, Scheffe's further test was analyzed by looking at the significance value smaller than 0.05 (Sig. < 0.05) or the asterisk in the mean difference column. If the significance value is less than 0.05, there is a significant difference—the same thing with asterisks. There is a significant difference if there is an asterisk.

## RESULTS AND DISCUSSION (70%)

One form of display of the mathematical physics e-module in this study is presented in Table 5 below:

**Table 5.** The appearance of the E-module of mathematical physics:

| Visual | Information |
|---|---|
|   | The quiz is displayed on the physics-mathematical e-module, and the score from the quiz will be listed immediately after the quiz is finished. |

Table 5 is one part of the content of the mathematical physics e-module. This mathematical physics e-module contains material descriptions, sample questions, quizzes, competency tests, videos, answer keys, and assessment guidelines. The main feature of the mathematical physics e-module is that it does not only contain a description of the material in the form of text but is equipped with videos that can be accessed offline by users, quizzes, and competency tests that are interactive and can be done offline by users, e-module users. Can immediately find out the scores obtained after the quiz and competency test are completed so that e-module users can find out the abilities that have been achieved while studying the physics-mathematical e-module. This e-module will be used to see how students perceive this e-module and how students are interested in using the physics-mathematical e-module.

The perception and interest questionnaires that have been collected will be analyzed using descriptive statistical tests first to determine the percentage category obtained. The descriptive statistical tests on student perception questionnaires can be seen in Figure 1.


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**Figure 1.** Description of Students' Perception of Mathematics Physics E-Module

Based on Figure 1, it is known that the highest percentage of female students' perceptions in class A is in the very good category, namely 52.90%, and the perceptions of male students are also in the very good category with a percentage of 60%. Thus, male students are more dominant in giving positive perceptions than female students. Then the perception of the highest grade B female students was in the very good category, namely 57.10%, while the male students' perceptions were in the good category with 43.70%. It turns out that women are more dominant in giving a very positive perception better than men. Furthermore, the highest percentage of female students' perceptions of class C was in the good category, namely 46.70%, and the perceptions of male students were also in the good category with a percentage of 42.86%. It can be seen that female students are more dominant in giving a good perception than male students. The results of descriptive statistical tests on student interest questionnaires can be seen in Figure 2.

