



## VAKSIN (Animated Video for Online Learning System): Support for Independent Asynchronous Learning in Introductory Geometry Courses through SIPEJAR

Anita Dewi Utami<sup>1</sup>, Ramdhan Fazrianto Suwarman<sup>2\*</sup>, Puguh Darmawan<sup>3</sup>,  
Tomi Listiawan<sup>4</sup>, Imam Rofiki<sup>5</sup>

\*1,2,3,4,5Departemen Matematika, FMIPA, Universitas Negeri Malang, Indonesia

<sup>1</sup>anita.dewiutami.fmipa@um.ac.id; <sup>2</sup>ramdhan.fazrianto.fmipa@um.ac.id;

<sup>3</sup>puguh.darmawan.fmipa@um.ac.id; <sup>4</sup>tomi.listiawan.fmipa@um.ac.id; <sup>5</sup>imam.rofiki.fmipa@um.ac.id

**\*Anita Dewi Utami**

### Keywords

VAKSIN, geometry,  
asynchronous, education

### Abstract

This research study is focused on developing the VAKSIN (Animated Video for Online Learning System) design, which aims to facilitate independent asynchronous learning in the introductory geometry course. The research methodology employed is based on Plomp's general educational problem-solving model, involving three out of five phases: initial investigation, design, and realization phases. Subsequent studies are planned to include testing, evaluation, revision, and implementation phases. The findings of the research indicate the feasibility of using VAKSIN in the Introductory Geometry course.

This is an open-access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

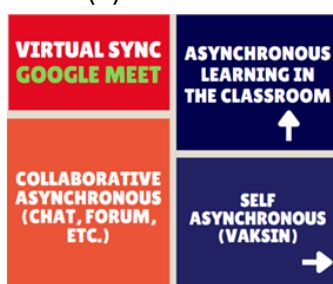


### Introduction

Universitas Negeri Malang is actively promoting the use of SIPEJAR as a learning platform among its lecturers. While traditional face-to-face learning is still being utilized, there is a strong emphasis on the potential of SIPEJAR to greatly enhance students' knowledge and provide a valuable learning experience. This strategic focus on SIPEJAR reflects a commitment to the blended learning model, where traditional classroom teaching is combined with innovative e-learning techniques. This activity is a reflection of the blended learning model, which integrates face-to-face learning with e-learning (1)(2)(3).

Previous research has demonstrated that the implementation of blended learning approaches has been associated with a significant increase in students' overall learning outcomes (4) and has effectively met the intended learning objectives (5). This suggests that educators may consider employing blended learning methodologies to provide students with the flexibility to engage in learning activities at their convenience, regardless of time and location constraints.

Based on interviews conducted between researchers and students, it was found that 80% of students believe that using SIPEJAR for independent asynchronous activities is not optimal. One of the main reasons for this is the underutilization of various features in SIPEJAR by lecturers, which hinders effective independent asynchronous learning. It is essential to address the challenges faced by students, especially considering the importance of mastering the Introductory Geometry course (6)(7)(8). This course covers fundamental concepts of plane shapes, which are crucial for the professional development of mathematics education students who are preparing to become teachers. To address these issues and ensure that students can effectively follow the learning process, the researchers plan to implement a blended learning model with the assistance of VAKSIN (Video Animated for Online Learning System). Blended learning involves integrating various media and tools within the e-learning environment to enhance the overall learning experience (9).



**Figure 1.** Learning Quadrants in VAKSIN-assisted Blended Learning Model

In a study conducted in 2021, researchers demonstrated that the VAKSIN-assisted blended learning model had a greater impact on enhancing student learning outcomes compared to the online learning model (10). This suggests that utilizing VAKSIN in the Introductory Geometry course to optimize independent asynchronous activities can effectively address this issue. Notably, VAKSIN has been shown to be effective in maximizing independent asynchronous activities (11). Figure 1 shown specific details of the blended learning model with VAKSIN.

It is essential to prioritize optimizing independent asynchronous activities in blended learning supported by VAKSIN as a practical approach in the 5.0 revolution era. Therefore, the focus of this study is to enhance independent asynchronous activities in the Introductory Geometry course through the development of a collaborative and participatory learning framework involving both instructors and students. This will be achieved by implementing the VAKSIN-supported blended learning model on the SIPEJAR platform.

