JURNAL PENDIDIKAN MATEMATIKA DAN IPA

Vol. 13, No. 1 (2022) h. 40-50

http://jurnal.untan.ac.id/index.php/PMP

IMPLEMENTATION OF VIBRATION AND WAVES MODULE BASED ON STEM EDUCATION TO IMPROVE HIGHER-ORDER THINKING ABILITY VIEWED FROM STUDENT'S SELF CONFIDENCE

Nurhayati[1*], Wahyudi[1], Dwi Fajar Saputri[1]

[1*] Department of Physics Education, IKIP PGRI Pontianak, Indonesia

Email: nurhayatideli@gmail.com

DOI: http://dx.doi.org/10.26418/jpmipa.v13i1.43653

Abstract

This study aims to determine (1) the effect of implementing STEM-based modules on students' higher order thinking skills; and (2) the effect of self confidence on students' higher order thinking skills. This study used an experimental method with a one way ANOVA research design. The research sample was 18 students in one class and attended vibration and wave courses. The instrument used to measure students' high-order thinking skills in the form of HOTS test questions in the form of essays totaling 10 questions that have high valid and reliable criteria and a closed questionnaire with a Likert scale to measure student self-confidence. The research data were analyzed statistically which included the N-Gain test, analysis prerequisite test and hypothesis testing. The results showed that significantly, learning using STEM-based modules had an effect on students' higher order thinking skills. The increase in students' higher order thinking skills is higher for the level of creating when compared to the level of analyzing and evaluating. Meanwhile, there is no significant effect of self-confidence on students' higher order thinking abilities.

Keywords: *modules, STEM, HOTS, self confidence.*

INTRODUCTION

Science and technology is growing rapidly in the era of industrial revolution 4.0. The development of science and technology certainly has a major impact on the progress of a nation. The real impacts felt at this time include improving the speed of production flexibility, increasing service to customers and increasing revenue (Lasi et al., 2014; Rubmann et al., 2015; Schmidt et al., 2015; Neugebauer, 2016). Sophisticated technologies cannot be separated from the development of human ability in science so that it can benefit in daily

Received **: 14/12/2020**
Revised **: 21/12/2021**
Accepted **: 05/01/2022**

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

work assistance. This indirectly fosters the spirit of global competition in various lives (Sudirman et al., 2018).

One of important skills needed in facing global competition in the 21st century is the ability to think at a higher level or known as HOTS (*Higher Order Thinking Skill*) (Saido et al., 2018; Rozi & Hanum, 2019). According to Nitko & Broookhart (2011), HOTS is divided into four groups, namely problem solving, decision making, critical thinking and creative thinking. In other words, HOTS is the ability to connect, manipulate, change the knowledge and experience already possessed critically and creatively in making decisions to solve problems in new situations (Dinni, 2018). If associated with Anderson's Taxonomy, HOTS includes the ability to analyze, evaluate and create (Saido et al., 2018; Nabilah et al., 2019).

For this reason, in order to increase the ability of global competitiveness through education, it is necessary to innovate and reconstruct learning. So that human resources are formed who have high-level thinking skills that are innovative, creative, and able to create new things. Learning with STEM approach is one of the ways to improve higher-order thinking skills (Duran, & Sendag, 2012; Ratri, 2019; Fitriyani et al., 2020; Nugraha & Syafi'ah, 2020).

The STEM approach is an interdisciplinary innovation approach which integrates science, technology, engineering, and mathematics that plays important role in the development of the 21st century (Erdogan & Ciftci 2017), including the ability to think critically and solve problems (Wagner, 2008). Apart from being an alternative to today's science learning (Permanasari 2016), STEM approach is also used to reconstruct science and engineering learning (Herschbach, 2011). The STEM approach will have a positive impact on developing students' scientific thinking processes (Scoot 2012), and develop skills to apply scientific knowledge through engineering (Firman, 2016). This is also reinforced by the statement of Khoiriyah (2018) that the STEM approach is able to train students' critical thinking which is characterized by the ability to solve problems, make decisions, analyze assumptions, evaluate, and create.

The concept of vibration and waves is one of the concepts of physics that can be packaged through STEM-based learning (Almuharomah et al., 2019; Safitri et al., 2019) and the concept is important to be mastered by students of the physics education study program and requires critical thinking skills to master it (Sarwi et al., 2012). Based on the curriculum analysis, the learning achievement of the vibration and wave course is that students are able to analyze the concepts of vibration and waves and are able to apply them in solving problems in everyday life.

