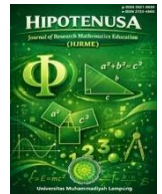


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Development of flipped classroom module based on student created videos to improve hots

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ABSTRACT

Higher Order Thinking Skills (HOTS) are essential competencies that should be fostered in mathematics education to enable students to analyze, evaluate, and solve problems critically. However, students' HOTS remain relatively low due to teacher centered instruction, low learning motivation, and limited learner autonomy. This condition was also identified among eighth grade students at SMPN 5 Kuningan. The results of the preliminary test on statistics indicated that students were able to calculate the mean, median, and mode but were not yet able to analyze, evaluate, or provide appropriate reasoning when solving problems. Although numerous studies have examined the flipped classroom approach and the student created video strategy separately, research integrating both into a teaching module to enhance HOTS in statistics instruction remains limited. Therefore, this study aimed to develop a student created video-based flipped classroom teaching module, evaluate its validity and practicality, and examine its effectiveness in improving students' HOTS. This study employed a Research and Development (R&D) approach using the ADDIE model involving 20 eighth-grade students at SMPN 5 Kuningan. Data were collected through observations, questionnaires, and tests and were analyzed using percentage analysis and the normalized gain (N-Gain) test. The results showed that the developed module was highly valid, with validity scores ranging from 82.00% to 87.69%, and highly practical, as reflected in the positive responses from teachers (85.42%) and students (82.05%). Furthermore, the implementation of the module improved students' HOTS, with an N-Gain score of 0.52, which was classified as moderate. These findings indicate that the student created video based flipped classroom teaching module is a valid, practical, and effective instructional resource for supporting statistics instruction and promoting the development of Higher Order Thinking Skills.

1.Introduction

Education plays a vital role in preparing human resources to meet the challenges of the twenty first century by fostering knowledge, skills, and higher order thinking abilities [1]. In mathematics education, students are expected not only to master

mathematical concepts and procedures but also to analyze, evaluate, and solve problems critically and creatively [2]. These competencies are collectively referred to as Higher Order Thinking Skills (HOTS) and represent one of the essential competencies that should be developed through mathematics instruction [3].

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Students' Higher Order Thinking Skills (HOTS) in Indonesia remain relatively low. The results of the Programme for International Student Assessment (PISA) indicate that Indonesia ranked seventh from the bottom among 76 participating countries, suggesting that students' abilities to solve problems requiring reasoning, analysis, and evaluation still need significant improvement [4,5]. Although the results of the Asesmen Nasional Berbasis Komputer (ANBK) (Computer Based National Assessment) indicate an improvement in junior high school students' numeracy achievement, these outcomes do not yet fully reflect the mastery of higher order thinking skills required to solve contextual problems [6]. Therefore, innovative instructional approaches are needed to effectively foster the development of students' HOTS.

One of the mathematics topics with considerable potential for fostering Higher Order Thinking Skills (HOTS) is statistics, particularly the topic of measures of central tendency (mean, median, and mode) [7]. This topic requires students not only to perform mathematical calculations but also to interpret data, analyze information, evaluate the appropriateness of different measures of central tendency, and make decisions based on contextual problems [8]. However, the results of a preliminary test administered to 20 eighth grade students from Class VIII B at SMPN 5 Kuningan indicated that their achievement in statistics remained low.

Analysis of the students' responses revealed that most students were able to calculate the mean, median, and mode, but were not yet able to provide appropriate justifications for selecting the most suitable measure of central tendency based on the given context. Students tended to choose the value that occurred most frequently without considering the characteristics of the data and their implications for decision making. These findings indicate that students' Higher Order Thinking Skills (HOTS), particularly in the areas of analyzing, evaluating, and providing logical reasoning, still require further development [9]. This condition highlights the need for a more student centered instructional approach that encourages active learning and provides students with meaningful opportunities to construct their own knowledge through authentic learning activities [10].