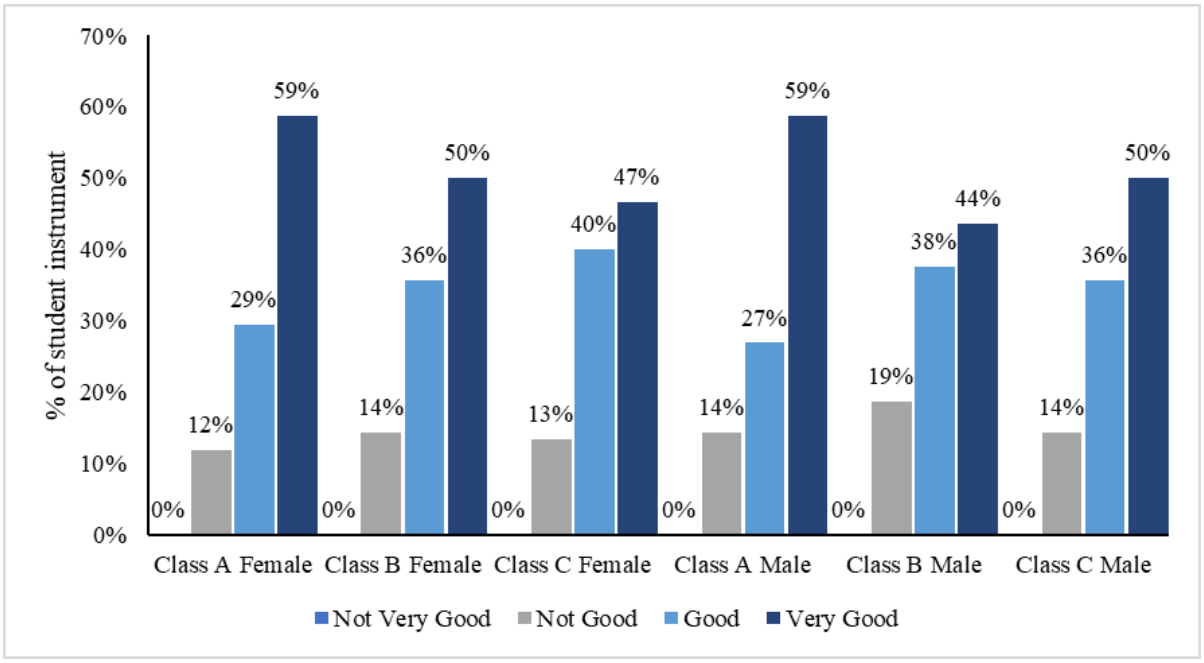


**Figure 2.** Description of Students' Perception of Mathematics Physics E-Module

Based on chart 2, it is known that the highest percentage of female students' interest in class A is in the very good category, namely 58.80%, and the interest of male students who are also in the very good category with a percentage of 58.80%. In this case, female students and male students in grade A have the same excellent interest in the same percentage. Furthermore, for the percentage of interest of


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female students in class B, the highest is in the very good category, namely 50.00%, and the percentage of interest of male students is also in the very good category, which is 43.70%. It can be seen that women have a higher percentage than male students. Furthermore, the highest percentage of female students' interest in class C was in the very good category, namely 46.70%, and the male students' interest was also very good in the very good category with a percentage of 50.00%. In grade C, male students are more interested in using the physics-mathematics electronics module.

The next step is to test assumptions, namely to test for normality and homogeneity tests as initial requirements before testing the hypothesis using the ANOVA test. The results of the normality test output can be seen in Table 6.

**Table 6.** The Output Results of the Normality Test of Students' Perceptions and Interests on the Mathematical Physics E-Module

| Variable | Gender | Class | Sig. |
|---|---|---|---|
| Student Perception | Female | Class A | 0.051 |
| | | Class B | 0.131 |
| | | Class C | 0.200 |
| | Male | Class A | 0.184 |
| | | Class B | 0.078 |
| | | Class C | 0.081 |
| Student Interest | Female | Class A | 0.145 |
| | | Class B | 0.200 |
| | | Class C | 0.051 |
| | Male | Class A | 0.114 |
| | | Class B | 0.200 |
| | | Class C | 0.149 |

Based on Table 6, it is seen that data on the perception and interest of male and female students in grades A, B, and C obtained a significance score of more than 0.05. So it can be concluded that all student perception data in each class and on each gender is normal.

After the data is normally distributed, the next step is to perform a homogeneity test to see the homogeneity of the data. The results of the SPSS output from the homogeneity test can be seen in Table 7.

**Table 7.** Result of Homogeneity Test of Student Perception and Interest Questionnaire for e-Module

| Variable | Gender | Sig. |
|---|---|---|
| Student Perception | Female | .073 |
| | Male | .744 |
| Student Interest | Female | .876 |
| | Male | .494 |

Based on Table 7, it can be seen that the acquisition of the significance of data on the perception and interest of male and female students is more than 0.05. So it can be concluded that the student's perception and interest data are all homogeneous.

Hypothesis testing can be done if the data are normal and homogeneous. The hypothesis test used in this study is to use the ANOVA test to see how the perceptions and interests of female students differ from those of male students. The results of the ANOVA test output can be seen in Table 8.

