JIPF (JURNAL ILMU PENDIDIKAN FISIKA)
p-ISSN: 2477-5959 | e-ISSN: 2477-8451 *Vol. 8 No. 1, January 2023, Page 53-63*

Student Perceptions and Responses: Learning Using E-Module Physics-Math II

Astalini [1], Darmaji [2], Dwi Agus Kurniawan [3], Siti Rohana [4*)]
Universitas Jambi, Indonesia[1234]
***)Corresponding E-mail: rohanasiti839@gmail.com**

Received: April 28th, 2022. Revised: October 25th, 2022. Accepted: November 7th, 2022

Keywords :
Education; E-Module; Physics-Math; Gender

ABSTRACT
Perception is influenced by several factors, one of which is biological factors such as gender. Gender is closely related to how different decisions are made between women and men. Based on the results obtained, it can be concluded that there are differences in the level of perception for each class which has two different genders, namely female and male. From the Anova table, it is found that the significance is smaller than 0.05 which indicates that both men and women have an average difference in perception about the product in the form of an e-module of Physics-Mathematics with double integral material.

INTRODUCTION

Technology that is developing rapidly today can provide unlimited information and innovation regarding various existing fields [1] [2] [3]. Innovations that are made can provide a benefit to human life both in positive and negative terms [4] [5] [6]. With positive and negative impacts in technological development, of course it can help human life in finding information to improve their standard of living [7] [8] [9]. This technological development can have an influence on the educational learning process in the future [10] [11] [12]. One of the learning processes that is influenced by the field of education is by using effective teaching materials.

Teaching materials are a form of learning materials to help the teaching and learning process in the classroom, both for teachers/instructors and students will greatly help their competence [13] [14] [15]. If teaching materials have many shortcomings, it will directly affect the effectiveness of learning in the classroom, especially in college [16] [17] [18]. Therefore, it takes an interactive, effective, and flexible teaching material to be applied in the classroom, one of the teaching materials that have these properties is the use of e-modules.

E-modules were chosen because there are several materials that can support learning such as audio, animation, images, videos, and can be used flexibly [19] [20] [21]. E-modules can train and assist students in understanding the material and being responsible according to their abilities, as well as facilitating educators in measuring student learning outcomes [22] [23] [24]. In addition to understanding the material, e-modules can train students to learn independently and be responsible according to their abilities [25] [26]. Independent learning is very important to see the effectiveness of using e-modules in classroom learning, researchers see that science learning in higher education,

especially Physics education, still lacks e-module teaching materials that speak Indonesian and discuss Mathematics Physics material.

Physics is one of the foundations for building students' conceptual understanding [27] [28] [29]. Physics discusses the symptoms and properties of objects that are in nature [30] [31] [32]. One of the objectives of learning physics is to guide students to apply their knowledge in problem solving activities [33] [34] [35]. Problem solving ability is usually often used on materials that are difficult to learn by students, one of the materials that is often the scourge of Physics education students is Mathematics Physics material.

Mathematics Physics is a subject at several universities which is often considered not easy and difficult to learn [36] [37] [38]. The fact that shows that the Mathematics Physics course is a difficult subject can be seen from the low student test results and the large number of advanced students who repeat this course [39] [40]. Mathematical Physics itself has a very close relationship to the completion of mathematics in any given problem or concept [41] [41] [43] [44]. The problem solving concepts given mostly only use a few teaching materials and tend to use English, this of course makes researchers interested in creating a source of complementary teaching materials in the form of e-modules that are in Indonesian, interactive, flexible, and effectively used in class.

The integrated e-module in the Mathematics Physics course takes quite difficult material, namely Double Integral. The double or fold integral is a further branching of integral material that often appears in the form of a double integral and a triple integral [45]. According to Apriandi & Krisdiana [46] the causes of students having difficulty in learning folding integral material are: (1) Difficulty in drawing a function; (2) Difficulty converting variables; (3) Difficulty in determining the limits of integration; (4) Difficulty in determining the form of integration. These difficulties will certainly be overcome if the source of teaching materials is equipped with appropriate complementary sources of teaching materials. The difference with the reaserch that the researcher did is that in the mathematics physics course the material of coordinate transformation is difficult to understand in determining the point of a coordinate.

