



This work is licensed under

a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

Gender Perception: Study of Students' Perceptions of the Electronic Module Linear Equations Mathematics and Physics I

Astalini¹, Dwi Agus Kurniawan², Darmaji³, Shella Maryani^{4*}

Universitas Jambi, Indonesia^{1,2,3,4}

^{*})Corresponding E-mail: shellamaryani27@gmail.com

Received: June 14th, 2021. Revised: February 28th, 2022. Accepted: March 11th, 2022

Keywords :

Perception; E-Module;
Mathematics Physics I

ABSTRACT

This research was conducted to answer how students' perceptions based on gender towards the E-module of Mathematical Physics I. The research methodology used a quantitative research type which was analyzed using descriptive and inferential statistical analysis techniques. Technique sampling used a purposive sampling technique with the criteria that students were or had followed the physics mathematics course. The sampel is using of 60 students. With data collection the instrument used was a student perception questionnaire. By using the T test results in class A sig.2 tailed value of $0.728 > 0.05$. Whereas in class B found a sig.2 tailed value of $0.034 < 0.05$, this can be concluded that there is a significant (real) difference between students' perceptions of the E-Module Mathematical Physics I. It is hoped that the Flip PDF Professional researcher will conduct an in-depth analysis of the relationship between gender and perception. on other Mathematical Physics materials I.

INTRODUCTION

Education has a very important role in educating the nation's life, this is in accordance with the ideals of the Indonesian state as stated in the 1945 Constitution. Education can be understood as a set of practices that have the function of educating and directing others which can be described as the achievement of a sustainable process [1] [2] [3]. In line with the industrial revolution 4.0, various technologies have developed so rapidly that it implies that teachers must be able to use digital technology [4]. Improving the quality of education is needed to achieve good learning outcomes in accordance with the curriculum targets [5] [6]. In Teaching 4.0, there is a change in digital learning that requires technology to be part of the process.

One of the impacts of technology development has to do with education. The rapid development of information and communication technologies encourages the emergence of innovations in education that enable interactive learning [7] [8]. The development of digital technology today has given many advantages to produce digital subject matter that is more focused, dynamic, interactive, flexible, and easy to use for anyone in accessing various information and connected without borders, without limited space and time [9] [10] [11] [12]. The use of technology as digital hardware and software

related to or utilizing computing and data is used to improve the effectiveness, efficiency and attractiveness of e-learning [12] [13] [14].

E-learning has emerged as a new alternative to conventional learning systems, to achieve educational goals for everyone where teachers are facilitators as messengers, as well as expected learning where participants are more active in pursuing knowledge [15] [16]. The use of e-learning relies on digital technology in the teaching and learning process, including to achieve educational goals through adequate education [17] [18]. E-learning has become an important trend in educational reform as it provides opportunities for more natural interaction [19] [20] [21] [22]. Besides the existence of e-learning as a form of technology use, another form of technology use in teaching is the e-module which serves as a learning medium.

Education in Indonesia has undergone many developments in the use of learning media as a complementary material for teaching books that are able to facilitate student learning activities as one form of technology utilization [23] [24] [25] [26]. The Learning Module is a learning resource that contains materials, methods and assessments systematically designed to support the successful implementation of the learning process [27] [28]. Module preparation has an important role in physics learning because it can accelerate the dissemination of information, improve students' literacy skills by having an advantage compared to print media [29] [30] [31]. In the research, the E-module was designed in the form of a flipbook using the Flip PDF Professional application.

Related to the development of teaching materials, currently the development of teaching materials in the form of modules is a very urgent need [32]. modules that are packaged in electronics or commonly called e-learning modules that are interesting and contextual [33]. By using In this e-module, students are directed to learn independently in new knowledge by using existing knowledge previously. Students learn independently without expecting all material is transferred by the subject lecturer and discover existing concepts yourself with the discovery module guided to be designed.

Perception is a process of students interpreting, evaluating, accepting, giving opinions, and testing the data and responses of the five senses that become the basis for applying modifications and thus optimizing the educational environment because it affects the effectiveness of teaching and learning [34] [35] [36]. Student perception is a critical dimension that determines their satisfaction with e-learning courses; positive attitude, and expectations about curricular goals and tasks to be completed [37] [38] [39]. Student perception also determines teachers' ability to acquire legitimate and essential knowledge as stakeholders in educational assessment reform [40] [41]. Consequently, it is necessary to evaluate the perception of students of flipbook maker-based E-modules in Mathematics Physics I courses with Linear equation material that will be used as a learning medium. In the process of learning science and technology involving male students, and female students, it is expected that there is no gender rather than gender bias or usually called gender bias. The gender gap associated with differences in roles, functions and responsibilities actually starts from the earliest level of children getting to know learning through socialization in the family [42] [43] [44].

Mathematical physics is a combination of physics and mathematics subjects, which is a compulsory course for physics education students that aims to enable students to have the ability to formulate various physical processes into mathematical statements and be able to complete them analytically, quantitatively, and predictively based on formulated reasoning models [45] [46]. According to research conducted by Ayu et al [47] Students' lack of understanding of the materials and problems provided is the reason for students' low motivation to learn. One solution to motivate students to learn Physics Matematika is to make teaching materials in the form of E-modules make students can learn independently, interactive learning, user friendly view, easy access to the cloud, practical to read, and do not require paper as print media [48].