**Table 8.** Test Output Results of Students' Perceptions and Interests in the Mathematical Physics E-Module

| Variable | Gender | Sig. |
|---|---|---|
| Student Perception | Female | 0.020 |
| | Male | 0.006 |
| Student Interest | Female | 0.016 |
| | Male | 0.025 |

Based on Table 8, the significance value of the data on the perception and interests of male and female students obtained is smaller than 0.05. It can then be concluded that the average perception and interest of male and female students of all three classes towards e-modules in The Subject of


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Mathematical Physics differs significantly. The basis for decision-making on the ANOVA test is that if the significance value is less than 0.05, the average data is different, while if the significance value is greater than 0.05, the average data is the same.

The ANOVA test needs to be further tested if there is a significant average difference from the analyzed data. In this study, there was a significant difference in the average perception and interest between female students in grades A, B, and C in the Mathematical Physics e-module and male students. There was also a difference in the average perception and interest in the e-module. Mathematical Physics is significant between classes A, B, and C. Therefore, it is necessary to carry out further tests to determine which classes have different perceptions and interests, namely by using the Scheffe follow-up test. Scheffe's other test results can be seen in Table 9 and Table 10.

**Table 9.** Scheffe Advanced Test Output Results for Student Perception Questionnaire of the Mathematical Physics E-Module

| Gender | (I) Class | (J) Class | Mean Difference (I-J) | Sig. |
|---|---|---|---|---|
| Female | Class A | Class B | -4.49 | 0.116 |
| | | Class C | 1.67 | 0.723 |
| | Class B | Class A | 4.49 | 0.116 |
| | | Class C | 6.16* | 0.025 |
| | Class C | Class A | -1.67 | 0.723 |
| | | Class B | -6.16* | 0.025 |
| Male | Class A | Class B | 4.83* | 0.048 |
| | | Class C | 6.33* | 0.009 |
| | Class B | Class A | -4.83* | 0.048 |
| | | Class C | 1.5 | 0.739 |
| | Class C | Class A | -6.33* | 0.009 |
| | | Class B | 1.5 | 0.739 |

Based on table 9, to find out which class pairs have a significant difference in perception, it can be seen by looking at the significance value smaller than 0.05 (Sig. <0.05) or by looking at the asterisk in the mean difference column. Based on table 9 for female students, class pairs with significant differences in perceptions of the Mathematical Physics e-module are class pairs B and C with a significance value of 0.025 and an average difference of 6.16. As for male students, class pairs that significantly differ in average perception of the Mathematical Physics e-module are A and B and class pairs A and C. Where pairs class A and B have a significance value of 0.048 with a difference in the average perception of 4.83. The pairs of classes A and C have a significant value of 0.009, with a difference in the average perception of 6.33.

Furthermore, the Scheffe Student Interest Questionnaire for the Mathematical Physics E-Module results can be seen in Table 10.

**Table 10**. Scheffe Advanced Test Output Results for Student Interest Questionnaire for the Mathematical Physics E-Module

| Gender | (I) Class | (J) Class | Mean Difference (I-J) | Sig. |
|---|---|---|---|---|
| Female | Class A | Class B | 6.38* | 0.04 |
| | | Class C | 6.03* | 0.05 |
| | Class B | Class A | -6.38* | 0.04 |
| | | Class C | -0.34 | 0.991 |
| | Class C | Class A | -6.03* | 0.05 |
| | | Class B | 0.34 | 0.991 |
| Male | Class A | Class B | 5.79 | 0.08 |
| | | Class C | 6.66* | 0.046 |
| | Class B | Class A | -5.79 | 0.08 |
| | | Class C | 0.86 | 0.944 |
| | Class C | Class A | -6.66* | 0.046 |
| | | Class B | -0.86 | 0.944 |

Based on table 10 for female students, class pairs with significant differences in interest in the Mathematical Physics e-module are class A and B pairs and class A and C pairs. The significance


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value obtained is 0.040 for class A and B pairs with an average difference is 6.38, while for class A and C pairs, a significance value of 0.050 is obtained with an average difference of 6.03. As for male students, class pairs with a significant difference in average interest in the Mathematical Physics e-module are class pairs A and C with a difference in the average interest of 6,66.