The flipped classroom is an instructional approach with considerable potential to support the development of Higher-Order Thinking Skills (HOTS) by allowing students to study learning materials independently before classroom instruction, thereby enabling face-to-face class time to be devoted to discussion, problem-solving, and collaborative learning activities [11]. Likewise,

the student created video strategy encourages students to become not only recipients of information but also active creators of learning content, thereby enhancing their learning engagement, communication skills, collaboration, and higher order thinking abilities [12]. Previous studies have shown that the flipped classroom approach has a positive effect on students' conceptual understanding of mathematics, is effective in teaching statistics, and enhances students' mathematical problem-solving skills through the use of instructional media [13]. Furthermore, studies on the development of mathematics teaching modules have reported that both HOTS based modules and statistics modules meet the criteria of validity, practicality, and effectiveness in improving students' higher order thinking skills and conceptual understanding of mathematics [14,15].

However, most previous studies have examined the flipped

classroom approach and the development of teaching modules separately, with limited research integrating the student created video strategy into a teaching module for statistics instruction to enhance junior high school students' Higher Order Thinking Skills (HOTS). Therefore, this study offers a novel contribution by developing a student-created video based flipped classroom teaching module for statistics instruction. The proposed module serves as an alternative instructional resource that promotes independent learning, encourages students to actively create learning products, and fosters the development of higher-order thinking skills.

Based on the foregoing, this study aimed to develop a student created video based flipped classroom teaching module on statistics for eighth grade junior high school students, evaluate the validity and practicality of the developed module, and examine its effectiveness in improving students' Higher Order Thinking Skills (HOTS) following its implementation. This study is expected to contribute to the development of innovative instructional materials that support student-centered mathematics instruction and to serve as a reference for teachers and researchers in designing statistics learning that promotes the development of HOTS.

2. Method

2.1. Research design

This study employed the Research and Development (R&D) method to develop a student created video based flipped classroom teaching module on statistics for junior high school students

and to evaluate its validity, practicality, and effectiveness in improving students' Higher Order Thinking Skills (HOTS) following its implementation. The development process adopted the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model was selected because it provides a systematic, structured, and flexible framework that is well suited for the development of instructional materials [16]. Through these stages, the development process was conducted sequentially, beginning with a needs analysis, followed by product design, development, implementation, and evaluation, to produce a teaching module that is feasible and effective for use in mathematics instruction [17].

2.2. Research Setting and Participants

The study was conducted during the second semester of the 2025/2026 academic year at SMP Negeri 5 Kuningan, Kuningan Regency, West Java, Indonesia. The research participants included expert validators, a mathematics teacher, and students. The validation stage involved six expert validators, consisting of two subject matter experts, two media experts, and two language experts, who evaluated the content, design, and language appropriateness of the developed teaching module. Following the validation and revision process, the module was implemented through a field trial involving one mathematics teacher and 20 students from Class VIII B of SMP Negeri 5 Kuningan. The participants were selected using purposive sampling based on the consideration that the students had already studied or were currently studying the statistics topic covered in the developed module. Prior to the study, permission was obtained from the school administration, and all research procedures were carried out in accordance with the objectives of the study.

2.3. Research Procedure

This study adopted the ADDIE development model, which consists of five phases: Analysis, Design, Development, Implementation, and Evaluation [18]. During the Analysis phase, a needs analysis was conducted through classroom observations at SMP Negeri 5 Kuningan to identify the curriculum, students' characteristics, learning needs, the implementation of the flipped classroom approach, and students' initial Higher Order Thinking Skills (HOTS) in statistics. The Design phase involved developing the structure of the teaching module, learning components, student worksheets, learning materials, flipped classroom and student created video based learning activities, as well

as research instruments, including validation sheets, teacher and student response questionnaires, and HOTS assessment tests. In the Development phase, the teaching module was developed based on the proposed design and subsequently validated by subject matter experts, media experts, and language experts before being revised according to their feedback.