Perception is basically a process that is preceded by sensing, organized, and then interpreted so that individuals realize and understand what is felt by the senses [47] [48] 49]. Perceptions examined in this study were reviewed based on gender in each class, namely Regular A, B, and C. Gender is one of the distinguishing factors that refers to gender identity which is generally divided into men and women [50] [51] [52]. Gender differences between men and women significantly affect decisions about something, women tend to think more carefully and effectively the decisions they will make. By looking at the importance of students' perceptions of the mathematics physics e-module made with double integral material, the researchers conclude the formulation of the problem as follows:

1. How are the students' perceptions of regular class a, regular b, and regular c regarding the double integral material of the e-module Mathematics Physics based on gender?
2. How is the average difference in perception of each class of regular a, regular b, and regular c in terms of gender?

METHOD

The research method used is a survey type quantitative research. Quantitative research method is a research method used to examine a particular population or sample with data results in the form of numbers [53] [54] [55]. This type of survey research is research that takes a sample from a population and uses a questionnaire as the main data collection tool [56] [57]. The data obtained in this study are numerical data obtained from the data collection instrument. The data collection instrument used in this study was a student perception questionnaire distributed to 60 students in three different classes, namely Regular A as many as 25 students with 10 male and 15 female, than Regular B as many 20 students with 8 male and 12 female, and Regular C with 5 male and 10 female. Questionnaire is a

method of collecting data through a statement factor filled in by the respondents which is used to find out student responses regarding the e-module given [58]. The grid of data collection instruments used in this study can be seen in table 1.

Table 1. Grid of Student Perception Questionnaire Instruments

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

The collected data is then made into a scoring category which states the level of student perception of the e-module made. The Likert scale used in this study were: 1 (Strongly disagree), 2 (Disagree), 3 (Agree), 4 (Strongly Agree) with 15 questions given to students. The category level of student perception of the e-module that was made can be seen in table 2.

Table 2. Students' Perception Level

No	Score Interval	Student Perception Level
1	48,76 – 60,00	Very good
2	37,51 – 48,75	Well
3	26,26 – 37,50	Not good
4	15,00 – 26,25	Very Not Good

The sampling technique used in this research is simple random sampling. Simple random sampling is a method of drawing from a population in a certain way so that each member of the population has an equal chance of being selected [59] [60] [61]. By using a simple random sampling technique, the researcher will obtain data that is in accordance with the objectives and needs of the researcher.

The results of the student perception questionnaire were analyzed using descriptive statistics and inferential statistics. Descriptive statistics are used to analyze data by describing or describing the collected data as they are without intending to make generalized conclusions [61] [62] [63]. The descriptive statistics used are presented using the mean, median, maximum and minimum values, ranges, and standard deviations. Meanwhile, inferential statistics is a technique to describe the data used to examine differences and relationships between groups or variables [64]. The first step in this research is to do a prerequisite test by checking the normality and homogeneity of the data obtained, the examination can be carried out using the normality test and homogeneity test. The normality test is carried out on data that is mainly small in size and it is possible that the data is normal which in fact is not normal [65]. The homogeneity test aims to see the level of homogeneity of the data obtained through research [66]. If the sig value is above 0.05 then the data is said to be normal and homogeneous [67] [68]. After the prerequisite test was met, the researcher then conducted the

ANOVA test to see the relationship between the 3 data groups, namely class a, class b, and class c. Anova test or F test is the distribution used to analyze the ratio of variance of the data obtained in the study [69].

The data obtained in this study are quantitative data, this data is then analyzed using descriptive statistics and inferential statistics. After the data has been analyzed, it can be concluded whether the data between class A, class B, and class C have a relationship or not. The research procedure carried out can be seen in Figure 1.

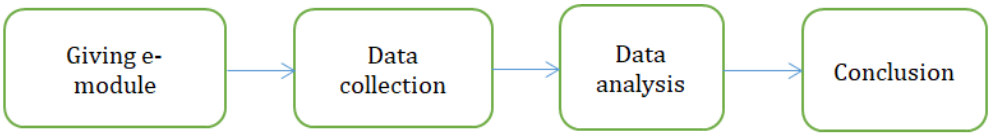

Fig 1. *Research procedure*

RESULTS AND DISCUSSIONS

Results

Describes The data obtained from students in three different classes, namely regular a, regular b, and regular were analyzed using descriptive statistics based on gender. Descriptive analysis of regular class a statistics can be seen in table 3.