Blended learning is an innovative educational approach that integrates traditional classroom instruction with technology-supported learning (12). This method combines the

benefits of face-to-face interaction with the flexibility and interactivity of digital resources. Blended learning fosters collaborative learning environments, encourages active and constructive participation, and utilizes computer-assisted tools to enhance the learning experience (2)(10).

In today's digital era, the adoption of blended learning has become widespread among educators (13)(14). Many teachers and instructional designers have embraced digital-based learning strategies, incorporating a variety of ICT (Information and Communication Technology) tools and resources into their instruction (15)(16). This approach allows for a more personalized and engaging learning experience, leveraging technology to support various learning styles and preferences.

The current development of blended learning is shown in Figure 2.



**Figure 2.** Blended Learning Development

Modifications in blended learning are increasing, including optimizing asynchronous activities with the help of animated videos in this study. Animated videos can be supplementary learning tools that support more effective learning (17) and enhance students' understanding of concepts (18)(19). Moreover, when these animated videos address contextual problems, they make it easier for students to grasp the material (20).

In recent years, there has been a growing trend in blended learning to incorporate animated videos as a way to enhance asynchronous activities. These videos are being recognized as valuable supplementary tools that can greatly improve the learning experience for students (17). Studies have found that animated videos not only aid in better understanding of concepts (18)(19), but also make it easier for students to apply their knowledge to real-world problems (20).

Based on the above explanation, this research is crucial as it provides innovation to keep learning effective. The research roadmap is presented in Figure 3.



**Figure 3.** Research Roadmap

Based on the roadmap shown at Figure 3, the research begins with developing a VAKSIN-assisted blended learning model (10). Subsequently, the model is applied in the Mathematics Learning Trends course. In 2024, to optimize independent asynchronous activities on SIPEJAR, the researchers will implement the VAKSIN-assisted blended learning model in the Introductory Geometry course.

## Method

This research was conducted with first-semester Mathematics Education students enrolled in the Introductory Geometry course. The stages of this research consists of three phases: initial investigation, design, and realization.

### Initial investigation phase

1) Pre-planning: considering the optimization of independent asynchronous activities by implementing the VAKSIN-assisted blended learning model; 2) Reviewing the theory about VAKSIN; 3) Identifying the material description in the Introductory Geometry course to organize learning objectives; and 4) Identifying the learning environment, particularly the readiness of facilities for the Introductory Geometry course.

### Design phase

1) Developing the theoretical framework underpinning the VAKSIN-assisted blended learning model; 2) Preparing the learning tools for the VAKSIN-assisted blended learning model in the Introductory Geometry course; and 3) Determining the content for creating teaching materials for the Introductory Geometry course, such as videos, infographics, PPTs, etc.

### Realization phase

1) Drafting the VAKSIN-assisted blended learning model tools for the Introductory Geometry course; 2) Conducting validation; 3) Analyzing and revising to create prototype 1; and 4) Implementing face-to-face learning and utilizing SIPEJAR with VAKSIN assistance.

## Results and Discussion

### Initial investigation phase

In this phase, we focused on several important activities. We realized during the initial planning that incorporating VAKSIN can improve independent asynchronous activities in the blended learning system at Universitas Negeri Malang, which is supported by SIPEJAR.

After studying the theory behind VAKSIN, we concluded that it is a valuable tool for the Mathematics Learning Trends course, based on previous research. The material for the Introductory Geometry course in the first semester of the Mathematics Education program at Universitas Negeri Malang includes five chapters: lines and angles, parallel lines, triangles, quadrilaterals, and similar triangles.

The learning environment in the Mathematics Education program adopts a blended approach, involving online learning through SIPEJAR and 16 face-to-face class meetings.

## Design phase

The VAKSIN-assisted blended learning model's theoretical framework includes four quadrants: synchronous virtual, synchronous face-to-face, asynchronous collaborative, and independent asynchronous. VAKSIN supports learning in the independent asynchronous quadrant to keep it optimal. Not all meetings use VAKSIN; only some do, as not all materials need to be facilitated with audio-visual aids (depending on the difficulty of student representation in understanding the material).