The novelty of development this e-module teaching material contains learning videos, quizzes and animations that will foster student interest in learning. This learning video is contained in a online learning and quizzes in each sub-chapter of material study, so that students can do independent

exercises. The advantages of this e-module are contained in the form of an attractive flipbook which is distributed via a link and a qr code so that students who use it do not need an additional application to access it. This can help students understand teaching materials because there are learning instructions and understanding concepts in a coherent manner [49]. Students can repeat or re-learn the material according to their needs because the module can be studied alone at home [50].

Consequently, it is necessary to measure the students' perception of e-modules as a reference for the efficiency of the process as teaching material. So the researchers did this study in response to the following questions:

1. How do students perceive the E-module of Mathematical Physics?
2. How does the perception of Class A students compare by gender with the Mathematical Physics E-module?
3. How does the perception of Class B students compare on a gender basis with the Mathematical Physics E-module?

METHOD

Research Design

This research uses a type of quantitative research. Quantitative research has a positivity paradigm, in which the world to be researched is seen as an objective reality, but qualitative research is a naturalistic paradigm, in which the world to be studied is seen as subjective reality because in this study in the form of numbers and data analysis using statistical data [51] [52]. Quantitative research reports are very rapid in their development, this research is usually compiled about four parts: Introduction, Methods, Results, and Discussion [53] [54]. This quantitative analysis represents a class because each class contains many analytical approaches that can be further divided into specific types of analysis [55]. Quantitative data from this study were obtained from a questionnaire. With the data collection instrument used in the form of a student perception questionnaire that is assessed based on aspects of a good e-module criteria must consist of aspects of the E-Module Display, aspects of Presentation of Materials in the E-Module and aspects of the Benefits of the E-Module [56].

Participants

Population is the entire object object of a person who has certain characteristics set by researchers and then studied and concluded while the number of samples is the total number of population [57] [58] [59] [60] [61]. The sample is part of the population of this study is physics education students class 2019 in regular class A and regular B. The number of samples in this study is a total of 60 students with a ratio of 32 female students and 28 men taken using total sampling techniques. The sample technique used at the time of data retrieval is a total sampling technique that is to make all populations into data retrieval samples [62].

Data Collection Tools

Questionnaire is a way of obtaining or collecting data by sending a list of questions or statements to respondents or research subjects [63] [64]. The questionnaires used by the researchers used a Likert scale approach. Likert scale is often used as an assessment scale, because it provides different scores or scores, for example Very Good (VG) = 4, Good (G) = 3, Not Good (NG) = 2, and Not Very Good (NVG) = 1 [65] [66] This research questionnaire was used to determine the feasibility of the e-module [67]. Questionnaires are often used in data collection methods [68], in this study using perception questionnaire by adopting on the assessment conducted by Riyana [69] with the number of questions in the questionnaire amounted to 15 points with assessment indicators in the form of display of teaching materials, presentation of materials in teaching materials and the usefulness of E-Modules. The E-module assessment indicator grid is attached in table 1

Table 1. E-Module Assessment Indicator Grid

No	Assessment Indicators	Rated aspect	Declaration Number
1	E-Module Display	Text clarity	1
		Multimedia size suitability	2
		The clarity of the color and shape of the image	3
		Good multimedia display quality	4
		Multimedia that is presented is attractive	5
2	Presentation of Material in the E-Module	The material is easy to understand	6
		The order of the material is clear	7
		The sentences used are simple and easy to understand	8
		The language used is communicative	9
		Sample suitability with material	10
		The suitability of multimedia with the material	11
3	Benefits of the E-Module	Ease of use of modules	12
		Media can help students understand the material	13
		Interest in using modules	14
		Increased motivation to learn	15

The intervals in the classification for students' perception scores of the E-Module in Mathematics Physics I are as follows.

Table 2. Student Perception Score Classification

Interval	Category
15.00 - 26.25	Invalid
26.26 - 37.50	Less
37.51 - 48.75	Good
48.76 - 60.00	Excellent

Data Analysis

Research with descriptive type is a research method that seeks to describe and interpret objects as they are. With the aim of explaining or describing a situation as it is and interpreting objects according to what they are, events, or everything related to variables that can be explained both with numbers and words in charge of organizing and analyzing data, numbers, in order to provide an overview in an orderly, concise, and clear manner, regarding a symptom, event or situation, so that a certain understanding or meaning can be drawn [70] [71]. Data analysis techniques include assumption tests (normality test and homogeneity test) and hypothesis testing using the Independent sample T test.

Assumption Test

According to Sembiring [72] and Septian [73], Assumption test includes normality and homogeneity test. In Normality test, The normality test was carried out to see that the data were normally distributed as seen from the significance value. The guideline for decision making is if the significant value is < 0.05 the data is not normal and vice versa if the significance value is > 0.05 the data is said to be normal. The normality test of the data distribution used was the Kolmogorov Smirnov test using SPSS. Homogeneity Test, The homogeneity test of the data was carried out to see the level of homogeneity with the assumption that the data was homogeneous by looking at Levene's Test for Equality of Variance on SPSS software with the test criteria used were $\text{sig} >$ with a level of $= 0.05$.

Hypothesis Test, using anova test. One Way Anova analysis or ANOVA test aims to compare the average values contained in the dependent variable in all groups being compared. Basis of decision making of ANOVA test. If the significance value (sig) > 0.05 then the average is the same, If the significance value (sig) < 0.05 then the average is different.

RESULTS AND DISCUSSIONS

Result

There has been a discussion of research to measure students' perception of E-modules as teaching materials. The update of this study is about the material attached in the E-Module, the use of flipbook software that uses Flip PDF Professional as well as different samples and populations, namely Regular A class and Regular B class of Physics education of Jambi University year 2019.