The Implementation phase involved a field trial with 20 eighth-grade students from Class VIII B of SMP Negeri 5 Kuningan using the revised teaching module. Research data were collected through expert validation sheets, HOTS tests (pretest and posttest), and teacher and student response questionnaires. Finally, the Evaluation phase aimed to assess the quality of the developed module based on its validity, practicality, and effectiveness in improving students' HOTS, thereby providing a basis for further refinement of the final product.

2.4. Instruments and Data Collection

This study employed four research instruments: an observation sheet, validation sheets, teacher and student response questionnaires, and a Higher Order Thinking Skills (HOTS) test. The observation sheet was used during the analysis phase to identify the existing learning conditions, students' characteristics, and the need for developing the teaching module. The validation sheets were used to evaluate the feasibility of the module in terms of its content, media design, and language aspects by six expert validators, consisting of two subject matter experts, two media experts, and two language experts. The practicality of the module was assessed through response questionnaires administered to one mathematics teacher and 20 students from Class VIII B following the implementation of the module. The teacher questionnaire evaluated the module in terms of presentation, usability, readability, and time allocation, whereas the student questionnaire assessed independent learning activities, the implementation of student created video activities, classroom learning experiences, and the overall use of the teaching module.

Students' HOTS were measured using three essay questions on statistics covering the cognitive domains of analyzing (C4), evaluating (C5), and creating (C6). The test was administered as both a pretest and a posttest. Prior to its implementation, the instrument was examined for validity using the Product Moment correlation and for reliability using Cronbach's alpha. All test items were found to be valid and reliable, with a reliability coefficient of 0.749, indicating that the instrument was appropriate for use in this study.

2.5. Data Analysis

Research data were analyzed quantitatively in accordance with the objectives of the study. Expert validation data were analyzed using percentage analysis based on a Likert scale to determine the validity of the teaching module in terms of its content, media design, and language aspects. Data obtained from the teacher and student response questionnaires were also analyzed using percentage analysis to determine the practicality of the developed module.

The improvement in students' Higher Order Thinking Skills (HOTS) was analyzed using the normalized gain (N-Gain) based on the pretest and posttest scores. The N-Gain values were classified into high, moderate, and low categories to determine the level of improvement in students' HOTS following the implementation of the student created video based flipped classroom teaching module. The results of the validity, practicality, and N-Gain analyses were used to evaluate the overall quality of the developed teaching module.

3. Results and discussion

3.1. Analysis Stage

The Analysis phase was conducted to identify the initial learning conditions and the need for developing a student created video based flipped classroom teaching module. The results of the classroom observation indicated that mathematics instruction had been implemented in accordance with the Merdeka Curriculum; however, the learning process remained predominantly teacher-centered, resulting in limited active student participation. In addition, the integration of technology into classroom instruction was still limited, and students' Higher Order Thinking Skills (HOTS), particularly in the cognitive domains of evaluating (C5) and creating (C6), remained relatively low.

These findings suggest that the existing instructional practices had not fully supported the development of students' HOTS. According to Anderson and Krathwohl (2001), the abilities to analyze, evaluate, and create are key components of HOTS that are best developed through student centered learning. Therefore, the development of a student created video based flipped classroom teaching module was considered an appropriate approach to promote learner autonomy, increase student engagement, and foster the development of Higher Order Thinking Skills [19].

3.2. Design Stage

The Design phase was carried out based on the results of the needs analysis by developing a student created

video based flipped classroom teaching module on statistics, covering the topics of mean, median, and mode. The module was designed in accordance with the components of the Merdeka Curriculum teaching module, which include general information, core components, and appendices. In addition, the learning activities were organized into the three phases of the flipped classroom model: pre-class, in-class, and post-class. During the pre-class phase, students studied the learning materials independently and created student-generated videos, while the in-class and post-class phases focused on discussion, problem-solving activities, and learning reflection.

