Journal of Research in Instructional
e-ISSN: 2776-222X
Vol. 3(2) 2023, pp. 296 – 306

Development of an interactive e-module based on a case method to improve higher-order thinking skills

Firmansyah Fimansyah*, Irfan Irnandi, Nahrun Najib Siregar, Ebeneser Wacner Simamora

Universitas Papua, Indonesia

Abstract: The objective of this study is to create a case-method-based interactive e-module that will enhance the higher-level thinking skills (HOTs) of students. Research and Development (R&D) utilizing the ten-step Borg & Gall model development constitutes this research method. This investigation is restricted to the seventh stage. This study's participants were FKIP UNIPA first-semester students enrolled in instructional mathematics courses. The sample for the study was determined by cluster random sampling. The participants in this research were partitioned into two groups: the experimental group consisted of students majoring in English education, while the control group comprised students majoring in Indonesian language education. In this study, questionnaires, interviews, validator assessment forms, and HOTs tests were utilized to collect data. Three data analysis techniques were utilized in this study: validity, practicability, and effectiveness. The outcomes demonstrate the e-module's validity. The practicality assessment yielded an 81.44% response rate from students in the very practical category. The HOTs of the pupils in the experimental class were superior to those of the control class. The mean HOTs of students in the control group were 67.67, whereas those in the experimental group had an average HOTs of 75.50.

Keywords: Case method, higher order thinking skills, interactive e-module

Pengembangan e-modul interaktif berbasis metode kasus untuk meningkatkan kemampuan berpikir tingkat tinggi

Abstrak: Tujuan dari penelitian ini adalah untuk membuat e-modul interaktif berbasis metode kasus yang akan meningkatkan kemampuan berpikir tingkat tinggi (HOTs) siswa. Research and development (R&D) yang memanfaatkan sepuluh langkah pengembangan model Borg & Gall merupakan metode penelitian ini. Riset ini dibatasi pada tahap ketujuh. Partisipan penelitian ini adalah mahasiswa FKIP UNIPA semester 1 yang mengikuti mata kuliah pembelajaran matematika. Sampel penelitian ditentukan secara cluster random sampling. Partisipan dalam penelitian ini dibagi menjadi dua kelompok: kelompok eksperimen terdiri dari mahasiswa jurusan pendidikan bahasa Inggris, sedangkan kelompok kontrol terdiri dari mahasiswa jurusan pendidikan bahasa Indonesia. Dalam penelitian ini, kuesioner, wawancara, formulir penilaian validator, dan tes HOTs digunakan untuk mengumpulkan data. Tiga teknik analisis data digunakan dalam penelitian ini: validitas, kepraktisan, dan efektivitas. Hasilnya menunjukkan validitas e-modul. Penilaian kepraktisan menghasilkan tingkat respon siswa pada kategori sangat praktis sebesar 81,44%. HOTs siswa kelas eksperimen lebih tinggi dibandingkan siswa kelas kontrol. Rerata HOTs siswa pada kelompok kontrol sebesar 67,67, sedangkan pada kelompok eksperimen mempunyai rata-rata HOTs sebesar 75,50.

Kata Kunci: Case method, keterampilan berpikir tingkat tinggi, e-modul interaktif

Received: 15-10-2023
Accepted: 23-12-2023

To cite this article: Fimansyah, F., Irnandi, I., Siregar, N. N., & Simamora, E. W. (2023). Development of an interactive e-module based on a case method to improve higher-order thinking skills. *Journal of Research in Instructional*, *3*(2), 296–306. https://doi.org/10.30862/jri.v3i2.254

*Corresponding author: f.firmansyah@unipa.ac.id

INTRODUCTION

Higher-order thinking abilities are necessary for college graduates to succeed in the 21st century. This is due to the fact that everyone will face many challenges and a more complex life in the twenty-first century. As a result, education is designed to produce comprehensive student competencies that cover all facets of knowledge, skills, and a literate attitude toward reading, writing, numeracy, science, digital, finance, culture, and citizenship. Higher order thinking skills, or HOTs, are sophisticated thought processes that go beyond the most fundamental mental operations when describing the subject matter, drawing conclusions, creating representations, evaluating, and forming connections (Resnick & Mustaghfirin, 2019). One of the stages that cannot be divorced from everyday life is high-level thinking, and it is expected that every student cultivate a consistent thought pattern. This high level is due to the ability higher level thinking makes a person think critically (Chotimah & Nurdiansyah, 2017; Damopolii et al., 2022; Iwan et al. 2023; Nasir et al., 2020). According to Miyarso (2019), and Widihastuti (2013), HOTs show an understanding of information and reasoning, not just remembering information.