Based on descriptive statistical tests in Table 6, Table 7, and Table 8, it is known that the average perception of female students in class B is more dominant to have a greater perception average than grades A and B, and compared to the perception of men in class A, class B, and class C. This can happen because women in class B more provide perception with excellent categories where the number of female students in class B is only 14 people. Furthermore, the highest student interest is among female students of class B. In class B, women have a higher interest in using electronic modules of mathematical physics. This can happen because female students in class B have more interest in excellent categories.

Furthermore, to find out the level of confidence that there is a significant difference between the data perception and interest obtained, ANOVA test where previously it has been known that the data is normality and homogeneous. The ANOVA test has found that female students between classes A, B, and C have an average of significant differences in perception of e-modules in mathematics physics. For students of the male gender, there was also an average of significant differences between the perception of male students in grades A, B, and C. To find out which classes have significant differences, it is necessary to do further tests after the ANOVA test. Further tests are only conducted if there is a significant difference in average perception, but there is no need for further tests if the average perception of students is the same. Because the results of the ANOVA test in this study showed that student perceptions were different, further tests were needed to find out which groups had significant differences. The follow-up test that the researchers used was Scheffe's advanced test which was chosen because the number of sample members from each class differed from the data analysis done by looking at the significance value of each class (Nasution, Bukit, & Ginting, 2016; Winarti & Kharis, 2014).

Table 9 shows which class pairs have significant differences in perception using the basic decision-making criteria of the Schaffe test. The basis for deciding on the Schaffe test is if the significance value is less than 0.05 (Sig. < 0.05), then there is a significant difference in perception between the two classes. In addition, it can also be seen by looking at the asterisks in the mean difference column, which means that there are differences between the two class groups. Based on Table 9 for female students, the class pairs that showed significant differences in perceptions of the Mathematical Physics e-module were class pairs B and C, with a significance value of 0.025 and an average difference of 6.16. For male students, the class pairs that showed a significant difference in the average perception of the Mathematical Physics e-module were class A and B pairs and class A and C pairs. Class A and B pairs had a significance value of 0.048 with an average difference perception of 4.83. Class A and C pairs have a significance value of 0.009 with a mean difference in perception of 6.33. Significant differences in perception between class groups can occur because the average value of perceptions obtained by class pairs has a fairly large difference. Furthermore, Based on Table 10 for female students, the class pairs that showed significant differences in interest in the Mathematical Physics e-module were class A and B pairs and class A and C pairs. Class A and B pairs had a significance value of 0.040 and an average difference of 6.38, then for pairs class, A and C had a significance value of 0.050 with an average difference of interest of 6.03. For male students, the class pairs that showed a significant difference in the mean perception of the Mathematical Physics e-module were the class pairs A and C, which had a significance value of 0.046 with a mean difference in the interest 6.66. Significant differences in interest between class groups can occur because the average scores obtained by class pairs have quite far differences.

Gender differences between men and women can affect the level of perception and interest a person has. Differences in perceptions that a person has can be caused by differences in the way each individual thinks and the basic knowledge possessed in providing perceptions of something that is both male and female (Aprillianti, 2017; Warliah, 2017; Khanifah & Adityawarman, 2020). A person's perception of something provides a reciprocal relationship (Astakoni, 2014; Erlintan, 2016; Rindayanti & Budiarto, 2017). Men generally have a courageous nature in taking risks but have a lower and indifferent perception than women, who are more sympathetic, and sensitive to the object seen (Musbah, Cowtown, & Tyfa, 2016; Rindayanti & Budiarto, 2017; Sofha & Utomo, 2018).


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Because they have high abilities, the perception of women is also high, so they have better perceptions than men.