Table 3. Description of the perception of class A students on the FISMAT e-module

Gender	Category	F	%	mean	Median	mode	min	max
Female	Not Very Good	0	0%	46.94	49.00	48.00	38.00	53.00
	Not Good	1	5.9%					
	Good	7	41, 18%					
	Very Good	9	52.9%					
Male	Not Very Good	0	0%	51.33	51.00	48.00	42.00	59,00
	Not Good	0	0%					
	Good	6	40%					
	Very Good	9	60%					

From the table above, it can be seen that for the regular class a has a good level of perception of the developed e-module. From the table it can also be seen that as many as 9 girls have a very good level of perception, 7 people have a good perception level, and1 person has a poor level of perception of the Physics-Mathematics e-module. Meanwhile, for boys, 9 students had a very good perception level and the remaining 6 students had a good perception level for the double integral Material Mathematics Physics e-module. Then, the descriptive statistical analysis data for regular class b can be seen in table 4.

Table 4. Description of class B students' perception of the Physics-Math e-module

Gender	Category	F	%	mean	Median	Mode	min	max
Female	Not Very Good	0	0%	51.43	53.50	48.00	37,00	59,00
	Not Good	2	13.34%					
	Good	5	33.33%					
	Very Good	8	53.33%					
Male	Not Very Good	0	0%	46.50	47,50	45.00	36.00	54.00
	Not Good	3	20.00%					
	Good	7	46.67%					
	Very Good	5	33.33%					

From the table above, it can be seen that the regular class b has a good level of perception of the developed e-module. From the table it is also seen that as many as 8 girls (53.33%) have a very good level of perception, 5 people (33.33%) have a good level of perception, and2 people (13.34%) have a bad level of perception of the Mathematics Physics e-module. Meanwhile, for boys, 5 people (33.33%) had a very good perception level, 7 people (46.67%) had a good level of perception, and the remaining 3 people (20.00%) had a good level of perception. good for the e-module Physics Mathematics Double integral material.

Furthermore, for descriptive statistical analysis data, perception questionnaires for regular class C can be seen in table 5.

Table 5. Description of the perception of class C students towards the FISMAT e-module

Gender	Category	F	%	mean	Median	Mode	min	max
Female	Not Very Good	0	0%	45.27	46.00	37,00	37,00	54.00
	Not Good	4	26.67%					
	Good	5	33.33%					
	Very Good	6	40.00%					
Male	Not Very Good	0	0%	45.00	45,50	45.00	36.00	50.00
	Not Good	1	6.66%					
	Good	7	46.67%					
	Very Good	7	46.67%					

From the table above, it can be seen that the regular class c has a good level of perception of the developed e-module. From the table it is also seen that as many as 6 girls (40%) have a very good level of perception, 5 people (33.33%) have a good level of perception, and4 people (26.67%) have a bad perception level of the Mathematics Physics e-module. Meanwhile, for boys, 7 people (46.67%) had a very good perception level, 7 people (46.67%) had a good perception level, and the remaining 1 person (6.66%) had a good perception level. good for the e-module Physics Mathematics Double integral material.

After the data were analyzed by descriptive statistics, the data were then tested for prerequisites, namely the normality test and homogeneity test. The normality test aims to see the normality of the data, the results of the normality test in the regular classes a, b, and c can be seen in table 6.

Table 6. The results of the normality test of student perceptions of the e-module

Gender	Kolmogorov-Smirnov (Sig)		
	Regular A	Regular B	Regular C
Male	. 107	.078	.067
Female	.200	. 112	.054

From the normality test data for the three classes above, a significance value greater than 0.05 was obtained. For girls, the significance of regular classes a, b and c was 0.107, 0.078 and 0.067, while for girls the significance was 0.200, 0.112, and 0.054 respectively. This significance value has met the requirements, which is above 0.05, which means that the data obtained are normally distributed.

Furthermore, the homogeneity test or the test used to see the homogeneity of the data can be seen in table 7.

Table 7. The results of the homogeneity test of students' perceptions of the e-module

Gender	Test of Homogeneity (Sig)		
	Regular A	Regular B	Regular C
Male	. 074	. 103	.058
Female	.083	. 127	. 165

From the homogeneity test data for the three classes above, a significance value greater than 0.05 was obtained. For girls, the significance of regular classes a, b and c was 0.74, 0.103 and 0.058, while for girls, the significance was 0.083, 0.127, and 0.65, respectively. This significance value has met the requirements, namely above 0.05, which means that the data obtained is homogeneous.

After completing the prerequisite test, the researcher then tested the hypothesis using the ANOVA test. The results of the Anova test carried out can be seen in table 8.