The learning tools for the VAKSIN-assisted blended learning model in the Introductory Geometry course have been prepared for 16 meetings, with both online and offline modes. The learning activities are designed to match student activities in both modes.

The content of the teaching materials for the Introductory Geometry course, such as videos, infographics, and PPTs, is shown in Figure 4.

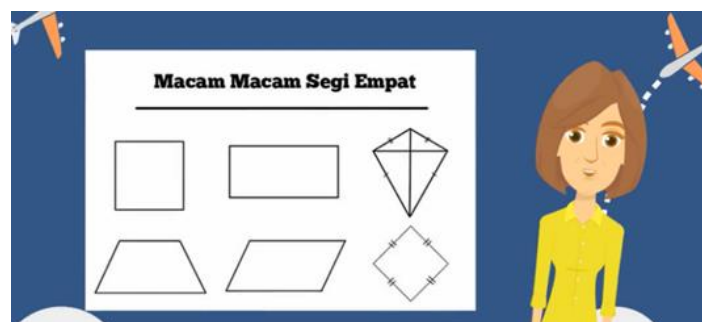


Figure 4. VAKSIN Display Example

## Realization phase

The draft learning tools for the VAKSIN-assisted blended learning model in the Introductory Geometry course broadly include activities conducted by students and lecturers offline and online through SIPEJAR.

The validation results from subject matter experts and media experts indicate that VAKSIN is feasible. The subject matter expert validator is a PhD in mathematics education who has conducted extensive research related to geometry, while the media expert validator is a lecturer who has long taught computer-based learning media courses. Both provided assessments that show that VAKSIN is feasible to use.

Examples of the VAKSIN prototypes that have been developed are shown in Figures 5, 6, and 7.

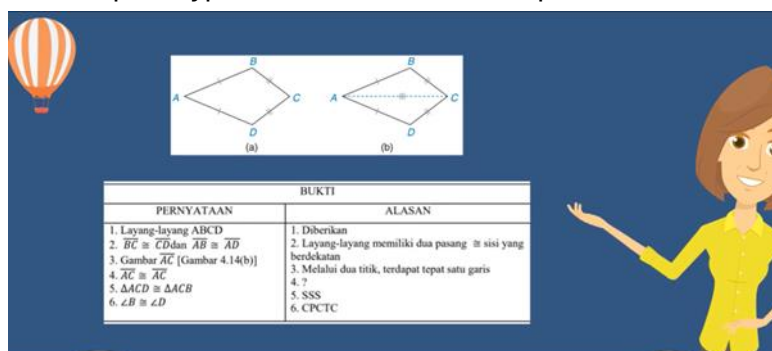


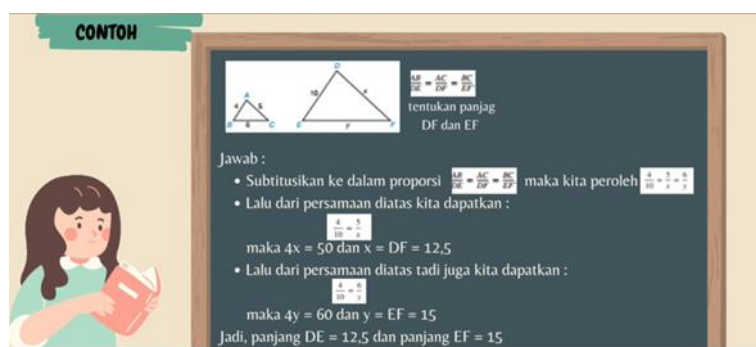
Figure 5. Explanation of Proof in Quadrilateral Material

The instructional materials for learning proofs are delivered through a series of engaging and comprehensive videos. These videos are thoughtfully designed to incorporate visual aids and audio explanations, creating an immersive learning experience that accommodates students with various learning styles, particularly those who benefit from audio-visual instruction.



**Figure 6.** Explanation of Comparison Concept

In addition to offering proofing, VAKSIN also offers in-depth explanations of fundamental concepts. The presentations feature captivating animations that help to maintain student interest throughout the video explanations.



**Figure 7.** Example Problem in VAKSIN

In addition to providing mathematical proofs and explanations of concepts, VAKSIN includes example problems to aid students in gaining a better understanding of geometry. Furthermore, each video features unique animations to enhance the learning experience.