Table 3. Descriptive test based on gender in class A

Class A	Interval	f	(%)	Categories	Mean	Median	Modus	Max	Min
Boys	15.00 – 26.25	0	0%	Not Very Good	50.7	52.00	52.00	59.00	35.00
	26.25 – 37.50	1	7.1%	Not Good					
	37.51 – 48.75	4	28.6%	Good					
	48.76 – 60.00	9	64.3%	Very Good					
Girls	15.00 – 26.25	0	0%	Not Very Good	47.93	48.50	42.00	58.00	37.00
	26.25 – 37.50	1	6.3%	Not Good					
	37.51 – 48.75	7	43.8%	Good					
	48.76 – 60.00	8	50.0%	Very Good					

Based on table 3 on descriptive tests based on gender in grade A, results for male gender were obtained by 7.1% of male students who had poor perception of E-module, 28.6% of male students who had good perception of E-module, and 64.3% of male students who had a very good perception of E-module. With an average value of 50.7, a middle value of 52.00, a data mode of 52.00 with a top score of 59.00 and a low of 35.00. while for A-grade students who are female, 6.3% of female students have a poor perception of E-module. 43.8% of students have a good perception of E-modules, and as many as 50.00% of female students have a very good perception of E-modules. With an average score of 47.93, a middle value of 48.50, a data mode of 42.00 with a top score of 58.00 and a low of 37.00.

Table 4. Descriptive Test Based on Gender in Class B

Class B	Interval	f	(%)	Categories	Mean	Median	Modus	Max	Min
Boys	15.00 – 26.25	0	0%	Not Very Good	51.21	52.00	43.00	59.00	43.00
	26.25 – 37.50	0	0%	Not Good					
	37.51 – 48.75	6	42.9%	Good					
	48.76 – 60.00	8	57.1%	Very Good					
Girls	15.00 – 26.25	0	0%	Not Very Good	49.75	48.00	53.00	58.00	43.00
	26.25 – 37.50	0	0%	Not Good					
	37.51 – 48.75	9	56.3%	Good					
	48.76 – 60.00	7	43.8%	Very Good					

Meanwhile, based on table 4 on descriptive tests based on gender in grade B, results for male gender were obtained by 42.9% of male students who had good perception of E-module, and 57.1% of male students who had a very good perception of E-module. With an average value of 51.21 with a middle value of 52.00, the data mode is 43.00 with the highest value of 59.00 and the lowest value of 43.00. while for grade B students who are female, 56.3% of students have a good perception of E-module, and as many as 43.8% of female students have a very good perception of E-module. With an average score of 49.75, with a middle value of 49.75, a data mode of 48.00 with a high of 58.00 and a low of 43.00.

Table 5. Normality Test and Homogeneity Test

		One-Sample Kolmogorov-Smirnov Test		Test of Homogeneity of Variances			
		A		Levene Statistic	df2	df2	Sig.
N			30				
Normal Parameters ^{a,b}	Mean		0.000000				
	Std. Deviation		6.1283767				
	Most Extreme Absolute Differences		.101	0.410	1	58	.524
	Positive		.084				
	Negative		-.101				
Test Statistic			.101				
Asymp. Sig. (2-tailed)			.200 ^c				

a. Test distribution is Normal

Normality test is one of the prerequisites to conduct T test, where this Normality test is used for the state of a data under normal circumstances or not. The basis of decision making taken for kolmogorov-smirnof normality test decision making is that if the sig value is greater than 0.05 then the research data is normally distributed. Based on the table above it is found that the sig value. $0.200 > 0.05$, it can be said that the data is normally distributed. Flip PDF Professional once we know that the data is normally distributed we will do a homogeneity test.

In statistical analysis, homogeneity test aims to find out whether the data variation from the sample population has the same variation or not, just like normality test, homogeneous test is also one of the prerequisites in comparative analysis such as Independent T test. However, this homogeneity test is not an absolute prerequisite meaning that even though the variance of data is not the same or not homogeneous, independent test T test samples can still be done to analyze the research data, but for decision making refers to the results of equal variance not assumed. Based on the table above shows that the sig is 0.524 then based on the prerequisite test T test where if the value of $\text{sig} > 0.05$ can be taken the decision that the variance of two or more population groups of data is the same (homogeneous). Then the data can be tested using an independent t test sample.

Table 6. Independent Sample t Test for class A and class B

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper	
PERSE PSION	Equal variances assumed	.410	.524	-.349	58	.728	-.56667	1.62388	-3.81721	2.68387
	Equal variances not assumed			-.349	57.863	.728	-.56667	1.62388	-3.81737	2.68404

In table 6 about the independent sample T test, where the independent T test is a statistical analysis that aims to compare two samples that are not paired with each other. While the purpose of this independent T test sample is to compare two samples in pairs. In this study, the independent T test sample test was to compare the perception of students in grade A and grade B against E-Module

Physics Mathematics I in linear equations. Based on the uoutput table in SPSS above it is known that the number of class A data as many as 30 students while the number of data in class B as many as 30 students. Based on the sign results contained in the table is $0.524 > 0.05$ can be taken decisions homogeneity data, it can be concluded that the variance of class A and class B data regarding perception of E-Module is the same or homogeneous. As for the sig.2 tailed value of $0.728 > 0.05$, the basis of decision making in the independent T test can be concluded that there is no significant (noticeable) difference between students' perception of E-Module in grade A and Class B. researchers are interested in conducting an in-depth analysis of gender differences in student perception.