Table 8. ANOVA Test Output Results of Students' Perceptions of the FISMAT . E-module

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Gender**
Between Groups	824,577	2	432,337	4, 177	,036	female
Within Groups	4064,731	43	97,927			
Total	4889,308	45				
Between Groups	834,130	2	328,280	5,136	0.017	Male
Within Groups	3134,251	42	66,432			
Total	3968,381	44				

From table 8 on the results of the ANOVA test output perceptions of regular class students a, b, and c, the significance value is less than 0.05, which means the data is significantly different. For boys, the significance was 0.036 and for girls it was 0.017. This value smaller than 0.05 indicates that the perception data for both girls and boys are different from each other.

Discussions

The renewal of this research can be seen from how researchers use gender variables as a separator of student perceptions. As we know, gender differences are also a factor that affects a person's perception [70]. Gender is an analytical concept used to identify differences between men and women from a non-biological point of view [71]. Women are thought to be more efficient and effective in processing information and analyzing it, women's decisions are more in-depth so that women's decisions are better than men.

Based on the table of descriptive analysis results for regular classes A, B, and C it can be said that for regular class a almost all student data are at the level of perception above good with details for women 52.9% have very good perceptions, 41.18% have perceptions good, and 5.9% have a bad perception level. In addition, for men, 40% have a good perception level and the remaining 60% have a very good perception. Then for the regular class b, there were 30 respondents, each 15 female students and 15 male students, from the table it can be seen that the level of perception is not too good compared to the regular class a because for girls there are 2 people (13.34%) have a perception which is not good, then for the remaining 5 people (33.33%) the perception level is good, and 8 people (53, 3%) the perception level is very good. Furthermore, for regular class c, the average level of perception is good and very good, but in class c, the perception level is not better than regular class a, from the table it is found that for girls as many as 4 people (26.67%) have a perception level which is not good, while the remaining 5 (33.33%) have a good level of perception, and 6 people (40%) have a very good level of perception. For the boys themselves, 1 person (6.66%) has a bad perception level, 7 people (46.67%) have a good perception level, and the remaining 7 people (46.67%) have a very high level of perception. good. From the three descriptive tables, it can be seen that 1 person out of 32 students in regular class A has a poor perception.

Then after finishing describing the data statistically, the next researcher described the data inferentially. Before testing the hypothesis, the researcher first conducted a prerequisite test, namely the normality test and the homogeneity test. Based on table 6, the significance of the normality test for

boys is 0.107 (Regular A), 0.078 (Regular B), 0.067 (Regular C). Meanwhile for girls, the significance was 0.200 (Regular A), 0.112 (Regular B), and 0.054 (Regular C). This significance result has met the requirements, which are above 0.05 [31], so the data obtained can be said to be normally distributed. Then for the next prerequisite test is the homogeneity test, this test is used to see whether the data is homogeneous or not. From the test table of homogeneity, the significance for boys was 0.074 (Regular A), 0.13 (Regular B), 0.058 (Regular C). As for the results, the significance of girls was 0.083 (Regular A), 0.127 (Regular B), 0.165 (Regular C). For the condition that the significance value of the homogeneity of the data is the same, it is 0.05, so it can be concluded that the data is homogeneous.

After the two conditions were met, the researcher then conducted an ANOVA test to see the relationship between the perception data between regular classes a, b and c. The ANOVA table shows a significance of 0.036 for girls and 0.017 for boys. The result of this ANOVA test is smaller than the value of 0.05 which indicates that there is an average difference in each gender, namely male and female.

Differences in gender or gender greatly affect a person's perception of something specific, namely the object to be assessed [70]. The process of perception itself describes how the stimulus in the form of an object or event is received and interpreted so that it can give meaning to something for the perceiver [72]. With the factors that influence it, the resulting perception is different for each individual, especially for men and women. These differences need to be analyzed in depth and also become an illustration of how the quality of the products in the form of e-modules is offered.

If the resulting perception is good, the e-module provided is very suitable for classroom learning. With this e-module, it is hoped that it can significantly improve student learning outcomes, this increase in learning outcomes is needed for the achievement of the objectives of the course itself. repeat because if there is a repetition of the course it will cause a delay in graduation for students. On the other hand, for other researchers, if they want to conduct similar research, it is expected that the sample used is even larger, besides that it can also be done using other variable questionnaires such as assessment questionnaires or others.

CONCLUSION AND SUGGESTION

Perception or a response can be influenced by several factors, one of which is biological factors such as gender. Gender is closely related to how different decisions are made between male and female so that there is an income gap between male and female. Based on the results obtained, it can be concluded that there are differences in the level of perception for each class which has two different genders, namely female and male. From the Anova table, it is found that the significance is smaller than 0.05 which indicates that both men and women have an average difference in perception about the product in the form of an e-module of Physics-Mathematics with double integral material.