Based on the results of observations on the lecture process in the first semester student class of the Physics Education Study Program, it is known that the learning carried out by lecturers has led to a scientific approach but the frequency is still relatively smaller than conventional learning (lectures and discussions). This conventional learning certainly does not facilitate students to think actively in developing their higher order thinking skills. Students will tend

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

to be passive in learning, this is indicated by the lack of students asking questions and responding to questions during class learning.

The results of recapitulation on the value of the Vibration and Wave course for the last three years also show that there are still many students who score below or equal to C (enough) as much as 42.4% and only 9.6% get an A (Very good). Based on the results of interviews with several physics education students from one of the LPTKs in Pontianak, information was obtained that they had difficulty in asking questions even though they did not understand the material being studied, and when they understood the material being studied, they lacked confidence to answer the questions asked. In addition, they also complained about the difficulty in finding easy references in understanding the lecture material. The results of interviews with course lecturers also informed that there were no references available specifically to assist students in vibration and wave lectures. The references used are still limited to textbooks that do not help students in developing their thinking skills about the concepts of vibration and waves.

The thinking ability of students is difficult to identify if students are not confident (*inconfidence*) (Retnawati, 2016). *Self-confidence* able to solve problems with the best situation (Amalia et al., 2015). Low self-confidence will hinder the development of one's potential (White, 2019). For students, low self-confidence will make students easily give up and feel afraid to make decisions in learning so that they cover their potential (Liu et al., 2017). Therefore, students' self-confidence needs to be considered in learning.

The above problems are a serious concern so this research needs to be done to improve students' higher-order thinking skills through the use of STEM-based wave vibration modules by paying attention to student self-confidence. The STEM approach is expected to foster student interest in mastering the concepts and applications of vibrations and waves and facilitate students to develop higher-order thinking skills so that innovative, creative and confident students will be formed in solving real problems. In addition, through STEM-based modules, students will be guided in a structured manner by presenting instructions in modules designed according to the STEM approach. The results of this study are expected to produce innovations in science and technology, especially in the field of education through the development of a STEM learning approach.

METHODS

The method used in this study is a pre-experimental method with *Intac Group Comparation* (Scott & Usher, 2010). The design was chosen because considering the research sample there was only one class, but it would be grouped into two parts based on the criteria high and low *self-confidence*. Because there is only one population class, the entire population is used as a research sample Rosdianto (2017) or saturated sampling (Supriyanto & Machfudz, 2010). The research sample is 18 students of physics education study program who take vibration and wave courses.

The research data in the form of students' higher order thinking skills

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

(HOTS) was measured by using an essay in the form of 10 questions covering aspects of analyzing, evaluating and creating. Meanwhile, self-confidence data as a moderating variable is categorized into high-low and is measured by a closed questionnaire instrument with a Likert scale (Mandini & Hartono, 2018). Empirical validation of data collection instruments (HOTS Essay Questions and Self-Confidence Questionnaires) was carried out through trials and calculated using the Product Moment Correlation Equation and Criteria (Arifin, 2012). Then the level of instrument reliability is calculated using the Alpha Equation formula and criteria (Arikunto, 2018). The results show that the data collection instrument has valid criteria with high reliability.

The data analysis technique used in this research is descriptive statistical analysis to present student HOTS data and inferential statistical analysis to determine the effect of STEM-based vibration and wave modules on student HOTS based on self-confidence. Before carrying out a comparative test through inferential statistics, a prerequisite analysis test is performed to determine the type of inferential statistics to be used, which includes the normality test and the homogeneity test. The normality test of the data was carried out using the Shapiro-Wilk test because the number of sample data was less than 50 Quraisy (2020) and the homogeneity test of the data was carried out using the Levene test (Usmadi, 2020). Comparison of student HOTS before and after (related data) applied to the STEM-based module was analyzed by the Wilcoxon test, while the comparison of student HOTS based on high-low self-confidence (independent data) was analyzed by the Mann Whitney U test (Karmini, 2020). All inferential statistical analyzes were carried out with the help of IBM Statistical SPSS v23 application.

RESULTS AND DISCUSSION

The students' higher-order thinking ability before the STEM-based module applied was at very low and low criteria, while the students' higher-order thinking ability after the STEM-based learning module was applied shifted to low and moderate criteria (Figure 1).