The case method is one teaching strategy that can help students develop higher order thinking abilities. Point 7 of State Universities promotes the case method and project-based group learning as two methods of learning in higher education based on the primary performance factors. Students can reach their full potential, become self-actualized, creative, and solve problems by using the case method learning paradigm (Widiastuti et al., 2022). Case-based Learning (CBL), alternatively referred to as the Case Method, is an educational method that motivates students to proactively confront difficult problems by emulating real-world circumstances. According to Wospakrik et al. (2020), Hodijah et al. (2022), Fauzi et al. (2023), and Sobri et al. (2021), using this approach can improve learning results and student motivation. Additionally, Hidayat et al. (2022) and Syam (2022) believe that the case method can also improve students' analytical and higher-order thinking skills.

According to Arsyad (2014) and Yomaki et al. (2023), students can comprehend the sense of hearing and sight through interactive e-modules. The likelihood that information will be retained and comprehended increases with the number of senses utilized to obtain it. Scholars have demonstrated noteworthy distinctions in the educational results acquired through the senses of hearing and sight (Prihantana et al., 2014; Hutapean, 2019; Herawati and Muhtadi, 2018). Subeksti and Widayanti (2017), and Dita et al. (2023), learning modules are instructional materials that are arranged in an engaging and methodical way to facilitate independent study. According to Firmansyah et al. (2021) as well as Subeksti and Widayanti (2017), student learning achievement can be enhanced by the use of modules. An electronic module, often known as an e-module, is a computer-readable electronic version of a printed module that has been created using the required software. E-modules are educational materials or tools that consist of content, strategies, limitations, and assessment techniques that are systematically and engagingly designed to electronically achieve the necessary skills in line with the level of difficulty.

Students majoring in education at FKIP UNIPA are required to take the educational mathematics course. 11 out of the 31 students who took basic mathematics in the English education department failed the course, according to data gathered from final semester tests for students enrolled in odd semester educational mathematics courses for the 2021–2022 academic year. This is a result of the students' inability to comprehend the content on their own. In addition, the results of student interviews revealed that the lack of accessible resources, such as books and modules, made it difficult for students to learn fundamental mathematical ideas. To motivate students to learn mathematics, creativity is required (Amoah et al., 2023; Matorevhu, 2023). This research aims to develop an interactive e-module based on the case method to improve students' HOTs.

METHOD

This study fell under the category of research and development (R & D) or development research. The process involves streamlining the ten-step Borg & Gall development paradigm (in Sugiyono 2015). This research was limited to step seven (Figure 1).

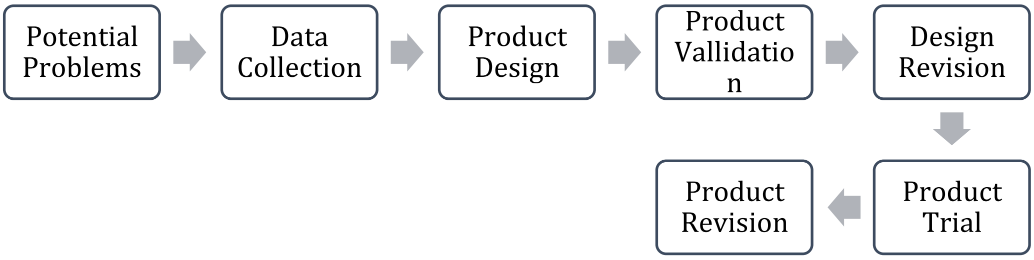


Fig. 1. Research process

Potential problems

Problems were obtained through student observations and interviews regarding the limited references for educational mathematics courses within the scope of FKIP, University of Papua. Students expressed concern about the limited number of good lecture books.

Data collection

The data collection process at this stage is the stage of collecting data related to study material for educational mathematics courses.