The teaching module was designed to promote a more student-centered learning environment through the implementation of the flipped classroom approach. According to Bergmann and Sams (2012), the flipped classroom model allows students to study instructional materials before attending class, enabling classroom time to be devoted to discussion, problem-solving, and concept reinforcement. Therefore, integrating student created videos into the teaching module was expected to enhance students' learning readiness prior to classroom instruction while encouraging their active participation throughout the learning process [20].

3.3. Development Stage

The Development phase involved transforming the designed student created video based flipped classroom teaching module into a product ready for classroom implementation. The developed module consisted of general information, core components, and appendices organized in accordance with the Merdeka Curriculum. Subsequently, the module was validated by six expert validators, comprising two subject matter experts, two media experts, and two language experts, to evaluate its content, design, and language quality prior to implementation. The validation results indicated that the module achieved a highly valid category in terms of content (82.00%), media design (87.69%), and language (87.27%), indicating that it was suitable for use after revisions were made based on the validators' recommendations.

These findings indicate that the developed teaching module satisfied the criteria for content, presentation, and language quality. According to Nieveen (1999), a development product is considered to be of high quality when it meets the criteria of validity, practicality, and effectiveness, making it appropriate for use in the learning process. Therefore, the module's highly valid ratings demonstrate that it met the required standards for instructional materials and was ready to be implemented in mathematics instruction [21].

3.4. Implementation Stage

The Implementation phase was conducted with 20 students from Class VIII B at SMP Negeri 5 Kuningan

after the teaching module had been confirmed as valid. The implementation was carried out over four instructional sessions using the student created video based flipped classroom teaching module on statistics [20-25]. The learning process began with the administration of a pretest, followed by the implementation of learning activities based on the phases of the flipped classroom model, and concluded with a posttest to measure the improvement of students' Higher Order Thinking Skills (HOTS).

Table 1

Pretest, Posttest, and N-Gain Scores for Each HOTS Indicator

Indicator	Pretest	Posttest	N-Gain	Category
C4 (Analyzing) Maximum score = 12	2.30	9.00	0.69	Moderate
C5 (Evaluating) Maximum score = 16	1.20	8.75	0.51	Moderate
C6 (Creating) Maximum score = 5	0.00	1.05	0.30	Moderate
Total	3.50	18.80	0.52	Moderate

As presented in Table 1, all HOTS indicators showed improvement following the implementation of the teaching module. The analyzing (C4) indicator achieved the highest N-Gain score of 0.69, followed by evaluating (C5) with 0.51 and creating (C6) with 0.30. Overall, the average N-Gain score was 0.52, which falls within the moderate category, indicating that the teaching module was effective in improving students' Higher Order Thinking Skills (HOTS).

These findings suggest that the implementation of the student created video based flipped classroom teaching module provided students with opportunities to study the learning materials before classroom instruction, allowing face to face class time to be devoted to discussion, problem-solving, and concept reinforcement [25-29]. This finding is consistent with Bergmann and Sams (2012), who argued that the flipped classroom model optimizes in-class learning activities by promoting active student engagement [30-34]. The results are also supported by Faridah et al. (2024), who reported that the implementation of the flipped classroom approach contributes to the improvement of students' HOTS through more active and student centered learning. Although the greatest improvement was observed in the analyzing (C4) indicator, the results for evaluating (C5) and creating (C6) demonstrate that the developed teaching module was capable of facilitating the development of all dimensions of Higher Order Thinking Skills [22].

3.5. Evaluation Stage

The evaluation results indicated that the student created video based flipped classroom teaching module received highly practical responses from both the teacher and the students following its implementation in the classroom. The practicality score based on the teacher's evaluation was 85.42%, while the students' evaluation yielded a score of 82.05%, both of which were classified as highly practical. The teacher reported that the module was systematically organized, easy to use, and supportive of the learning process. Likewise, the students expressed positive responses toward the independent learning activities, the use of student-created videos, and the classroom learning experience, all of which helped them develop a deeper understanding of statistics through more active participation.