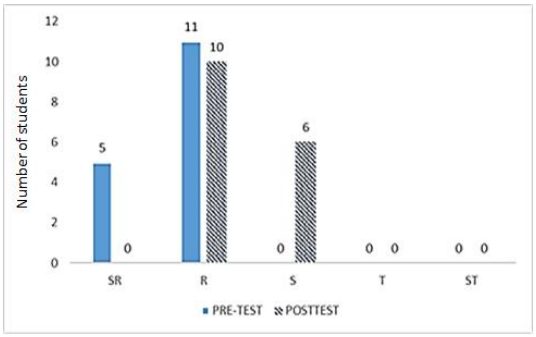

Figure 1. Comparison chart *pre-test* and *posttest* hots of students with criteria very high (ST), high (T), moderate (S), low (R) and very low (SR).

Before applying the STEM-based vibration and wave module, students were not maximal in analyzing, evaluating and creating vibration and wave concepts. Students have not been trained to use scientific steps in solving the problems given. This makes the HOTS of students still in the low and even in very low category. Through the STEM module, students are trained to analyze problems, formulate problems, identify aspects of science, technology,

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

engineering and mathematics in vibration and wave phenomena and plan efforts to solve problems through engineering design ideas related to the concepts of vibration and waves. So that there is an increase in the ability to analyze, evaluate and create in students at the end of learning. This is in accordance with the opinion of Duran & Sendag (2012) that the STEM approach trains problem-solving, innovative, confident and logical thinking skills.

There is a significant difference between students' higher order thinking skills before and after the application of STEM-based modules. There were 5 students with very low criteria in the pre-test, but these criteria were not found after the posttest. There are 6 students with moderate criteria in the posttest who previously did not find these criteria during the pre-test. This result is in accordance with the findings of Ratri (2019) which shows that higher order thinking skills become higher after the STEM model is applied..

Based on the results of the analysis prerequisite test in the form of a normality test (Table 1), it is known that the Posttest data and high self-confidence data are not normally distributed. This is because the data tends to be in the high and low portions. Likewise, the homogeneity test shows that the test data and self-confidence are not homogeneous because the two data are more heterogeneous. So that the hypothesis test used non-parametric statistics in the form of the Wilcoxon test (Table 2) and the Mann Whitney U test (Table 3).

Table 1. Data normality test results

HOTS Data Based on	***Shapiro-Wilk***		
	Stat	**df**	**Sig.**
Pre-Test	0.154	16	0.582
Posttest	0.223	16	0.013
Self Confidence High	0.337	7	0.007
Self Confidence Low	0.212	9	0.247

Table 2. Wilcoxon test results

Statistic	**HOTS (*Pre-Test-Postetst*)**
Z	-3.521
Asymp.Sig	0.000

The results of data analysis (Table 2) show that the significance value is less than 0.05, so it can be concluded that there is an effect of implementing STEM-based learning modules on students' higher-order thinking skills. The average higher-order thinking ability of students after the module was applied was higher than the average student's higher-order thinking ability before the module was applied. This is because the STEM-based vibration and wave module follows the steps of the STEM approach by integrating science, technology, engineering and mathematics in contextual problem solving. At the beginning of each module chapter, a stimulus is presented in the form of a phenomenon that they often encounter in everyday life. This stimulus is intended to assist students in formulating problems or hypotheses (temporary answers) based on the phenomena presented. Contextual and interesting stimuli can train students' thinking skills in finding some contextual problems and finding solutions in problem solving (Thomas & Thorne, 2009; Murnawianto, 2017).

The students' higher order thinking skills in this study consisted

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

of analyzing, evaluating and creating levels. When viewed from the increase in student HOTS for each HOTS level (Figure 2), it appears that overall there was an increase at all levels but the highest increase was at the level of creating.

Figure 2. Comparison of student HOTS based on each HOTS level

The material presentation in the module is packaged systematically and deductively inductive so that it trains logical thinking Mustofa (2016) and make it easier for students to understand the material. Modules will become more meaningful if users can easily use them (Pratiwi et al., 2017). In the module, sample questions are also given by presenting several problem-solving strategies for the problem, this is intended to train students in solving problems by using several solutions so as to enable students to find solutions that are different from the solutions given. In the module, practice questions with HOTS criteria are also given at the level of analyzing, evaluating and creating so that students are trained in solving problems at that level.