Product design

At this point, the researcher will use the Canva tool to create an interactive E-module for math education classes. This stage involves the following activities: (1) Media selection, which involves choosing the right medium in which to communicate the content; and (2) Format selection, which involves modifying it based on the parameters outlined in the course outcomes. The format selected is for content and appearance design. (3) Canva was used to help design the module's original layout, which included practice questions, a synopsis of the material, a description of the course objectives, and a material description.

Product validation

Product validation encompasses the evaluation of content and material validity, conducted by three education professionals who have at least an S3 or Doctorate degree.

Design revision

Product revision is the process of improving a product by fixing flaws and refining it in light of expert and validater evaluation results. Until the final design is valid, make revisions to the design.

Product trial

Product usability trials are trials carried out on limited groups to determine the practicality and effectiveness of the product to be developed. At this stage, researchers will test it on students who are programming educational mathematics courses for the odd semester of 2022/2023 within the scope of FKIP UNIPA.

Product revision

The data obtained from the trial results were analyzed and revised. Usability trials and product revisions can be carried out until a draft of effective teaching materials is obtained.

The FKIP UNIPA students made up the study's population. Students enrolled in educational mathematics courses were selected as the research sample using cluster random sampling. Students majoring in English education made up the experimental class in this study, whereas students majoring in Indonesian language education made up the control group.

Data collection techniques used in this research include:

Questionnaire

A written questionnaire is a method of gathering data in which participants are asked questions. This methodology is employed to ascertain the product's feasibility for development and the degree of student learning autonomy. 24 statements make up the learning independence questionnaire, which was created using the indicators of learning initiative, need diagnosis, goal-setting, resource selection and application, strategy selection and application, independent learning, group collaboration, and self-control.

Interview

This research uses semi-structured interviews.

Validator assessment sheet

The validator assessment sheet in this study was used to obtain data about the validity of teaching material products.

Higher-order thinking ability test

The high-level thinking ability test is used as a reference for determining the effectiveness of the device. The high-level thinking ability test is a written test consisting of 10 questions.

The study employs three data analysis techniques to assess the validity, practicality, and effectiveness of the interactive e-module designed for educational mathematics courses. This study will use internal testing, in the form of an expert evaluation of the e-module, to ensure the module's validity. Testing can occur several times until a valid e-module design is found. Expert opinion testing (expert review) was carried out by asking for the opinions of 3 experts and practitioners. Practicality data was obtained from student response questionnaires. Isharyadi and Ario (2019) stated that the e-module practicality test analysis was carried out by giving questionnaires to students to determine the percentage of all items.

The average difference test in learning achievement is used in the analysis of effectiveness data. A test of the assumption of requirements consisting of a homogeneity and normality test is conducted first, followed by an average difference test to determine the difference in average learning achievement between the experimental and control classes. The Kolmogorov-Smirnov Normality test is used in this study's normality testing to ascertain whether the population is normally distributed. Levene's Test, which measures homogeneity between two groups—the experimental and control classes—was employed in this work to test for homogeneity. Following completion of the required exams, data analysis moves on to a test of the average difference in learning success between the experimental and control courses, carried out .Following completion of the necessary exams, an independent sample t-test with a 5% significance threshold is used to examine the average difference in learning achievement between the experimental and control classes.

RESULTS

Validity analysis results

At this stage, the researcher validated the interactive e-module for the educational mathematics course, a high-level thinking ability test, and a questionnaire. E-module validation includes aspects of content/material validity, carried out by three experts in the field of education with a minimum education qualification of S3 or Doctorate. A recapitulation of validation results is presented in Table 1.

Table 1. A summary of the validation findings

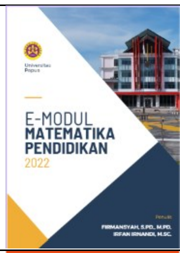
No	Research Instrument	V1	V2	V3	Average	Category
1	The interactive e-module for the educational mathematics course	3.67	3.83	3.83	3.78	Very Good
2	The high-level thinking ability test	3.5	3.83	3.67	3.67	Very Good
3	The questionnaire practicality of e-module	3.5	3.5	3.67	3.56	Very Good

Note: V = Validator

Validators gave the interactive e-module for the case-based educational mathematics course an average score of 3.78 based on the evaluation results. With the help of the Canva app, the interactive e-module for math education courses has an excellent average validation score. Validators gave the high-level thinking ability test an average score of 3.67. The high-level thinking ability exam has an extremely high validation score on average. Validators gave the questionnaire an average score of 3.56. The e-module practicality questionnaire has an average validation score that falls into the very good range.