Table 7. Independent Sample t Test in Class A

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Percepti on	Equal variances assumed	.005	.944	2.811	28	.009	5.93333	2.11044	1.61029	10.25638
	Equal variances not assumed			2.811	27.408	.009	5.93333	2.11044	1.60608	10.26059

Based on the table above can be known for independent test T test conducted against class A has a sign value. (2-tailed) is worth 0.009. then for the analysis of data with a tailed sig.2 value of $0.009 < 0.05$ can be made decision making in the independent test T test concluded that there is a significant difference (real) between students' perception of E-Module in class A based on gender perception in the research sample.

Table 8. Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Perception	Boys	15	52.2000	6.18985	1.59821
	Girls	15	46.2667	5.33809	1.37829

By looking at the difference in the average student perception based on gender, it is known that the average score for A-grade students with male gender has an average nili of 52.2. while the average score for A-grade students with female gender has an average of 46.27. it can be concluded that the perception value of A-grade students with male gender has a higher average value than the average value of female gender

Table 9. Independent Sample t Test in Class B

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Percepti ion	Equal variances assumed	1.545	.224	2.223	28	.034	3.75893	1.69106	.29494	7.22291
	Equal variances not assumed			2.247	27.989	.033	3.75893	1.67284	.33220	7.18566

Based on the table above can be known for independent test T test samples conducted against class B has a sign value. (2-tailed) is worth 0.034. then for the analysis of data with a tailed sig.2 value of $0.034 < 0.05$ can be made decision making in the independent test T test concluded that there is a significant difference (real) between students' perception of E-Module in class B based on gender perception that is in the research sample.

Table 10. Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Perception	Boys	14	53.5714	4.21927	1.12765
	Girls	16	49.8125	4.94259	1.23565

Based on the results of data analysis using SPSS to conduct independent T test. By looking at the difference in the average student perception based on gender, it is known that the average score for B-grade students with male gender has an average nili of 53.57. while the average score for A-grade students with female gender has an average of 49.8125 nili. it can be concluded that the perception value of students class B with male gender has a higher average value than the average value of female gender.

Discussions

Based on the results of data analysis using descriptive data analysis techniques, for the sample of class A population with male gender was found as much as 7.1% of male students who have a poor perception of E-module, 28.6% male students male students who have a good perception of E-module, and as many as 64.3% male students who have a very good perception of E-module. As for women, 6.3% of students have a bad perception of E-module. 43.8% of students have a good perception of E-modules, and up to 50.00% of students have an excellent perception of E-modules. As for the sample of class B population with male gender, 42.9% of male students were male students who had a good perception of E-module, and as many as 57.1% of male students who had a very good perception of E-module. As for women of gender, 56.3% of students have a good perception of the E-module, while 43.8% of students have a very good perception of the E-module. This explains why the average student gives a better perception response with a range in the category strongly agreeing to the E-module of Mathematical Physics on the hardware of linear equations.

After data analysis through descriptive data analysis techniques. Furthermore, the researchers will test using the normality test and the homogeneity test, this test is a prerequisite for inferential data analysis techniques using independent T-test samples. The results of the analysis in daptakan for the normality test using the Kalmogrov-Smirnov test have been found for the sig value. $0.200 > 0.05$ means that the data is normally distributed. After the data distribution has been confirmed as normal, the data will be tested for homogeneity by conducting a homogeneity test. In this test, it was found that the sig amounted to 0.782 then based on the prerequisites of the T test test where if the $sig > 0.05$ value is then it is said that the variance of two or more population groups of data is the same (homogeneous). In homogeneity tests, a sig value of $0.524 > 0.05$ proved to be the decision that the variance of two or more population groups was the same (homogeneity). Therefore, on the basis of the two tests above, it can be concluded that the data can be tested through an independent sample T-test.

After the T test, it was found that for the comparison of the perception of grade A and Grade B students to the E-Module of Mathematical Physics in linear equations material was not found a noticeable difference, then researchers tested the comparison of student perception in grade A and grade B with the differences in gender of men and women, it was found that there were noticeable differences to the perception of E-Module. This can be demonstrated by the average perception value of male students being higher than the average perception value of gender for women. This is because male students tend to be more capable of thinking critically about math equipment than female students. This assumption is reinforced by the research conducted by Anggoro [74] in his research found the conclusion that the disposition of high mathematical creative thinking is found in students

with male gender. The level of ability to think critically of the mathematics of male students is caused by differences in treatment among men and women at home and school. This is in accordance with the research conducted by Cahyono [75] in his research mentioned that differences in treatment and assumptions are very influential on the identity and development of academic students.

In a similar discussion, it was found that the perception of students with female gender is lower than the perception of students with male gender towards E-Module of Mathematical Physics in Linear Equations material. This is because female students have more critical thinking to assess the appearance and material contained in the E-module. Female students tend to be more real in the evaluation of available e-modules, female students will be more critical with a higher standard than male students. This is reinforced by research conducted by Feriyanto [76] with the results of research that female subjects have the ability of verbal representation with complete and precise good, so that female gender has better representation capabilities compared to men. This is supported by research conducted by Umaroh & Pujiastuti [77] with the results of research that concluded that female students have good visual, symbolic, and verbal representation skills capable of researching and good at drawing conclusions, but female students tend to have low levels of confidence.

Based on the above study, several similar studies were found that examined student perceptions of digital electronic-based learning, this was explained by Febro et al [78] that the digital gender gap is still a big challenge that needs to be addressed in poor rural and urban populations in developing countries. Therefore, it is necessary to study student perceptions of e-module teaching materials as digital electronic-based learning media. While students' perceptions of e-modules based on gender can be explained by research conducted by Nurramadhani et al [79] Boys have outperformed in understanding, relationship, and evaluation categories of female students, while female students have outperformed in information, findings & solutions than male students. This is in accordance with the findings of researchers in this study where men have a higher level of creative thinking in solving problems so that men's perceptions of e-modules are higher.