These findings indicate that the developed teaching module was not only valid in terms of its content but also practical for classroom implementation. According to Nieveen (1999), the quality of a development product is determined by the extent to which it satisfies three key criteria: validity, practicality, and effectiveness [21]. The findings of this study demonstrate that the teaching module fulfilled all three criteria, as evidenced by its high validity, high practicality based on teacher and student responses, and its effectiveness in improving students' HOTS, as indicated by an N-Gain score of 0.52, which falls within the moderate category. Therefore, the student-created video-based flipped classroom teaching module can be considered a feasible alternative instructional resource for promoting students' Higher Order Thinking Skills (HOTS) in statistics learning.

4. Conclusion

This study successfully developed a student-created video-based flipped classroom teaching module on statistics to enhance junior high school students' Higher Order Thinking Skills (HOTS). The developed teaching module was found to be highly valid based on expert validation, highly practical based on teacher and student responses, and effective in improving students' HOTS, as indicated by an N-Gain score of 0.52, which falls within the moderate category. These findings demonstrate that the student created video based flipped classroom teaching module is a feasible and effective alternative instructional resource for supporting the development of students' Higher Order Thinking Skills in statistics learning.

CRedit authorship contribution statement

Azin Taufik: Conceptualization, Methodology, Supervision, Validation, Writing – review & editing. **Aulia Barkah Safitri:** Investigation, Data curation, Formal analysis, Visualization, Writing – original draft. **Rahayu Syafari:** Supervision, Validation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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References