REFERENCES

[1] Setiawan, A. R. (2019). Menyusun instrumen penilaian untuk pembelajaran topik lingkungan berorientasi literasi saintifik. In *Seminar Nasional Fisika* (Vol. 1, No. 1, pp. 7-14).
[2] Zoebaidha, S. (2020). Penggunaan media prezi dan kahoot serta pemberian reward sebagai upaya meningkatkan hasil belajar akuntansi. *Kwangsan: Jurnal Teknologi Pendidikan*, *8*(2): 213-224.
[3] Widarti, H. R., Rokhim, D. A., & Syafruddin, A. B. (2020). The development of electrolysis cell teaching material based on stem-pjbl approach assisted by learning video: A need analysis. *Jurnal Pendidikan IPA Indonesia*, *9*(3): 309-318.
[4] Ntelok, Z. R. E., Jamun, Y. M., & Opar, A. S. (2020). Analisis Kemampuan Guru Dalam Melakukan Pengelolaan Kelas Menuju Pembelajaran Yang Efektif. *JURNAL LITERASI PENDIDIKAN DASAR*, *1*(2): 35-41.

[5] Ananda, N. R., Hufri, H., & Nurhayati, N. (2016). Pengaruh Penerapan LKS Bernuansa Keterampilan Berpikir Kritis dalam Pendekatan Saintifik terhadap Hasil Belajar Fisika Siswa Kelas X SMA N 2 Padang. *Pillar Of Physics Education*, *7*(1).
[6] Desi, N., Sabri, M., Karim, A., Gonibala, R., & Wekke, I. S. (2021). Environmental Conservation Education: Theory, Model, and Practice. *Psychology and Education Journal*, *58*(3): 1149-1162.
[7] Nurdin, S. (2016). Guru Profesional dan Penelitian Tindakan Kelas. *Jurnal Educative: Journal of Educational Studies*, *1*(1): 1-12.
[8] Rais, M., Aryani, F., Ahmar, A. S., Arfandi, H., & Ahmad, W. K. (2018, June). Learning Media Edu-Games "My Profession" as an Effort to Introduce Various Types of Profession in Early Childhood Education Students. In *Journal of Physics: Conference Series* (Vol. 1028, No. 1, p. 012091). IOP Publishing.
[9] Rantung, D. A., & Boiliu, F. M. (2020). Teknologi Dalam Pembelajaran Pendidikan Agama Kristen Yang Antisipatif Di Era Revolusi Indusri 4.0. *Jurnal Shanan*, *4*(1): 93-107.
[10] Hasibuan, I. (2015). Hasil belajar siswa pada materi bentuk Aljabar di Kelas VII SMP Negeri 1 Banda Aceh tahun pelajaran 2013/2014. *Jurnal peluang*, *4*(1).
[11] Rastati, R. (2018). Media literasi bagi digital natives: perspektif generasi Z di Jakarta. *Kwangsan: Jurnal Teknologi Pendidikan*, *6*(1): 60-73.
[12] McGrew, S., Breakstone, J., Ortega, T., Smith, M., & Wineburg, S. (2018). Can students evaluate online sources? Learning from assessments of civic online reasoning. *Theory & Research in Social Education*, *46*(2): 165-193.
[13] Sundayana, W. (2015). Readiness and competence of senior high school English teachers to implement Curriculum 2013. *Indonesian Journal of Applied Linguistics*, *5*(1): 29-36.
[14] Harahap, H. J. P., & Aini, I. (2019). Development of "deutsch für touristmus" teaching based on livejournal website to improve student competence in tourism. *Britain International of Linguistics Arts and Education (BIoLAE) Journal*, *1*(2): 135-141.
[15] Wulandari, A., Handayani, P., & Prasetyo, D. R. (2019). Pembelajaran ilmu pengetahuan alam berbasis EMC (education mini club) sebagai solusi menghadapi tantangan pendidikan di era revolusi industri 4.0. *Thabiea: Journal of Natural Science Teaching*, *2*(1): 51-56.
[16] Lee, S. J., Ward, K. P., Chang, O. D., & Downing, K. M. (2021). Parenting activities and the transition to home-based education during the COVID-19 pandemic. *Children and Youth Services Review*, *122*: 105585.
[17] Effiong, O. E., & Igiri, C. E. (2015). Impact of instructional materials in teaching and learning of biology in senior secondary schools in Yakurr LG A. *International letters of Social and humanistic sciences*, *62*: 27-33.
[18] Setiana, L. N., & Arsanti, M. (2018, December). Pendidikan Karakter Berprofetik Melalui Budaya Literasi Berbasis Teras Ilmu Cendekia di Era Revolusi Industri. In *Pertemuan Ilmiah Bahasa Dan Sastra Indonesia (PIBSI) 2018*.
[19] Fonda, A., & Sumargiyani, S. (2018). The developing math electronic module with scientific approach using kvisoft flipbook maker pro for xi grade of senior high school students. *Infinity Journal*, *7*(2): 109-122.
[20] Sulisworo, D., Ummah, R., Nursolikh, M., & Rahardjo, W. (2020). The analysis of the critical thinking skills between blended learning implementation: Google Classroom and Schoology. *Universal Journal of Educational Research*, *8*(3): 33-40.
[21] Sari, A. M., & Ariswan, A. (2021). The Integrated Physics Learning E-Module with Pancasila Character Values in Work and Energy Subjects as Solution to Improve Students' Critical Thinking Ability and Independence: Is It Effective?. *Jurnal ilmiah pendidikan fisika Al-Biruni*, *10*(1): 85-100.
[22] Chang, K. C. (2005). *Methods in nonlinear analysis* (Vol. 10). Berlin: Springer.
[23] Hidayati, A. S., Adi, E. P., & Praherdhiono, H. (2019). Pengembangan media video pembelajaran untuk meningkatkan pemahaman materi gaya kelas IV di SDN Sukoiber 1 Jombang. *JINOTEP (Jurnal Inovasi Dan Teknologi Pembelajaran): Kajian Dan Riset Dalam Teknologi Pembelajaran*, *6*(1): 45-50.
[24] Haspen, C. D. T. (2020, March). The preliminary study in the development of e-Physics module integrated ethnoscience. In *Journal of Physics: Conference Series* (Vol. 1481, No. 1, p. 012056).