At the time of learning using E-module Mathematical Physics on the materials of linear equations as instructional material. Students give the perception that E-Module is very helpful in providing materials and providing teaching materials that are practical, interesting, and generate motivation in learning. The e-module itself provides interactive learning materials, where students not only read the text but also see the animation of the process resembles the actual process so as to facilitate the understanding of students [80]. E-modules contain learning objectives, materials, exercises, methods, and ways of evaluating that are systematically designed and interesting to be used independently or with educator guidance in order to achieve the expected competencies. In addition, another analysis was carried out regarding the factors that influence the presence of students who gave responses in the unfavorable category. After reviewing it, it turned out that there were several things that influenced the use of E-Modules including Smartphones or learning hardware that was less supportive and networks or connections. Internet students who experience problems inhibit the use of E-Modules to the fullest. This is in accordance with research conducted by Feriyanti [81] which states that e-modules also have some basic weaknesses, namely that they require a large amount of money and take a long time to procure or develop the module itself, and require high persistence from the teacher as a facilitator to continuously monitor the student learning process. This is also supported by research conducted by where the E-Module download process requires internet quota [82]

From the statement regarding other factors that cause students' poor perceptions of e-modules, it is hoped that further research will design 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 E-modules. module when used during learning. By combining other applications and other teaching materials and other materials. The need for research on student perceptions is because perception is a process that starts from the use of the five senses in receiving a stimulus, then it is organized and interpreted so that it has an understanding of what is sensed [83]. The importance of student perceptions is used as a reference for the suitability of teachers in providing teaching materials, can be used as an evaluation of learning by teachers to make learning more effective. Effective

learning will improve the quality of learning so that educational assessments are more focused. Therefore, it is necessary to assess students' perceptions of the professional flip pdf-based E-module in the Mathematics Physics I course material on Linear Equations.

CONCLUSION AND SUGGESTION

Based on data analysis using the Anova hypothesis test, it was found that the perceptions of male and female students were different, where the perception of male students was higher than the perception of female values. Men's perceptions are higher than women's because men tend to have the ability to think critically about mathematics-related material compared to female students who have verbal representations. It is hoped that further researchers will be able to carry out an in-depth analysis of the relationship between gender and perceptions of other Mathematics Physics I materials. besides that it is also developed in e-modules by adding other more effective learning media such as the availability of many interactive videos, more modern animation effects, quiz, and can be available offline in the form of applications.

ACKNOWLEDGMENTS

We are grateful to all parties who contributed to this research, especially to the dean, we are grateful to all parties who contributed to this research, especially to the dean of the Faculty of Teacher Training and Education, Jambi University, who has allowed this research. along with students of Physics Education class 2019 at Jambi University who are willing to be the subjects of this research.

REFERENCES

- [1] Edwards, R. (2009). Introduction: Life as a learning context?. In *Rethinking contexts for learning and teaching* (pp. 13-26). Routledge.
- [2] Edwards, R., Ivanič, R., & Mannion, G. (2009). The scrumpled geography of literacies for learning. *Discourse: Studies in the cultural politics of education*, 30(4): 483-499.
- [3] Veiga-Neto, A., & Lopes, M. C. (2017). Education and pedagogy: A Foucauldian perspective. *Educational Philosophy and Theory*, 49(7): 734-741.
- [4] Darmaji, D., Kurniawan, D. A., Astalini, A., & Nasih, N. R. (2019). Persepsi mahasiswa pada penuntun praktikum fisika dasar II berbasis mobile learning. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 4(4): 516-523.
- [5] Kapitan, Y. J., Harsiati, T., & Basuki, I. A. (2018). Pengembangan bahan ajar menulis teks cerita fantasi bermuatan nilai pendidikan karakter di kelas VII. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 3(1): 100-106.
- [6] Sukaningtyas, D., & Sa'ud, U. S. (2016, August). Developing the Capacity of School Management to Build Understanding of Vision and Mission. In *6th International Conference on Educational, Management, Administration and Leadership* (pp. 53-58). Atlantis Press.
- [7] Billman, A., Harding, A., & Engelbrecht, J. (2018). Does the chalkboard still hold its own against modern technology in teaching mathematics? A case study. *International Journal of Mathematical Education in Science and Technology*, 49(6): 809-823.
- [8] Nofaizzi, M. U., Ulfa, S., & Kuswandi, D. (2020). Pengembangan Pembelajaran Berbasis Web dengan Menggunakan Teori Belajar Generatif. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 5(4): 537-543.
- [9] Dabbagh, N. (2002). The evolution of authoring tools and hypermedia learning systems: Current and future implications. *Educational Technology*, 42(4): 24-31.
- [10] Du, X., Zhang, M., Shelton, B. E., & Hung, J. L. (2022). Learning anytime, anywhere: a spatio-temporal analysis for online learning. *Interactive Learning Environments*, 30(1): 34-48.
- [11] Farida, R., Alba, A., Kurniawan, R., & Zainuddin, Z. (2019). Pengembangan Model