The implementation of face-to-face learning supplemented with the use of SIPEJAR and VAKSIN is scheduled for the Odd Semester of the 2024/2025 academic year, commencing on September 1, 2024.

The study results show that VAKSIN is feasible for student use based on suggestions from subject matter expert validators and media experts. This is consistent with the findings of previous research [11], which stated that animated videos help students in independent asynchronous learning. Animated videos present material with added audio and animation, making them more engaging for students [21]. Using animated videos in learning can increase students' interest and response in following the lessons [22].

## Conclusion

This research indicates that the use of VAKSIN is suitable for students enrolled in the Introductory Geometry course, as validated by input from subject matter experts and media professionals. The findings of this study suggest that further research should be conducted to evaluate the efficacy and feasibility of incorporating VAKSIN media into educational settings on both small and large scales. In addition, it is proposed that educators integrate similar media formats that are more interactive, possibly by including thought-provoking questions within video presentations. For students, it is advised to enhance asynchronous activities by supplementing VAKSIN with additional learning resources.

## Authorship Contribution Statement

Anita: Generating ideas and conceptualization, developing the research design and managing the entire research process. Ramdhan: translating, field research including data collection, and final editing. Puguh: Writing the literature review, organizing the discussion and conclusion. Tomi: Data analysis and data presentation. Imam: results composition and supervising the research.

## Funding Statement

We would like to express our sincere gratitude to Universitas Negeri Malang for their generous support in funding this research activity.

## References

- M. Agustiono, E. Ahman, A. Machmud, and I. Waspada, "Penerapan Blended Learning Berbasis Google Classroom Terhadap Keterampilan Berpikir Kreatif &Kemandirian Belajar Peserta Didik," *J. Pendidik. Ekon. UM Metro*, vol. 8, no. 2, pp. 14–20, 2020.
- A. W. Yudha, M. Mustaji, and A. N. Fatirul, "Pengaruh Model Blended Learning Dan Motivasi Belajar Terhadap Kemampuan Berpikir Kreatif Siswa Smk," *JUPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 7, no. 1, pp. 147–154, 2022, doi: 10.29100/jipi.v7i1.2517.
- F. D. Mohd Nasir, M. A. M. Hussain, H. Mohamed, M. A. Mohd Mokhtar, and N. A. Karim, "Student Satisfaction in Using a Learning Management System (LMS) for Blended Learning Courses for Tertiary Education," *Asian J. Univ. Educ.*, vol. 17, no. 4, pp. 442–454, 2021, doi: 10.24191/ajue.v17i4.16225.
- N. B. Haka, L. Anggita, B. S. Anggoro, and A. Hamid, "Pengaruh Blended Learning Berbantuan Google Classroom Terhadap Keterampilan Berpikir Kreatif Dan Kemandirian Belajar Peserta Didik," *Edu Sains J. Pendidik. Sains Mat.*, vol. 8, no. 1, pp. 1–12, 2020, doi: 10.23971/eds.v8i1.1806.
- C. Dziuban, C. R. Graham, P. D. Moskal, A. Norberg, and N. Sicilia, "Blended learning: the new normal and emerging technologies," *Int. J. Educ. Technol. High. Educ.*, vol. 15, no. 1, pp. 1–16, 2018, doi: 10.1186/s41239-017-0087-5.