IOP Publishing.
[25] Perdana, F. A., Sarwanto, S., Sukarmin, S., & Sujadi, I. (2017). Development of e-module combining science process skills and dynamics motion material to increasing critical thinking skills and improve student learning motivation senior high school. In *International Journal of Science and Applied Science: Conference Series* (Vol. 1, No. 1, pp. 45-54).
[26] Nurhasna, N. (2020). *Pengembangan Media Pop-Up Book Pada Materi Pecahan Kelas IV SD (Penelitian Pengembangan Media Pop up Book Materi Pecahan Pelajaran Matmatika Kelas IV SD Negeri 013 Kumantan)* (Doctoral dissertation, Universitas Pahlawan Tuanku Tambusai).
[27] Taqwa, M. R. A., & Rivaldo, L. (2019). Pembelajaran problem solving terintegrasi phet: membangun pemahaman konsep listrik dinamis. *Kwangsan: Jurnal Teknologi Pendidikan*, *7*(1): 45-56.
[28] Suprapto, E., Sumiharsono, R., & Ramadhan, S. (2020). The Analysis of Instrument Quality to Measure the Students' Higher Order Thinking Skill in Physics Learning. *Journal of Turkish Science Education*, *17*(4): 520-527.
[29] Sur, W. A. A., Hasanah, M., & Mustofa, M. R. (2020). Analisis motivasi belajar mahasiswa dengan sistem pembelajaran daring selama masa pandemi covid-19. *Jurnal Equation: Teori dan Penelitian Pendidikan Matematika*, *3*(2): 157-171.
[30] Martawijaya, D. H. (2011). Pengembangan program pendidikan guru pendidikan teknologi dan kejuruan Trans-Nasional. *Jurnal Pendidikan Vokasi*, *1*(1): 91-112.
[31] Darmaji, D., Kurniawan, D. A., & Suryani, A. (2019). Effectiveness of Basic Physics II Practicum Guidelines Based on Science Process Skills. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, *4*(1): 1-7.
[32] Neldawati, N. (2020). Deskripsi Lingkungan Belajar Siswa Terhadap Mata Pelajaran Fisika di SMA Ferdy Ferry Putra Kota Jambi. *Journal Evaluation in Education (JEE)*, *1*(1): 1-7.
[33] Nurhayati, N., Yuliati, L., & Mufti, N. (2016). Pola penalaran ilmiah dan kemampuan penyelesaian masalah sintesis fisika. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *1*(8): 1594-1597.
[34] Al Maliki, I. M., Hidayat, A., & Sutopo, S. (2017). Kemampuan Pemecahan Masalah Siswa pada Topik Suhu dan Kalor melalui Pembelajaran Cognitive Apprenticeship. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, *2*(2): 304-308.
[35] Sari, N. M., Yetti, E., & Hapidin, H. (2020). Pengembangan Media Permainan Mipons Daily untuk Meningkatkan Kemampuan Berhitung Anak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *4*(2): 831.
[36] Hendrastuti, Z. R., Siswanto, S., Muhlisin, A., Firmadani, F., Hartono, H., Subali, B., & Elianawati, E. (2021, June). Explicit scientific argument on science teaching as an inquiry: designing activity on online schema using fuzzy delphi method. In *Journal of Physics: Conference Series* (Vol. 1918, No. 5, p. 052071). IOP Publishing.
[37] Wibawa, R. P., & Agustina, D. R. (2019). Peran pendidikan berbasis higher order thinking skills (hots) pada tingkat sekolah menengah pertama di era society 5.0 sebagai penentu kemajuan bangsa indonesia. *EQUILIBRIUM: Jurnal Ilmiah Ekonomi dan Pembelajarannya*, *7*(2): 137-141.
[38] Marisda, D. H. (2019). The effect of task-based collaborative learning on students' mathematical physics learning outcomes at Universitas Muhammadiyah Makassar. *Jurnal Pendidikan Fisika*, *7*(2): 140-150.
[39] Fadhilah, F., Effendi, Z. M., & Ridwan, R. (2017). Analysis of contextual teaching and learning (CTL) in the course of applied physics at the mining engineering department. In *International Journal of Science and Applied Science: Conference Series* (Vol. 1, No. 1, pp. 25-32).
[40] Bustami, B., Ngadimin, N., & Farhan, A. (2020). The Difficulty Factors of Students to Understand Mathematics Physics 1 at Physics Education Department FKIP Unsyiah. *Asian Journal of Science Education*, *2*(1): 1-10.
[41] Tanjung, H. S., & Nababan, S. A. (2018). Pengembangan perangkat pembelajaran matematika berorientasi model pembelajaran berbasis masalah (pbm) untuk meningkatkan kemampuan berpikir kritis siswa SMA Se-Kuala Nagan Raya Aceh. *Genta Mulia: Jurnal Ilmiah Pendidikan*, *9*(2).
[42] Ellianawati, E., Supriyadi, M., & Istikomah, M. (2018, September). Cooperatif Learning Model to Reduce Mathematics Anxiety in High School Physics Learning. In *International Conference*