- Pembelajaran Flipped Classroom Dengan Taksonomi Bloom Pada Mata Kuliah Sistem Politik Indonesia. *Kwangsan: Jurnal Teknologi Pendidikan*, 7(2): 104.
- [12] Chaeruman, U. A. (2020). Ruang belajar baru dan implikasi terhadap pembelajaran di era tatanan baru. *Kwangsan: Jurnal Teknologi Pendidikan*, 8(1): 142-153.
- [13] Anaraki, F. (2004). Developing an effective and efficient elearning platform. *International Journal of the computer, the internet and management*, 12(2): 57-63.
- [14] Bahreini, K., Nadolski, R., & Westera, W. (2016). Towards multimodal emotion recognition in e-learning environments. *Interactive Learning Environments*, 24(3): 590-605.
- [15] Finkel, K. (2017). Investigating the lived experience of writing and technology. *Oxford Review of Education*, 43(3): 348-364.
- [16] Premalatha, K. R., Dharani, B., & Geetha, T. V. (2016). Dynamic learner profiling and automatic learner classification for adaptive e-learning environment. *Interactive Learning Environments*, 24(6): 1054-1075.
- [17] Luo, N., Zhang, Y., & Zhang, M. (2019). Retaining learners by establishing harmonious relationships in e-learning environment. *Interactive Learning Environments*, 27(1): 118-131.
- [18] Douce, C. (2015). E-learning and disability in higher education. *Open Learning: The Journal of Open, Distance and e-Learning*, 30(1): 89-92.
- [19] Kong, S. C. (2018). Parents' perceptions of e-learning in school education: Implications for the partnership between schools and parents. *Technology, Pedagogy and Education*, 27(1): 15-31.
- [20] Njenga, J. K., & Fourie, L. C. H. (2010). The myths about e-learning in higher education. *British journal of educational technology*, 41(2): 199-212.
- [21] Liao, J., Wang, M., Ran, W., & Yang, S. J. (2014). Collaborative cloud: a new model for e-learning. *Innovations in Education and Teaching International*, 51(3): 338-351.
- [22] Njenga, J. K. (2018). Sociocultural paradoxes and issues in e-learning use in higher education Africa. *Globalisation, Societies and Education*, 16(1): 120-133.
- [23] Chumaidi, A. C., Sulton, S., & Sulthoni, S. (2016). Pengembangan Multimedia Interaktif Mata Pelajaran Biologi Kelas X Semester II di SMA Wahid Hasyim Model Lamongan. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 1(3): 507-520.
- [24] Nuha, U., Amin, M., & Lestari, U. (2016). Pengembangan buku ajar berbasis penelitian evolusi dan filogenetik molekuler untuk matakuliah evolusi di Universitas Jember. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 1(9): 1791-1796.
- [25] Puspa, A., Latief, M. A., & Iragiliati, E. (2018). English for academic purposes: e-module of writing a report for food processing technology students. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 3(3): 371-376.
- [26] Okdriani, E., & Fauzi, A. (2019, April). Media Analysis in the development of E-Physics Module to improve the Hurricane Disaster Preparedness. In *Journal of Physics: Conference Series* (Vol. 1185, No. 1, p. 012105). IOP Publishing.
- [27] Taufiqy, I. R., Sulthoni, S., & Kuswandi, D. (2016). Pengembangan Bahan Ajar Digital Berlandaskan Model Guided-Project Based Learning. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 1(4): 705-711.
- [28] Sopacua, J., Fadli, M. R., & Rochmat, S. (2020). The History Learning Module Integrated Character Values. *Journal of Education and Learning (EduLearn)*, 14(3): 463-472.
- [29] Sundaygara, C., Pratiwi, H. Y., & Hudha, M. N. (2018). Pengembangan bahan ajar media pembelajaran fisika dengan pendekatan multi representasi untuk meningkatkan kemampuan pembuatan alat-alat praktikum calon guru fisika. *Momentum: Physics Education Journal*, 2(2): 86-93.
- [30] Kurniawan, D. A., Kurniawan, W., Anwar, K., & Lumbantoruan, A. (2019). Students' Perceptions of Electronic's Module in Physics Practicum. *Journal of Education and Learning (EduLearn)*, 13(2): 288-294.
- [31] Permata, S. D., & Mustadi, A. (2020). Reflective Modul Berbasis Child Friendly School untuk Meningkatkan Kemampuan Literasi dan Karakter Siswa. *Kwangsan: Jurnal Teknologi Pendidikan*, 8(02): 251-274.
- [32] Hartono, W., & Noto, M. S. (2017). Pengembangan modul berbasis penemuan terbimbing untuk meningkatkan kemampuan matematis pada perkuliahan kalkulus integral. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 1(2): 320-333.