At the end of the module, the columns "Let's Explore" and "Let's Innovate" are presented. In the column “Let's Explore”, students are given the opportunity to make observations through experiments using simple tools that they can easily find at home. In this step, students are trained to analyze observational data so as to obtain conclusions until they find a pattern that they develop in the "let's innovate" column. In this innovation column, students are directed to carry out projects by producing products or designing experiments using new patterns. This is what causes students to be more trained in the ability to create (Mustofa, 2016; Lukitasari, 2018; Fitriyani et al., 2020). However, the increase in students' HOTS abilities is still low at the level of analyzing and evaluating, this is because in the exploration section, the presentation of activity steps still seems to guide. So that students become fixated on doing activities according to the instructions given in the module. In addition, students are also not used to carrying out distance learning independently at home, causing the improvement of students' higher-order thinking skills to be not optimal.

Table 3. U mann whitney test results

Statistic	**HOTS (*Postetst*) *Self Confidence* High and Low**
Mann-Whitney U	23.500
Wilcoxon W	68.500
Z	-0.874
Asymp. Sig. (2-tailed)	0.382
Exc Sig. [2*(1-tailed Sig.)]	0.408

One of the factors that influence student learning outcomes is self-confidence. Students who have high self-confidence tend to have high learning outcomes and vice versa (Nilasari et al., 2020). However, the results of this study indicate a

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

significance value greater than 0.05, so it can be concluded that there is no effect of self-confidence on students' higher-order thinking skills (Table 3). This means that students who have high self-confidence do not necessarily have high high-level thinking skills and vice versa, students who have low self-confidence do not necessarily have low high-level thinking skills. The findings of this study are different from the results of previous studies which found that self-confidence affects student learning outcomes, students who have high self-confidence will have an impact on high learning outcomes and vice versa (Wulandari & Sinambela, 2017; Nilasari et al., 2020). This happens because, the implementation of learning that is carried out independently at home makes students not feel competitive with their classmates so that even though they have high self-confidence they are less challenged and less motivated to innovate in learning.

CONCLUSION AND RECOMMENDATION

Based on the research conducted, it is concluded that: (1) There is an effect of implementing STEM-based learning modules on students' higher-order thinking skills (2) the increase in student HOTS occurs at all HOTS levels and the highest increase is at the level of creating; and (3) there is no effect of high self-confidence and low self-confidence on students' higher-order thinking skills.

The application of STEM-based modules has an impact on increasing students' ability to analyze, evaluate and create related to the concepts and applications of vibrations and waves. The developed STEM module can be used as a reference for other courses to improve student HOTS. It is recommended that further research can increase the variety of learning steps presented in the module so that it can develop students' higher-order thinking skills, especially in the aspect of analyzing and evaluating abilities.

REFERENCES

Almuharomah, F. A., Mayasari, T., & Kurniadi, E. (2019). Pengembangan Modul Fisika Stem Terintegrasi Kearifan Lokal "Beduk" untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa SMP. *Berkala Ilmiah Pendidikan Fisika*, 7(1), 1-10.

Amalia, Y., Duskri, M., & Ahmad, A. (2015). Penerapan Model Eliciting Activities untuk Meningkatkan Kemampuan Berpikir Kreatif Matematis dan Self Confidence Siswa SMA. *Jurnal Didaktik Matematika*, *2*(2).

Arifin, Z. (2012). *Evaluasi pembelajaran: Prinsip Teknik Prosedur*. In Bandung: PT Remaja Rosdakarya.

Arikunto, S. (2018). *Dasar-Dasar Evaluasi Pendidikan (Edisi 3)*. In Jakarta: Bumi Aksara.

Dinni, H. N. (2018). HOTS (High Order Thinking Skills) dan Kaitannya dengan Kemampuan Literasi Matematika. *In Prisma, Prosiding Seminar Nasional Matematika*, 1, 170-176.

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

Duran, M., & Sendag, S. (2012). A Preliminary Investigation into Critical Thinking Skills of Urban High School Students: Role of an IT/STEM Program. *Creative Education*, 3(2), 241-250.

Erdogan, I., & Ciftci, A. (2017). Investigating the Views of Pre-Service Science Teachers on STEM Education Practices. *International Journal of Environmental and Science Education*, 12(5), 1055-1065.