The validation process was carried out several times by making improvements based on suggestions from the validator (Table 2).

Tabel 2. Validator suggestions

No	Validator suggestions	Before	After
1	Validator 1: The cover should be designed to include the author and add a supporting logo		
2	Validator 2: Interactive e-modules need to add practice questions that integrate HOTs practice questions.	Not yet	
3	Validator 3: When preparing the e-module, please pay attention to spelling, capital letters, and the layout.		

Based on the experts validation, it can be declared that the interactive e-module research instrument for the educational mathematics course and the three research instruments that will be used are valid.

Practicality analysis results

Product usability trials are studies done on small groups of people to find out how useful and effective a proposed product will be. In the context of FKIP, researchers will currently test it on 2022 class students. Student answer surveys to the created instructional mathematics e-modules provided the practicality data. Three factors are considered in a practical analysis of the module: attractiveness, language, and material.

Table 3. Recapitulation of student responses

No	Statement	Percentage	Category
1	Interesting e-module used in learning	81.33	Very Practical
2	Learning using e-module makes me more active	80.67	Very Practical
3	E-modules can be used under any conditions	83.33	Very Practical
4	The e-module design is attractive, with clear illustrations	84.00	Very Practical
5	The sentences used do not give rise to multiple (ambiguous) interpretations	80.00	Very Practical

6	The language utilized in the module is communicative and simple to comprehend	81.33	Very Practical
7	The provision of information (user guide, learning objectives, and practical activity steps) in the module is very clear	82.00	Very Practical
8	The material is presented using spelling (letter writing and punctuation) according to correct Indonesian language rules	80.00	Very Practical
9	Modules are presented coherently and clearly	81.33	Very Practical
10	With the module, I was able to measure the level of understanding of the material	79.33	Practical
11	The module facilitates my comprehension of the subject matter	85.33	Very Practical
12	The module helped me in discovering new concepts	78.67	Practical
	Average	81.44	Very practical

Based on the results of the practicality test, a positive response from students was 81.44%, which was in the very practical category.

Effectiveness analysis results

Analysis of effectiveness data using a test of differences in students' high-level thinking abilities. The test of the average difference in students' high-level thinking abilities between the experimental and control classes begins with a test of the assumption of requirements consisting of a normality and a homogeneity tests.

Table 4. Normality and homogeneity test

	Kolmogorov-Smirnov[a]			**Levene Test**	
	Statistic	**df**	**Sig.**	**F**	**Sig.**
Control	0.106	30	0.200	0.761	0.387
Experimental	0.132	30	0.192		

Based on the results obtained in Table 4, the normality test on control class students' HOTs scores obtained a significance value of 0.200 where 0.200 >0.05. This means the data of control class students' HOTs scores is normally distributed. Besides, the normality test on experimental class students' HOTs scores obtained a significance value of 0.192 where 0.192>0. This means that the data on experimental class students' HTOs scores is normally distributed

In light of the outcomes, in Table 4, the homogeneity test on students' HOTs scores using Levene's obtained a significance value of 0.387 where 0.387>0.05. This means that the variance between students in the Indonesian language education department and the English language education department is homogeneous.

After the prerequisite tests were met, a test of the average difference in high-level thinking abilities of control class and experimental class students was continued. The average difference test was carried out using the independent sample t-test with a significance level of 5%. The test results of the differences in the average results of the HOTs test for control class and experimental class students can be seen in Table 5.

Table 5. T-test

Class	N	Mean	SD	Std. Error Mean	t	df	Sig
Control	30	67.67	14.187	2.590	-2.223	58	0.030
Experimental	30	75.50	13.088	2.390			

Based on the results obtained in Table 5, the test of the difference in the average test results of the HOTs of the control class and experimental class students obtained a significance value of 0.030, where 0.030 < 0.05. This means that the HOTs of experimental class students are better than HOTs of control class students. The average HOTS score for control class students was 67.67, while the average HOTs score for experimental class students was 75.50. With details as shown in Table 5.