on Science and Education and Technology 2018 (ISET 2018) (pp. 119-121). Atlantis Press.
[43] Kurniawan, D. A., Perdana, R., & Kurniasari, D. (2018). Identification of student attitudes toward physics learning at Batanghari District high school. *The Educational Review, USA*, *2*(9): 475-484.
[44] Jufrida, J., Kurniawan, W., Astalini, A., Darmaji, D., Kurniawan, D. A., & Maya, W. A. (2019). Students' Attitude and Motivation in Mathematical Physics. *International Journal of Evaluation and Research in Education*, *8*(3): 401-408.
[45] Ermawati, S., & Hidayat, T. (2017). Penilaian autentik dan relevansinya dengan kualitas hasil pembelajaran (persepsi dosen dan mahasiswa ikip pgri bojonegoro). *Jurnal Pendidikan Ilmu Sosial*, *27*(1): 92-103.
[46] Apriandi, D., & Krisdiana, I. (2016). Analisis kesulitan mahasiswa dalam memahami materi integral lipat dua pada koordinat polar mata kuliah kalkulus lanjut. *Al-Jabar: Jurnal Pendidikan Matematika*, *7*(2): 123-134.
[47] Purwanti, K. L. (2013). Perbedaan Gender Terhadap Kemampuan Berhitung Matematika Menggunakan Otak Kanan Pada Siswa Kelas I. *Sawwa: Jurnal Studi Gender*, *9*(1): 107-122.
[48] Hamidah, A. (2014). Persepsi siswa tentang kegiatan praktikum biologi di laboratorium SMA Negeri Se-Kota Jambi. *Sainmatika: Jurnal Sains dan Matematika Universitas Jambi*, *8*(1): 221111.
[49] Cahyono, B. (2017). Analisis ketrampilan berfikir kritis dalam memecahkan masalah ditinjau perbedaan gender. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, *8*(1): 50-64.
[50] Perry, J., Lundie, D., & Golder, G. (2019). Metacognition in schools: what does the literature suggest about the effectiveness of teaching metacognition in schools?. *Educational Review*, *71*(4): 483-500.
[51] Bates, S. M., Mellin, E., Paluta, L. M., Anderson-Butcher, D., Vogeler, M., & Sterling, K. (2019). Examining the influence of interprofessional team collaboration on student-level outcomes through school–community partnerships. *Children & Schools*, *41*(2): 111-122.
[52] Sullivan, A. L., Kulkarni, T., & Chhuon, V. (2020). Making visible the invisible: Multistudy investigation of disproportionate special education identification of US Asian American and Pacific Islander students. *Exceptional children*, *86*(4): 449-467.
[53] Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*. routledge.
[54] López-Pastor, V., & Sicilia-Camacho, A. (2017). Formative and shared assessment in higher education. Lessons learned and challenges for the future. *Assessment & Evaluation in Higher Education*, *42*(1): 77-97.
[55] Dikananda, A. R., Pratama, F. A., & Rinaldi, A. R. (2019). E-Learning Satisfaction Menggunakan Metode Auto Model. *Jurnal Informatika*, *4*(2-2).
[56] Iskandar, L. (2005). The informal sector: non-formal education settings for working children. In *Meeting Basic Learning Needs in the Informal Sector* (pp. 61-73). Springer, Dordrecht.
[57] Aidin, L., Indahwati, N., & Priambodo, A. (2019). Pengembangan Aplikasi Lembar Kerja Peserta Didik (Lkpd) Pjok Berbasis Android Pada Sekolah Menengah Kejuruan. *e-Jurnal Mitra Pendidikan*, *3*(2): 226-240.
[58] Wahyudin, W., Rishanty, A. M., Nursalman, M., Nazir, S., & Riza, L. S. (2021). Learning through computer science unplugged on team assisted individualization on the computational thinking ability. *Linguistics and Culture Review*, *5*(S3): 1442-1452.
[59] Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it. *Indian Journal of Medical Specialties*, *4*(2): 330-333.
[60] Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, *5*(6): 00149.
[61] Dhani, I. P., & Utama, A. G. S. (2017). Pengaruh pertumbuhan perusahaan, struktur modal, dan profitabilitas terhadap nilai perusahaan. *Jurnal Riset Akuntansi dan Bisnis Airlangga*, *2*(1).
[62] Rulandari, N., & Sudrajat, A. (2017). Financial ratio (altman Z score) with statistic modelling. *International Journal of Scientific Research in Science and Technology*, *3*(6): 341-344.
[63] Zellatifanny, C. M., & Mudjiyanto, B. (2018). Tipe penelitian deskripsi dalam ilmu komunikasi. *Diakom: Jurnal Media Dan Komunikasi*, *1*(2): 83-90.
[64] Guetterman, T. C. (2019). Basics of statistics for primary care research. *Family medicine and community health*, *7*(2).