- [33] Ningsih, S. Y., & Mahyuddin, N. (2021). Desain e-module tematik berbasis kesantunan berbahasa anak usia dini di taman kanak-kanak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(1): 137-149.
- [34] Chen, Y. H., & Wang, C. H. (2018). Learner presence, perception, and learning achievements in augmented–reality–mediated learning environments. *Interactive learning environments*, 26(5): 695-708.
- [35] Goodlad, K., Westengard, L., & Hillstrom, J. (2018). Comparing faculty and student perception of academic performance, classroom behavior, and social interactions in learning communities. *College Teaching*, 66(3): 130-139.
- [36] Howland, J. L., & Moore, J. L. (2002). Student perceptions as distance learners in Internet-based courses. *Distance education*, 23(2): 183-195.
- [37] Martens, R., Bastiaens, T., & Kirschner, P. A. (2007). New learning design in distance education: The impact on student perception and motivation. *Distance education*, 28(1): 81-93.
- [38] Martín-Rodríguez, Ó., Fernández-Molina, J. C., Montero-Alonso, M. Á., & González-Gómez, F. (2015). The main components of satisfaction with e-learning. *Technology, Pedagogy and Education*, 24(2): 267-277.
- [39] Hostetler, K. D. (2016). Beyond reflection: Perception, virtue, and teacher knowledge. *Educational Philosophy and Theory*, 48(2): 179-190.
- [40] Huang, R., & Jiang, L. (2021). Authentic assessment in Chinese secondary English classrooms: teachers' perception and practice. *Educational Studies*, 47(6): 633-646.
- [41] Zarei, M., Ahour, T., & Seifoori, Z. (2020). Impacts of implicit, explicit, and emergent feedback strategies on EFL learners' motivation, attitude and perception. *Cogent Education*, 7(1): 1727130.
- [42] Astuti, T. M. P. (2013). Bias Gender Dalam Ilmu Pengetahuan Dan Teknologi. *Jurnal Ilmiah Infokam*, 3(2).
- [43] Mz, Z. A. (2013). Perspektif gender dalam pembelajaran matematika. *Marwah: Jurnal Perempuan, Agama Dan Jender*, 12(1): 15-31.
- [44] Fauzan, F., Fathurrohman, M., & Syamsuri, S. (2020). Perbedaan Persepsi dan Kemandirian Belajar Siswa SMA Terhadap Pembelajaran Daring Ditinjau Dari Gender. *TIRTAMATH: Jurnal Penelitian dan Pengajaran Matematika*, 2(2).
- [45] Ellinawati, S. W. (2012). Pengembangan Bahan Ajar Fisika Matematika Berbasis Self Regulated Learning Sebagai Upaya Peningkatan Kemampuan Belajar Mandiri. *Jurnal Pendidikan Fisika Indonesia*, 8(1): 33-40.
- [46] Gunada, I. W., Rokhmat, J., Hikmawati, H., & Kesipudin, K. (2017). Pengembangan Bahan Ajar Kompilasi Fisika Matematika Ii Pokok Bahasan Persamaan Diferensial Untuk Meningkatkan Penalaran Matematis. *Jurnal Pendidikan Fisika dan Teknologi*, 3(2): 216-227.
- [47] Ayu, H. D., Pratiwi, H. Y., Kusairi, S., & Muhardjito, M. (2017). Developing E-Scaffolding To Improve The Quality Of Process And Learning Outcomes. *Jurnal Kependidikan: Penelitian Inovasi Pembelajaran*, 1(2).
- [48] Yusuf, Y., Setyorini, R., Rachmawati, R., Sabar, M. P., Tyaningsih, R. Y., Nuramila, M. P., ... & SAP, M. (2020). *Call for book tema 3 (Media Pembelajaran)*. Jakad Media Publishing.
- [49] Puspitasari, R., Hamdani, D., & Risdianto, E. (2020). Pengembangan e-modul berbasis HOTS berbantuan flipbook marker sebagai bahan ajar alternatif siswa SMA. *Jurnal Kumbaran Fisika*, 3(3): 247-254.
- [50] Fitri, H., Maison, M., & Kurniawan, D. A. (2019). Pengembangan E-Modul Menggunakan 3D Pageflip Professional Pada Materi Momentum dan Impuls SMA/MA Kelas XI. *EduFisika*, 4(01): 46-58.
- [51] Tavakol, M., & Sandars, J. (2014). Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part II. *Medical teacher*, 36(10): 838-848.
- [52] Winarsunu, T. (2017). *Statistik dalam penelitian psikologi dan pendidikan* (Vol. 1). UMM Press.
- [53] Simpson, G. K., & Lord, B. (2015). Enhancing the reporting of quantitative research methods in Australian social work. *Australian Social Work*, 68(3): 375-383.
- [54] Hodis, F. A., & Hancock, G. R. (2016). Introduction to the special issue: Advances in quantitative methods to further research in education and educational psychology. *Educational Psychologist*, 51(3-4): 301-304.
- [55] Ross, A., & Onwuegbuzie, A. J. (2014). Complexity of quantitative analyses used in mixed