DISCUSSION

The educational mathematics course's interactive e-module has successfully raised students' HOTS. Based on the interactive e-module's implementation, students' HOTs have improved significantly in educational mathematics courses. Innovations were used in the development of the interactive e-module for the educational mathematics course. Numerous module developments that can enhance students' learning achievement have been adopted by previous study. In order to raise students' HOTs, this study incorporates interactive e-modules into case method-based educational mathematics courses.

Based on the evaluations of the three validators, the interactive e-module for educational mathematics courses, HOTs tests, questionnaires, and interview guides that have been created are in the very good category (See table 1). To assess the tools, designs, and language that researchers have created, expert validation is required. Researchers used questionnaires to collect both quantitative and qualitative data from experts (Chrisyarani & Yasa, 2018). The validation procedure is repeated multiple times, with adjustments made in response to validator recommendations.

Upon satisfying the validity criteria, the study proceeded to the limited trial stage, wherein an interactive e-module was introduced for the educational mathematics course intended for students enrolled in the odd semester of the 2022/2023 academic year. Students majoring in English education made up the experimental class in this study, whereas students majoring in Indonesian language education made up the control group. During one meeting for the HOTs test and four material meetings, the e-module was implemented in the experimental class. The purpose of the test was to gather information for analysis in order to determine the efficacy of the constructed e-module.

The experimental class received an average of 75.50, which was higher than the control class's average of 67.67, according to the findings of the average difference test based on the HOTs test. This comes after studies by Qodiratullah et al. (2021), and Puspitasari et al. (2020) found that interactive e-modules can raise students' capacity for higher-order thinking. In addition, interactive e-modules have been shown by Ritonga (2020) to enhance student learning achievement. Education needs to be able to inspire students and raise their performance levels (Damopolii et al., 2019; Yurida et al., 2021).

Through increased student motivation to learn, this research has improved students' HOTs. The e-module is designed to motivate students to read it and enable them to think to understand the material well.

CONCLUSION

The interactive e-module for the educational mathematics course, the high-level thinking ability test, the questionnaire, and the interview guide that have been developed are in the very good category based on the assessments of the three validators. Based on the validation results, it can be concluded that the two research instruments used are valid so they can be used in limited product trials. After conducting a limited trial, it can be concluded that the interactive module for the educational mathematics course is practical and effective in improving students' HOTs in terms of their curious character with the following criteria: (a) The results of the practicality test obtained a positive response from students of 81.44%, which was in the very practical category; (b) The HOTs of experimental class students is better than control class students. The average HOTs score for control class students was 67.67, while the average HOTs score for experimental class students was 75.50.

REFERENCES

Amoah, C., Adu-Gyamfi, R., & Mifetu, R. K. (2023). Investigating the factors influencing the attitudes of students toward the study of mathematics. *Journal of Research in Instructional*, *3*(1), 55–68. https://doi.org/10.30862/jri.v3i1.213

Arsyad, A. (2014). *Media Pembelajaran*. PT Rajagrafindo Persada.

Chotimah, U., & Nurdiansyah, E. (2017). Meningkatkan high order thinking skills mahasiswa semester III PPKn dalam pembelajaran Psikologi Sosial melalui penerapan metode six thinking hats. *Jurnal Civics: Media Kajian Kewarganegaraan*, *14*(1), 63–74. https://doi.org/10.21831/civics.v14i1.14563

Chrisyarani, D. D., & Yasa, A. D. (2018). Validasi modul pembelajaran: Materi dan desain tematik berbasis PPK. *Premiere Educandum : Jurnal Pendidikan Dasar Dan Pembelajaran*, *8*(2), 206. https://doi.org/10.25273/pe.v8i2.3207

Damopolii, I., Botutihe, V. T., & Nunaki, J. H. (2019). The contribution of science process skill towards students cognitive achievement through guided inquiry-based learning. *Journal of Physics: Conference Series*, *1317*, 012184. https://doi.org/10.1088/1742-6596/1317/1/012184

Damopolii, I., Paiki, F. F., & Nunaki, J. H. (2022). The development of comic book as marker of augmented reality to raise students’ critical thinking. *TEM Journal*, *11*(1), 348–355. https://doi.org/10.18421/TEM111-44

Dita, K. I., Tuririday, H. T., Damopolii, I., & Latjompoh, M. (2023). Designing the human circulatory system e-module to increase student achievement. *Inornatus: Biology Education Journal*, *3*(2), 75–84. https://doi.org/10.30862/inornatus.v3i2.422