1. M. B. Purwanto, R. Hartono, and S. Wahyuni, "Essential skills challenges for the 21st century graduates: Creating a generation of high-level competence in the Industrial Revolution 4.0 era," *Asian Journal of Applied Education (AJAE)*, vol. 2, no. 3, pp. 279–292, 2023, doi: [10.55927/ajae.v2i3.3972](https://doi.org/10.55927/ajae.v2i3.3972).
2. Y. Safari and P. Nurhida, "Pentingnya pemahaman konsep dasar matematika dalam pembelajaran matematika," *Karimah Tauhid*, vol. 3, no. 9, pp. 9817–9824, 2024, doi: [10.30997/karimahtauhid.v3i9.14625](https://doi.org/10.30997/karimahtauhid.v3i9.14625).
3. M. Badolo, M. A. Malik, R. Nur, and A. Latifa, "The impact of metacognitive strategy training on higher-order thinking skills (HOTS) in high school mathematics: A quasi-experimental study," *International Journal of Environment, Engineering and Education*, vol. 7, no. 2, pp. 146–157, 2025, doi: [10.55151/ijeedu.v7i2.302](https://doi.org/10.55151/ijeedu.v7i2.302).
4. M. I. Rahmatilah, S. T. Madawistama, and D. Kurniawan, "Peningkatan higher order thinking skills (HOTS) melalui penguatan kecerdasan emosional siswa," *Jurnal Kajian Penelitian Pendidikan dan Kebudayaan (JKPPK)*, vol. 2, no. 3, pp. 232–241, 2024, doi: [10.59031/jkppk.v2i3.473](https://doi.org/10.59031/jkppk.v2i3.473).
5. M. H. Setiawan, R. Amelia, dan R. Nurmeidina, "Kemampuan Numerasi Siswa Menyelesaikan Soal Hots Pada Materi Posisi Garis Terhadap Lingkaran," *Hipotenusa J. Res. Math. Educ.*, vol. 6, no. 2, hal. 122–143, 2023, doi: [10.36269/hjrme.v6i2.1826](https://doi.org/10.36269/hjrme.v6i2.1826).
6. E. P. Lestari and T. Y. E. Siswono, "Profil berpikir kritis siswa SMP menyelesaikan soal numerasi berdasarkan tingkat kemampuan numerasi," *MATHEdunesa: Jurnal Ilmiah Pendidikan Matematika*, vol. 11, no. 2, pp. 536–547, 2022, doi: [10.26740/mathedunesa.v11n2.p538-547](https://doi.org/10.26740/mathedunesa.v11n2.p538-547).
7. E. S. Cipta, D. Suryadi, T. Herman, and A. Jupri, "The effect of digital didactic intervention on measures of central tendency towards students' statistical thinking," *Journal of Innovative Mathematics Learning (JIML)*, vol. 9, no. 1, pp. 164–176, 2026, doi: [10.22460/jiml.v9i1.29891](https://doi.org/10.22460/jiml.v9i1.29891).
8. O. D. Lestari, J. D. Riyanti, S. Fatimah, and N. M. Az-Zahra, "Kemampuan berpikir kritis statistika siswa SMP melalui LKPD dengan pendekatan contextual teaching and learning (CTL)," *Pedagogy: Jurnal Pendidikan Matematika*, vol. 11, no. 2, pp. 1294–1308, 2026, doi: [10.30605/d3wkpq61](https://doi.org/10.30605/d3wkpq61).
9. N. Kania and Y. S. Kusumah, "The measurement of higher-order thinking skills: A systematic literature review," *Malaysian Journal of Learning and Instruction*, vol. 22, no. 1, pp. 97–116, 2025, doi: [10.32890/mjli2025.22.1.6](https://doi.org/10.32890/mjli2025.22.1.6).
10. K. H. D. Tang, "Student-centered approach in teaching and learning: What does it really mean?," *Acta Pedagogica Asiana*, vol. 2, no. 2, pp. 72–83, 2023, doi: [10.53623/apga.v2i2.218](https://doi.org/10.53623/apga.v2i2.218).
11. A. Zaeni, Kartono, Mulyono, and Y. L. Sukestiarno, "Analysis of higher order thinking skills in a TPACK-based flipped classroom supported by dynamic assessment," *Hipotenusa: Journal of Mathematical Society*, vol. 7, no. 2, pp. 271–281, 2025, doi: [10.18326/hipotenusa.v7i2.5554](https://doi.org/10.18326/hipotenusa.v7i2.5554).
12. J. Z. Lam and M. M. Yunus, "Student-produced video for learning: A systematic review," *Journal of Language Teaching and Research*, vol. 14, no. 2, pp. 386–395, 2023, doi: [10.17507/jltr.1402.14](https://doi.org/10.17507/jltr.1402.14).
13. M. J. L. G. de Torres, "The effectiveness of the flipped classroom strategies in teaching statistics and probability among the senior high school learners in Ragay District 2, Division of Camarines," *International Journal of Sustainability and Advanced Integrated Research*, vol. 2, no. 3, pp. 90–97, 2026, doi: [10.65339/ijrsair.V2.I3.707](https://doi.org/10.65339/ijrsair.V2.I3.707).