Firman, H. (2016). Pendidikan Stem Sebagai Kerangka Inovasi Pembelajaran Kimia untuk Meningkatkan Daya Saing Bangsa Dalam Era Masyarakat Ekonomi ASEAN. *Prosiding seminar nasional kimia dan pembelajarannya*. FMIPA Universitas Negeri Surabaya.

Fitriyani, A., Toto, T., & Erlin, E. (2020). Implementasi Model Pjbl-Stem untuk Meningkatkan Keterampilan Berpikir Tingkat Tinggi. *Bioed: Jurnal Pendidikan Biologi*, *8*(2), 1-6.

Herschbach, D. R. (2011). The STEM initiative: Constraints and challenges. *Journal of STEM Teacher Education*, 48(1), 96-122.

Karmini. (2020). *Statistik Non-Parametrik*. Samarinda: Mulawarman University Press

Lasi, H., Fettke, P., Kemper, H. G., Feld, T. & Hoffmann, M. (2014). Industry 4.0. *Business & Information Systems Engineering*, 6(4), 239.

Liu, W., Dong, Y., Chiclana, F., Cabrerizo, F. J., & Herrera-Viedma, E. (2017). Group Decision-Making Based On Heterogeneous Preference Relations With Self-Confidence. *Fuzzy Optimization And Decision Making*, 16(4), 429-447.

Lukitasari, M., Handika, J., & Murtafiah, W. (2018). Higher Order Thinking Skills: Using E-Portofolio in Project-Based Learning. IOP Conf. Series: *Journal of Physics Conf. Series*, 983, 012047.

Mandini, G. W., & Hartono, H. (2018). Analisis Kemampuan Menyelesaikan Soal HOTS Model TIMSS dan Kepercayaan Diri Siswa Sekolah Menengah Pertama. *Pythagoras: Jurnal Pendidikan Matematika*, 13(2), 148-157.

Murnawianto, S., Sarwanto., & Rahardjo, S.B. (2017). Stem-Based Science Learning In Junior High School: Potency For Training Students' Thinking Skill. *Jurnal Pancaran Pendidikan*, 6(4), 69-80.

Mustofa, I. (2016). Jendela Logika dalam Berfikir; Deduksi dan Induksi sebagai Dasar Penalaran Ilmiah. *EL-BANAT: Jurnal Pemikiran dan Pendidikan Islam*, *6*(2), 1-21.

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

Mustofa, M. H. (2016). *Penerapan Pendekatan Entrepreneural Science Thinking (Escit) Melalui Model Project Based Learning Untuk Meningkatkan Kemampuan Memahami Dan Keterampilan Berpikir Kreatif Siswa SMA Pada Materi Listrik Dinamis* (Doctoral dissertation, Universitas Pendidikan Indonesia).

Nabilah, S., Anwar, Y., & Riyanto, R. (2019). Motoric Mechanism with Problem-Based Learning: Impact on Students' Higher-Order Thinking Skills. *Biosphere: Journal of Biology Education/ Biosfer: Jurnal Pendidikan Biologi*, 12(2), 182–193

Neugebauer, R., Hippmann, S., Leis, M., & Landherr, M. (2016). Industrie 4.0-From the Perspective Of Applied Research. *Procedia CIRP*, 57, 2-7.

Nilasari, A., Effendi, M. M., & Putri, O. R. U. (2020). Analisis Self-Confidence Dan Hasil Belajar Matematika Sma Dalam Kurikulum Berbasis Unit Kegiatan Belajar Mandiri. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, *9*(2), 433-439.

Nugraha, A. W., & Syafi'ah, R. (2020). Pengembangan Buku Ajar Bioteknologi Berbasis Science, Technology, Engineering, Math (STEM) untuk Meningkatkan High Order Thinking Skill (HOTS) Mahasiswa. *Jurnal BIOEDUIN: Program Studi Pendidikan Biologi*, 10(2), 1-9.

Permanasari, A. (2016). STEM Education: Inovasi Dalam Pembelajaran Sains. In *Prosiding SNPS (Seminar Nasional Pendidikan Sains)*, 3, 23-34.

Pratiwi, P. H., Hidayah, N., & Martiana, A. (2017). Pengembangan Modul Mata Kuliah Penilaian Pembelajaran Sosiologi Berorientasi HOTS. *Cakrawala Pendidikan*, (2), 85339.