Fauzi, A., Ermiana, I., Nur Kholifatur Rosyidah, A., & Sobri, M. (2023). The Effectiveness of Case Method Learning in View of Students’ Critical Thinking Ability. *Pedagogia : Jurnal Pendidikan*, *12*(1), 15–33. https://doi.org/10.21070/pedagogia.v11i1.1544

Firmansyah, Purwati, & Wyrasti, A. F. (2021). Pengembangan modul micro teaching terintegrasi beleanded learning Jurusan Pendidikan Matematika. *Jurnal Theorems*

(The Original Reasearch Of Mathematics), *6*(1), 1–15. https://doi.org/http://dx.doi.org/10.31949/th.v6i1.3116

Herawati, N. S., & Muhtadi, A. (2018). Pengembangan modul elektronik (e-modul) interaktif pada mata pelajaran Kimia kelas XI SMA. *Jurnal Inovasi Teknologi Pendidikan*, *5*(2), 180–191. https://doi.org/10.21831/jitp.v5i2.15424

Hidayat, O. S., Kholis, A., Hanu, L., & Sibarani, C. G. G. T. (2022). Case Study method dan problem based learning sebagai model pembelajaran digital terhadap HOTS learning guru akuntansi di masa era revolusi industri 4.0. *Journal of Education, Humaniora and Social Sciences (JEHSS)*, *4*(4), 2642–2648. https://doi.org/10.34007/jehss.v4i4.1171

Hodijah, S., Hastuti, D., & Zevaya, F. (2022). Implementasi model case method dalam meningkatkan inovasi pembelajaran mahasiswa dan kemampuan berpikir kritis pada mata kuliah teknik perdagangan internasional. *Jurnal Paradigma Ekonomika*, *17*(2), 477–484. https://doi.org/10.22437/jpe.v17i2.20895

Hutapean, L. A. (2019). Pemanfaatan E-module interaktif sebagai media pembelajaran di era digital. *Prosiding Seminar Nasional Teknologi Pendidikan Pascasarjana UNIMED*, *2018*, 298–305.

Isharyadi, R., & Ario, M. (2019). Praktikalitas dan efektivitas modul geometri transformasi berbantuan geogebra bagi mahasiswa pendidikan matematika. *Jurnal Absis : Jurnal Pendidikan Matematika Dan Matematika*, *1*(2), 86–93. https://doi.org/10.30606/absis.v1i2.93

Iwan, I., Sumitro, S. B., Ibrohim, I., & Roman, F. (2023). Students’ critical thinking skills (2011-2020): A bibliometric analysis. *Journal of Research in Instructional*, *3*(2), 104–117. https://doi.org/10.30862/jri.v3i2.26

Lelasari, T., Yohanita, A. M., & Damopolii, I. (2021). Effect of inquiry science learning on students’ metacognitive skill. *Journal of Research in Instructional*, *1*(1), 53–60. https://doi.org/10.30862/jri.v1i1.12

Matorevhu, A. (2023). Curriculum innovation implementation for industrialization: A case of education 5.0 pre-service science and mathematics teacher preparation. *Journal of Research in Instructional*, *3*(1), 69–86. https://doi.org/10.30862/jri.v3i1.214

Miyarso, E. (2019). *Perancangan pembelajaran inovatif*. Kementrian Pendidikan dan Kebudayaan. https://lmsspada.kemdikbud.go.id/pluginfile.php/551898/mod_resource/content/2/P12.%20Perancangan%20Pembelajaran%20Inovatif-KB1-KB2.pdf

Nasir, N. I. R. F., Damopolii, I., & Nunaki, J. H. (2020). Pengaruh pembelajaran inkuiri terhadap level berpikir siswa SMA. *Bioilmi: Jurnal Pendidikan*, *6*(2), 112–119. https://doi.org/10.19109/bioilmi.v6i2.6948

Prihantana, M. A. S., Santyasa, I. W., & Warpala, I. W. S. (2014). Pengembangan bahan ajar interaktif berbasis pendidikan karakter pada mata pelajaran animasi stop motion untuk siswa SMK. *E-Journal Program Pascasarjana Universitas Pendidikan Ganesha*, *4*(1), 1–12. https://doi.org/https://doi.org/10.23887/jtpi.v4i1