14. Taufiq, Sukmawati, M. R. Baharuddin, and Patmaniar, "Pengembangan modul ajar Kurikulum Merdeka berorientasi pendekatan realistic mathematics education konteks budaya Luwu dan higher order thinking skills (HOTS)," *Jurnal Riset HOTS Pendidikan Matematika*, vol. 4, no. 3, pp. 1105–1121, 2024, doi: [10.51574/kognitif.v4i3.2132](https://doi.org/10.51574/kognitif.v4i3.2132).
15. W. T. Utami dan D. A. Yuwaningsih, "Pengembangan modul elektronik matematika materi turunan menggunakan kvisoft flipbook maker pro," *Hipotenusa J. Res. Math. Educ.*, vol. 7, no. 1, hal. 16–36, 2024.
16. M. A. Adeoye, K. A. S. I. Wirawan, M. S. S. Pradnyani, and N. I. Septiarini, "Revolutionizing education: Unleashing the power of the ADDIE model for effective teaching and learning," *JPI (Jurnal Pendidikan Indonesia)*, vol. 13, no. 1, pp. 202–209, 2024, doi: [10.23887/jpiundiksha.v13i1.68624](https://doi.org/10.23887/jpiundiksha.v13i1.68624).
17. M. H. Yahya, R. I. Rokhmawati, and F. Amalia, "Pengembangan modul pembelajaran interaktif untuk mata pelajaran informatika berbasis media digital dengan model ADDIE," *Jurnal Sistem Informasi, Teknologi Informasi, dan Edukasi Sistem Informasi*, vol. 5, no. 2, pp. 62–74, 2024, doi: [10.25126/justsi.v5i2.405](https://doi.org/10.25126/justsi.v5i2.405).
18. M. Rusdi, H. Sirajuddin, and R. Alfah, "Implementation of the ADDIE model (analysis, design, development, implementation, evaluation) in PHP-based e-learning in the era of pandemic," *Jurnal Teknologi Informasi Universitas Lambung Mangkurat (JTIULM)*, vol. 7, no. 1, pp. 49–56, 2022, doi: [10.20527/jtiulm.v7i1.74](https://doi.org/10.20527/jtiulm.v7i1.74).
19. N. K. Widiarti, I. K. Sudarma, and I. M. Tegeh, "Meningkatkan hasil belajar matematika kelas V SD melalui media video pembelajaran," *Jurnal Edutech Undiksha*, vol. 9, no. 2, pp. 195–205, 2021, doi: [10.23887/jeu.v9i2.38376](https://doi.org/10.23887/jeu.v9i2.38376).
20. D. K. Annan, D. G. Onodipe, and D. A. Stephenson, "Using student-created content videos in flipped learning to enhance student higher-order thinking skills, engagement, and satisfaction," *Journal of Education & Social Policy*, vol. 6, no. 3, pp. 22–31, 2019, doi: [10.30845/jesp.v6n3p4](https://doi.org/10.30845/jesp.v6n3p4).
21. H. Djidu and Jailani, "Pengembangan model pembelajaran kalkulus berbasis masalah," *Jurnal Kependidikan*, vol. 2, no. 1, pp. 68–84, 2018, doi: [10.21831/jk.v2i1.12689](https://doi.org/10.21831/jk.v2i1.12689).
22. Harun, I. Suciati, A. Manaf, and Sudaryanti, "Investigating the impact of the flipped classroom model on higher order thinking skills: A meta-analysis study," *Multidisciplinary Science Journal*, vol. 6, no. 12, pp. 1–11, 2024, doi: [10.31893/multiscience.2024269](https://doi.org/10.31893/multiscience.2024269).
23. M. Usman, H. Pramudawardani, R. Umam, and H. Takahashi, "Synthesizing a Framework and Establishing Content Validity of an Energy Literacy Instrument for Indonesian Students," *Islamic J. Integr. Sci. Educ. (IJISE)*, vol. 4, no. 3, pp. 175–185, 2025, doi: [10.30762/ijise.v4i3.6993](https://doi.org/10.30762/ijise.v4i3.6993).
24. M. Yasin, S. Huda, F. G. Putra, M. Syazali, R. Umam, and S. Widyawati, "IMPROVE Learning Model and Learning Independence: Influence and Interaction on Mathematics Problem-Solving Abilities in Islamic Boarding School," *J. Phys.: Conf. Ser.*, vol. 1467, no. 1, Art. no. 012003, 2020, doi: [10.1088/1742-6596/1467/1/012003](https://doi.org/10.1088/1742-6596/1467/1/012003).