- E. Program, E. Program, M. E. Program, A. Andira, H. Syam, and A. Info, "Exploring of Students' Ability To Solve Geometry Problems Based on Van Hiele's Level of Thinking," vol. 1, no. 2, pp. 192–200, 2022.
- E. Suanto, S. M. Maat, and E. Zakaria, "The Effectiveness of the Implementation of Three Dimensions Geometry KARA Module on Higher Order Thinking Skills (HOTS) and Motivation," *Int. J. Instr.*, vol. 16, no. 3, pp. 95–116, 2023, doi: 10.29333/jji.2023.1636a.
- T. Kandaga, R. Rosjanuardi, and D. Juandi, "Epistemological Obstacle in Transformation Geometry Based on van Hiele's Level," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 18, no. 4, p. em2096, 2022, doi: 10.29333/ejmste/11914.
- H. S. Batubara, A. R. Riyanda, R. Rahmawati, A. Ambiyar, and A. D. Samala, "Implementasi Model Pembelajaran Blended Learning di Masa Pandemi Covid-19: Meta-Analisis," *J. Basicedu*, vol. 6, no. 3, pp. 4629–4637, 2022, doi: 10.31004/basicedu.v6i3.2816.
- On Student Learning Outcomes In Geometry," *J. Math Educ. Nusant. Wahana Publ. Karya Tulis Ilm. di Bid. Pendidik. Mat.*, vol. 8, no. 1, pp. 39–47, 2022, doi: 10.29407/jmen.v8i1.17785.
- A. D. Utami et al., "JPE ( Jurnal Pendidikan Edutama ) Vol . 10 No . 2 Juli 2023 MODEL BLENDED LEARNING BERBANTUAN VAKSIN YANG," vol. 10, no. 2, pp. 227–238, 2023.
- D. Lalima and K. Lata Dangwal, "Blended Learning: An Innovative Approach," *Univers. J. Educ. Res.*, vol. 5, no. 1, pp. 129–136, 2017, doi: 10.13189/ujer.2017.050116.
- P. Astuti and F. Febrian, "Blended Learning: Studi Efektivitas Pengembangan Konten E-Learning Di Perguruan Tinggi," *J. Tatsqif*, vol. 17, no. 1, pp. 104–119, 2019, doi: 10.20414/jtq.v17i1.972.
- A. Saefullah, A. Fitriyani, Y. Ruhayat, and ..., "Blended Learning: The Effect on Higher Order Thinking Skills (HOTS) in Thermodynamics," ... *J. Sci. ...*, vol. 03, no. November, pp. 262–271, 2020, doi: 10.24042/ijsme.v3i3.6666.
- Yustina, W. Syafii, and R. Vebrianto, "The effects of blended learning and project-based learning on pre-service biology teachers' creative thinking skills through online learning in the COVID-19 pandemic," *J. Pendidik. IPA Indones.*, vol. 9, no. 3, pp. 408–420, 2020, doi: 10.15294/jpii.v9i3.24706.
- S. Hrastinski, "What Do We Mean by Blended Learning?," *TechTrends*, vol. 63, no. 5, pp. 564–569, 2019, doi: 10.1007/s11528-019-00375-5.
- M. Zheng, K. Cuenin, C. Lyon, and D. Bender, "An Exploratory Study of Dental Students' Use of Whiteboard Animated Videos as Supplementary Learning Resources in Basic Sciences," *TechTrends*, no. 2014, 2023, doi: 10.1007/s11528-023-00875-5.
- A. Puspaningrum, D. Adrian, and I. Widiati, "Development of Animated Video-Based Mathematics Learning Media using Powtoons on Quadrilateral and Triangular Materials," vol. 11, no. 4, pp. 1048–1056, 2023.



- I. Journal, D. A. Anggraeni, A. Kamaludin, and A. Safarova, “Animated Video on Thermochemistry Materials with Everyday Life Phenomena to Increase High School Student ’ s Understanding,” vol. 12, no. 4, pp. 47–63, 2024.
- A. A. Minalla, “Enhancing Young EFL Learners ’ Vocabulary Learning Through Contextualizing Animated Videos,” vol. 14, no. 2, pp. 578–586, 2024.
- W. A. Prasetya, I. I. W. Suwatra, and L. P. P. Mahadewi, “Pengembangan Video Animasi Pembelajaran Pada Mata Pelajaran Matematika,” *J. Penelit. dan Pengemb. Pendidik.*, vol. 5, no. 1, pp. 60–68, 2021, [Online]. Available: file:///D:/Semester 7/jurnal kajian relevan/32509-78001-1-PB (1).pdf.
- P. N. S. Hariati, R. Lily, and S. Islamiani, “Pengaruh Penggunaan Media Video Animasi Terhadap Respon Siswa the Effect of Using Animation Video Media on Student Responses in Mathematics Learning on Operating Number of Round Numbers,” *J. Pembelajaran dan Mat. Sigma*, vol. 6, no. 1, pp. 18–22, 2020.