Puspitasari, R., Hamdani, D., & Risdianto, E. (2020). Pengembangan e-modul berbasis HOTs berbantuan flipbook marker sebagai bahan ajar alternatif siswa SMA. *Jurnal Kumparan Fisika*, *3*(3), 247–254. https://doi.org/10.33369/jkf.3.3.247-254

Qodiratullah, A., Sholeh, H., & Sudrajat, A. (2021). Pengembangan e-modul berorientasi higher order thinking skills (Hots) Pada pelajaran ilmu pengetahuan alam (IPA) kelas VI sekolah dasar. *Jurnal Muara Pendidikan*, *6*(1), 33–40. https://doi.org/10.52060/mp.v6i1.513

Resnick, & Mustaghfirin, A. (2019). *Penyusunan Instrumen penilaian berbasis HOTs*. Kementerian Pendidikan Dan Kebudayaan Direktorat Jenderal Pendidikan Dasar dan Menengah Direktorat Pembinaan Sekolah Menengah Kejuruan.

Ritonga, A. F. (2020). Peningkatan prestasi belajar mahasiswa dengan menggunakan e-modul interaktif berbasis schoology pada materi momentum dan impuls di Universitas Binawan. *Jurnal Ikatan Alumni Fisika*, *6*(4), 15. https://doi.org/10.24114/jiaf.v6i4.21348

Sobri, M., Muid, A., & Daud, S. M. (2021). Penggunaan model Pembelajaran case method dalam mengatasi demotivasi belajar during mata kuliah muhadatsah lil mubtadiin Prodi Pendidikan Bahasa Arab Universitas Jambi. *AD-DHUHA : Jurnal Pendidikan Bahasa Arab Dan Budaya Islam*, *2*(2), 1–11. https://online-journal.unja.ac.id/Ad-Dhuha/article/view/15932

Subeksti, P., & Widayanti, L. (2017). Pengembangan modul mata kuliah statistika dan probabilitas dengan pendekatan problem based learning untuk mahasiswa Program Studi Teknik Informatika Di STMIK Asia Malang. *Jurnal Kajian Pembelajaran Matematika*, *1*(2), 96–105. http://journal2.um.ac.id/index.php/jkpm

Sugiyono. S. (2015). *Metode penelitian & pengembangan (Research and Development)*. Alfabeta.

Syam, S. (2022). Penerapan case method dalam meningkatkan hasil belajar mahasiswa. *Jurnal Ilmiah Mandala Education*, *8*(2), 1397–1401. https://doi.org/10.58258/jime.v8i2.3127

Widiastuti, F., Amin, S., & Hasbullah, H. (2022). Efektivitas metode pembelajaran case method dalam upaya peningkatan partisipasi dan hasil belajar mahasiswa pada mata kuliah manajemen perubahan. *Edumaspul: Jurnal Pendidikan*, *6*(1), 728–731. https://doi.org/10.33487/edumaspul.v6i1.3034

Widihastuti, W. (2013). Mengembangkan higher order thingking skills (HOTs) dan sikap positif mahasiswa melalui penerapan assessment for learning (AFL) berbasis HOTs dalam pembelajaran di kelas (sebuah pemikiran menyambut penerapan kurikulum 2013 di perguruan tinggi). *Pembelajaran Kelas*, 52–66. https://journal.uny.ac.id/index.php/ptbb/article/view/33069

Wospakrik, F., Sundari, S., & Musharyanti, L. (2020). Pengaruh penerapan metode pembelajaran case based learning terhadap motivasi dan hasil belajar mahasiswa. *JHeS (Journal of Health Studies)*, *4*(1), 30–37. https://doi.org/10.31101/jhes.515

Yomaki, E. K., Nunaki, J. H., Jeni, J., Mergwar, S. D. I., & Damopolii, I. (2023). Flipbook based on problem-based learning: Its development to bolster student critical thinking skills. *AIP Conference Proceedings*, 020022. https://doi.org/10.1063/5.0126212

Yurida, Y., Damopolii, I., & Erari, S. S. (2021). Hubungan Antara Kreativitas Guru dengan Motivasi Belajar Sains Siswa selama Pandemic COVID-19. *Prosiding SNPBS (Seminar Nasional Pendidikan Biologi Dan Saintek)*, 146–152. https://proceedings.ums.ac.id/index.php/snpbs/article/view/28