25. A. Saregar, F. G. Putra, R. Diani, A. Anugrah, M. Misbah, and R. Umam, "Innovative Integrated Disaster Education in Physics Learning: An Effort to Enhance Students' Disaster Literacy Skills," *J. Pendidikan. IPA Indones.*, vol. 14, no. 2, Art. no. 23959, 2025, doi: [10.15294/jpii.v14i2.23959](https://doi.org/10.15294/jpii.v14i2.23959).
26. F. G. Putra, D. Lengkana, S. Sutiarso, Nurhanurawati, A. Saregar, R. Diani, S. Widyawati, S. Suparman, K. Imama, and R. Umam, "Mathematical Representation: A Bibliometric Mapping of the Research Literature (2013–2022)," *Infinity J.*, vol. 13, no. 1, pp. 1–26, 2024, doi: [10.22460/infinity.v13i1.p1-26](https://doi.org/10.22460/infinity.v13i1.p1-26).
27. M. Munifah, I. Tsani, M. Yasin, H. S. Tortop, E. K. Palupi, and R. Umam, "Management System of Education: Conceptual Similarity (Integration) Between Japanese Learning System and Islamic Learning System in Indonesia," *Tadris: J. Keguruan dan Ilmu Tarbiyah*, vol. 4, no. 2, pp. 159–170, 2019, doi: [10.24042/tadris.v4i2.4893](https://doi.org/10.24042/tadris.v4i2.4893).
28. N. Nurulsari, Abdurrahman, H. Maulina, I. Sukanto, and R. Umam, "Exploring the Prospective of Pre-Service Physics Teacher's Pedagogical Content Knowledge: A Case Study," *J. Phys.: Conf. Ser.*, vol. 1467, no. 1, Art. no. 012023, 2020, doi: [10.1088/1742-6596/1467/1/012023](https://doi.org/10.1088/1742-6596/1467/1/012023).
29. F. Lestari, Dalman, Nopriza, D. Efendi, I. Ariyanti, B. Anggara, and R. Umam, "The Effectiveness of Math Learning Based on Multiple Intelligence: Implications at MTs Darul Ma'wa," *AIP Conf. Proc.*, vol. 2438, no. 1, Art. no. 020001, 2021, doi: [10.1063/5.0071296](https://doi.org/10.1063/5.0071296).
30. I. P. Hardini, A. Saregar, Subandi, A. Anugrah, M. R. Fitri, V. R. Panse, R. Umam, and S. Huda, "Development of Electronic Student Worksheet on Disaster-Based Waves for Eleventh-Grade Senior High School Students," *AIP Conf. Proc.*, vol. 3226, no. 1, Art. no. 020023, 2026, doi: [10.1063/5.0329108](https://doi.org/10.1063/5.0329108).
31. S. Huda, L. Anggraini, R. D. Saputri, M. Syazali, and R. Umam, "Learning Model to Improve the Ability to Understand Mathematical Concepts," *PRISMA*, vol. 8, no. 2, pp. 173–181, 2019.
32. S. Huda, M. Munifah, and R. Umam, "Think Talk Write (TTW) Learning Model on Thinking Skills, Creativity, and Problem Solving," *J. Gifted Educ.*

Creativity, vol. 7, no. 1, pp. 25–32, 2020.

33. S. Huda, M. Munifah, M. Syazali, S. S. Rahayu, and R. Umam, “The Effectiveness of Two Stay Two Stray, Somatic, Auditory, Visualization, Intellectually, and Auditory Learning to Improving Numerical Ability,” *Humanit. Soc. Sci. Rev.*, vol. 8, no. 4, pp. 431–441, 2020, doi: [10.18510/hssr.2020.8442](https://doi.org/10.18510/hssr.2020.8442).
34. S. Huda, M. U. Ridwanulloh, U. Karomah, R. E. Febrian, E. Kurniasari, U. F. Laili, and R. Umam, “Effectiveness of Physics Exams Using Smartphone-Based Test System in Senior High School of MAN 1 Kediri City, Indonesia,” *AIP Conf. Proc.*, vol. 3226, no. 1, Art. no. 020059, 2026, doi: [10.1063/5.0333689](https://doi.org/10.1063/5.0333689).