[65] Sunday, J. M., Bates, A. E., & Dulvy, N. K. (2011). Global analysis of thermal tolerance and latitude in ectotherms. *Proceedings of the Royal Society B: Biological Sciences*, *278*(1713): 1823-1830.
[66] Abu, A., Jusmawati, J., Makmur, Z., Jumliadi, J., & Yusuf, M. (2020, July). Problems faced by IAIN Palu students in online learning in the middle of the COVID-19 pandemic. In *International Colloquium on Environmental Education (ICEE)*.
[67] Yusuf, I., & Widyaningsih, S. W. (2019, February). HOTS profile of physics education students in STEM-based classes using PhET media. In *Journal of Physics: Conference Series* (Vol. 1157, No. 3, p. 032021). IOP Publishing.
[68] Suryana, O. A., Supardi, K. I., & Kasmui, K. (2018). Desain Media Permainan Edukasi Berorientasi Chemo-Edutainment pada Pembelajaran Kimia SMA. *Chemistry in Education*, *7*(2): 46-53.
[69] Kim, J. (2020). Learning and teaching online during Covid-19: Experiences of student teachers in an early childhood education practicum. *International Journal of Early Childhood*, *52*(2): 145-158.
[70] 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.
[71] Yuliani, N. (2019). The role of student teams achievement divisions (STAD) in improving student's learning outcomes. *Classroom Action Research Journal (CARJO)*, *3*(1): 8-15.
[72] Dzakirin, M. K. (2013). Orientasi idealisme, relativisme, tingkat pengetahuan, dan gender: pengaruhnya pada persepsi mahasiswa tentang krisis etika akuntan profesional. *Jurnal Ilmiah Mahasiswa FEB Universitas Brawijaya*, *2*(1).