- research articles published in a flagship mathematics education journal. *International Journal of Multiple Research Approaches*, 8(1): 63-73.
- [56] Rani, L., & Maarif, S. (2021). Development E-Module Three Variables Linear Equations System Based On Mathematic Communication. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 5(2): 377-389.
- [57] Agung, A. A. (2011). Metodologi Penelitian Pendidikan Suatu Pengantar. Singaraja: Fakultas Ilmu Pendidikan Universitas Pendidikan Ganesha.
- [58] Rediarta, I. W., Sudarma, I. K., & Murda, I. N. (2014). Pengaruh Model Kooperatif Two Stay Two Stray Terhadap Hasil Belajar IPA. *MIMBAR PGSD Undiksha*, 2(1).
- [59] Ayuni, I. A. S., Kusmariyati, N., & Japa, I. G. N. (2017). Pengaruh model pembelajaran Talking Stick berbantuan media Question Box terhadap hasil belajar IPA kelas V. *Journal of Education Technology*, 1(3): 183-190.
- [60] Zedko, M., & Ali, M. (2017). Evaluation of Primary School Teachers Pedagogical Competence in Implementing Curriculum. *Journal of Education and Learning*, 11(3): 343-350.
- [61] Dewi, N. N. K., Kristiantari, M. R., & Ganing, N. N. (2019). Pengaruh model pembelajaran picture and picture berbantuan media visual terhadap keterampilan menulis bahasa Indonesia. *Journal of Education Technology*, 3(4): 278-285.
- [62] Sutisyana, A., & Ilahi, B. R. (2017). Pengaruh metode latihan plyometric terhadap kemampuan jumping smash bola voli siswa ekstrakurikuler SMPN 1 bermari ilir Kabupaten Kepahiang. *Kinestetik: Jurnal Ilmiah Pendidikan Jasmani*, 1(1): 64-67.
- [63] Agung, G. (2014). *Buku Ajar Metodologi Penelitian Pendidikan (Edisi 2)*. Singaraja: Undiksha.
- [64] Lestari, H. D., & Parmiti, D. P. (2020). Pengembangan e-modul IPA bermuatan tes online untuk meningkatkan hasil belajar. *Journal of Education Technology*, 4(1): 73-79.
- [65] Syofian, S., Setiyaningsih, T., & Syamsiah, N. (2015). Otomatisasi metode penelitian skala likert berbasis web. *Prosiding Semnastek*.
- [66] Pranatawijaya, V. H., Widiatry, W., Priskila, R., & Putra, P. B. A. A. (2019). Pengembangan Aplikasi Kuesioner Survey Berbasis Web Menggunakan Skala Likert dan Guttman. *Jurnal Sains dan Informatika*, 5(2): 128-137.
- [67] Siyoto, S., & Sodik, M. A. (2015). *Dasar metodologi penelitian*. literasi media publishing.
- [68] Irwansyah, F. S., Lubab, I., Farida, I., & Ramdhani, M. A. (2017, September). Designing interactive electronic module in chemistry lessons. In *Journal of Physics: Conference Series* (Vol. 895, No. 1, p. 012009). IOP Publishing.
- [69] Riyana, D. Pengembangan (2017). *Pengembangan E-Modul Berbasis 3d Pageflip Professional Pada Materi Model Atom Hidrogen Mata Kuliah Fisika Atom Dan Inti*. Jambi.
- [70] Zellatifanny, C. M., & Mudjiyanto, B. (2018). Tipe penelitian deskripsi dalam ilmu komunikasi. *Diakom: Jurnal Media Dan Komunikasi*, 1(2): 83-90.
- [71] Sholikhah, A. (2016). Statistik Deskriptifatif Amiroton Sholikhah. *Komunika*, 10(2): 342-362.
- [72] Sembiring, E. A. (2019). Pengaruh Metode Pencatatan Persediaan Dengan Sisitem Periodik Dan Perpetual Berbasis Sia Terhadap Stock Opname Pada Perusahaan Dagang Di Pt Jasum Jaya. *Accumulated Journal (Accounting and Management Research Edition)*, 1(1): 69-77.
- [73] Septian, A. (2017). Penerapan geogebra untuk meningkatkan kemampuan pemecahan masalah matematis mahasiswa program studi pendidikan matematika universitas suryakencana. *Prisma*, 6(2): 180-191.
- [74] Anggoro, B. S. (2016). Analisis persepsi siswa smp terhadap pembelajaran matematika ditinjau dari perbedaan gender dan disposisi berpikir kreatif matematis. *Al-Jabar: Jurnal Pendidikan Matematika*, 7(2): 153-166.
- [75] Cahyono, B. (2017). Analisis ketrampilan berfikir kritis dalam memecahkan masalah ditinjau perbedaan gender. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, 8(1): 50-64.
- [76] Feriyanto, F. (2020, January). Analisis Kemampuan Representasi Matematis Mahasiswa dalam Menyelesaikan Soal Program Linear Ditinjau dari Perbedaan Gender. In *Prosiding SNP2M (Seminar Nasional Penelitian Dan Pengabdian Masyarakat) UNIM* (No. 2, pp. 90-97).
- [77] Umaroh, U., & Pujiastuti, H. (2020). Analisis kemampuan representasi matematis siswa dalam mengerjakan soal PISA ditinjau dari perbedaan gender. *Jurnal Pendidikan Matematika Raflesia*, 5(2): 40-53.
- [78] Febro, J., Catindig, M., & Caparida, L. (2020). Development of E-learning Module for ICT Skills

- of Marginalized Women and Girls for ICT4D. *International Journal of Emerging Technologies in Learning (iJET)*, 15(16): 94-105.
- [79] Nurramadhani, A., & Lathifah, S. S. (2021, March). Gender differences in science learning: how is students' questioning quality through STEM based e-module?. In *Journal of Physics: Conference Series* (Vol. 1806, No. 1, p. 012134). IOP Publishing.
- [80] Serevina, V., Astra, I., & Sari, I. J. (2018). Development of E-Module Based on Problem Based Learning (PBL) on Heat and Temperature to Improve Student's Science Process Skill. *Turkish Online Journal of Educational Technology-TOJET*, 17(3): 26-36.
- [81] Feriyanti, N., Hidayat, S., & Asmawati, L. (2019). Pengembangan e-modul matematika untuk siswa SD. *JTPPm (Jurnal Teknologi Pendidikan dan Pembelajaran): Edutech and Intructional Research Journal*, 6(1).
- [82] Ariani, K. K., Susanti, L. R., & Slamet, A. (2021). E-Modul Materi Biogas Untuk Pendidikan Vokasi Agribisnis Ternak Ruminansia. *JKTP: Jurnal Kajian Teknologi Pendidikan*, 4(4): 398-407.
- [83] Nugroho, S. (2012). Profesionalisme Guru SD Negeri Se-Kecamatan Warungasem Kabupaten Batang Suatu tinjauan aspek persepsi guru tentang kepemimpinan kepala sekolah dan motivasi berprestasi guru. *Jurnal Varidika*, 24(2).