Quraisy, A. (2020). Normalitas Data Menggunakan Uji Kolmogorov-Smirnov dan Saphiro-Wilk. *J-HEST Journal of Health, Education, Economics, Science, and Technology*, *3*(1), 7-11.

Ratri, D. K. (2019). *Pengaruh pembelajaran STEM berbasis inkuiri terhadap peningkatan kemampuan berpikir tingkat tinggi siswa kelas XI SMAN 1 Pesanggrahan materi fluida dinamis* (Doctoral dissertation, Universitas Negeri Malang).

Retnawati, H. (2016). The Challenges of Junior High School Mathematic Teachers in Implementing the Problem-Based Learning for Improving the Higher-Order Thinking Skills. *Online Journal of Counseling & Education*, 5(3).

Rosdianto, H. (2017). Pengaruh Model Generative Learning Terhadap Hasil Belajar Ranah Kognitif

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

Siswa Pada Materi Hukum Newton. *Jurnal Pendidikan Fisika Dan Keilmuan (JPFK)*, 3(2), 66.

Rozi, F., & Hanum, C. B. (2019). Pembelajaran IPA SD Berbasis Hots (Higher Order Thinking Skills) Menjawab Tuntutan Pembelajaran Di Abad 21. In *Seminar Nasional PGSD Unimed*, 2(1), 246-311.

Rubmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P. & Harnisch, M. (2015). Industry 4.0: The Future Of Productivity And Growth In Manufacturing Industries. *Boston Consulting Group*, 14.

Safitri, Y., Mayasari, T., & Handhika, J. (2019, March). Interdiciplinary Stem Module Of Guitar Based Scientific Literacy: Modul Stem Pada Gitar Berbasis Literasi Sains. *Prosiding Seminar Nasional Hasil Penelitian LPPM Universitas PGRI Madiun*, 109-115.

Saido, G. A. M., Siraj, S., Dewitt, D., & Al-Amedy, O. S. (2018). Development Of An Instructional Model For Higher Order Thinking In Science Among Secondary School Students: A fuzzy delphi approach. *International Journal of Science Education*, 40(8), 847–866.

Sarwi., Rusilowati, A., & Khanafiyah, S. (2012). Implementasi Model Eksperimen Gelombang Open-Inquiry untuk Mengembangkan Keterampilan Berpikir Kritis Mahasiswa Fisika. *Jurnal Pendidikan Fisika Indonesia*, 8(1).

Schmidt, R., Möhring, M., Härting, R. C., Reichstein, C., Neumaier, P. & Jozinović, P. (2015). Industry 4.0-Potentials For Creating Smart Products: Empirical Research Results. *International Conference On Business Information Systems*, 16-27.

Scoot, C. (2012). An Investigation Odd Science Technology Engineering And Mathematics (Stem) Focused High Scools In The U.S. *Journal of Stem Education*,13(5), 30-39.

Scott, D., & Usher, R. (2010). *Researching Education: Data, Methods And Theory In Educational Enquiry*. Bloomsbury Publishing.

Sudirman, S., Kistiono, K., & Taufiq, T. (2018). Pengembangan Modul Mata Kuliah Gelombang Berbasis Stem (Science Technology Engineering And Mathematics) Pada Program Studi Pendidikan Fisika. *Jurnal Inovasi Dan Pembelajaran Fisika*, 5(2), 134-140.

Supriyanto, S. A., & Machfudz, M. (2010). *Metodologi Riset Manajemen Sumberdaya Manusia*. Malang: UIN-Maliki Press

Thomas, A., & Thorne, G. (2009). How To Increase Higher Order

Jurnal Pendidikan Matematika dan IPA
Vol. 13, No. 1 (2022) h. 40-50

Thinking. *Metarie, LA: Center for Development and Learning*.

Usmadi, U. (2020). Pengujian Persyaratan Analisis (Uji Homogenitas dan Uji Normalitas). *Inovasi Pendidikan*, *7*(1).

Wagner, T. (2008). Rigor Redefined. *Educational Leadership*, 66(2), 20-24.

White, K. A. (2009). Self-confidence: A Concept Analysis. *In nursing forum*, 44(2), 103-114.

Wulandari, & Sinambela, N. (2017). Hubungan Kepercayaan Diri (Self Confidence) Dengan Kemampuan Pemecahan Masalah Matematika Siswa dengan Menggunakan Model Problem Basedlearning Di Man Kisaran. *Inspiratif :Jurnal Pendidikan Matematika*, *3*(2).