Good perception and high interest in learning will determine the process and good learning outcomes. The success of the learning process can be seen from the achievement of good learning outcomes by the learning objectives that have been set (Pantic & Wubbels, 2012; Jayul & Irwanto, 2020). To achieve good learning outcomes, it is necessary to have students' involvement and active role during the learning process (Kazempour, 2014; Puspita, Supriadi, & Pangestika, 2018). Improving the quality of the learning process cannot be separated from the role of interactive e-modules (Herawati & Muhtadi, 2018; Kuswanto, 2019) so that students do not feel bored and can carry out the process independently, especially in Mathematical Physics learning.

This study's findings are that gender differences in each person can affect the perception and interest given to an object. In this study, students gave a very good perception of the mathematical physics e-module produced, and students had a very high interest in using the mathematical physics e-module as a learning medium as stated by Elpira & Ghufron (2015) that a person's perception, attention, and interest in science learning can affect learning achievement. If an appropriate and interesting learning media is used, it will make students interested in learning so that it can improve learning achievement. Muslimah & Hamidah (2014) state that interest closely relates to impulses, motives, and emotional responses.

Research on differences in learning interest that affects learning achievement between male and female students is supported by a theory—supporting theories regarding gender differences. According to Wilson (1975) from Harvard University, sociologically divides women's struggles into two major groups, namely the concept of nurture (cultural construction) and the concept of nature (natural). Meanwhile, according to Hollows (2010), the difference between women and men is divided into two roles, namely feminine roles and masculine roles. People's views on education based on gender are still considered to legitimize the differences between men and women. Based on the results of this study, it is known that the interest of female students is higher than that of male students. This is in line with the results of research by Ngadiran et al. (1981), who examined differences in interests that affect academic achievement between male and female students at FPIPS-IKIP Yogyakarta, where the results showed that the average score of male students was higher than that of male students. Significantly lower than female students. The cause differences are also caused by students' internal factors, namely diligence and consistent behavior in learning, where female students are more diligent and consistent in the learning process (Sayidani, Irianto, & Fuady, 2016).

Therefore, the results of this study can contribute to improving the quality of education in increasing the effectiveness of using media in learning. Through these findings, educators can consider the influence of gender in providing perceptions and interest in the learning media used, especially in learning mathematics and physics, so that the use of learning media can be selected as the best media that can increase student interest in learning, both male and female. From the results of this study, the e-module got a very good perception, and students had a high interest in using this e-module so that the mathematics physics e-module could be used by students in learning mathematics physics in class and outside the classroom as a form of independent learning.

Mathematical physics is very important in learning in college, especially in the study program physics education. Therefore, there need to be interactive teaching materials used in learning to facilitate students in understanding mathematical physics materials. To find out if the teaching materials used by educators can be used by students effectively and efficiently, educators need to see how students perceive the teaching materials used, such as e-modules of mathematical physics. Moreover, educators must know whether the teaching materials used can increase students' interest in learning or not in learning. Educators look at perceptions and interests and review sex differences because gender is one of the factors that can affect students' perceptions and interests. The results obtained from this study are expected to help educators improve the quality of learning by using teaching materials that can be used effectively and efficiently by students. Then, the next researcher is expected to perfect the research done by adding other variables to be studied.

## CONCLUSION


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The perceptions that each individual has can vary from an observed object. Different perceptions of each individual can be caused by the difference in sex of each individual. Based on research that has been conducted on students' perception of e-modules of mathematical physics reviewed by gender, the conclusion is that overall for the average student perception of e-modules of mathematics physics that students best own with female gender, namely in class B with an average of 51.43. Furthermore, the average student interest in e-modules of mathematics physics is best also owned by students of the female gender, namely in class B, with an average of 51.33. Thus, female students in class B of FKIP's physics education study program at Jambi University are more dominant in having a better average perception and interest in e-modules of mathematical physics than students of the male gender. Furthermore, based on the ANOVA test results, there is a significant difference in the perception and interest of students of FKIP physics education at Jambi University towards using electronic modules of mathematical physics with a confidence level of 95% with a significance value used is 0.05.

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