



ORIGINAL ARTICLE

Development of Sparkol VideoScribe-Based Mathematics Learning Media for Assignment Problems in Linear Programming



Fitri Nurrohmah

Universitas Islam Negeri Raden Intan Lampung, Indonesia

ARTICLE INFORMATION

Article history:

Received: 2026-01-19

Revised : 2026-02-28

Accepted: 2026-03-29

Keywords:

Sparkol VideoScribe; Mathematics learning media; Linear programming; Assignment problems; Research and development

Corresponding Author:

Fitri Nurrohmah

Universitas Islam Negeri

Raden Intan Lampung,

Indonesia

Email:

Fitri.nurrohmah@gmail.com

ABSTRACT

Introduction: The teaching of linear programming in higher education often presents difficulties due to its abstract and analytical nature, particularly in assignment-related problem-solving tasks. Conventional instructional approaches that rely heavily on verbal explanation and static materials tend to limit students' conceptual understanding and engagement. The integration of technology-based learning media, such as Sparkol VideoScribe, offers an alternative approach by combining visual animation and narrative explanation to enhance learning experiences.

Objectives: This study aims to develop Sparkol VideoScribe-based mathematics learning media for assignment topics in linear programming and to evaluate its validity, practicality, and effectiveness in improving students' understanding.

Methods: This research employed a Research and Development (R&D) design using a systematic development model consisting of analysis, design, development, implementation, and evaluation stages. The participants were undergraduate mathematics students. Data were collected through expert validation instruments, student response questionnaires, and learning outcome assessments. The developed media were evaluated in terms of validity by experts, practicality through implementation, and effectiveness based on student learning outcomes and responses.

Results: The findings indicate that the developed learning media achieved a high level of validity according to expert evaluation. The implementation results showed that the media were practical and easily used in the learning process. Furthermore, the effectiveness test revealed that the use of Sparkol VideoScribe significantly improved students' understanding of linear programming assignment problems, as reflected in improved learning outcomes and positive student responses.

Conclusions: Sparkol VideoScribe-based learning media is a valid, practical, and effective instructional tool for teaching linear programming, particularly in assignment-related topics. The integration of animated visualizations and structured explanations enhances students' engagement and supports better conceptual understanding in mathematics learning.



This is an open access article under the Creative Commons Attribution-ShareAlike 4.0 International License ([CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/)), which permits use, sharing, adaptation, distribution, and reproduction in any medium, provided appropriate credit is given to the original author(s) and source, a link to the license is provided, and any changes are indicated. Derivative works must be distributed under the same license. which permits use, sharing, adaptation, distribution, and reproduction in any medium, provided appropriate credit is given to the original author(s) and source, a link to the license is provided, and any changes are indicated. Derivative works must be distributed under the same license.

A. Introduction

Mathematics learning at the higher education level requires students to understand abstract concepts, analytical reasoning, and problem-solving processes, particularly in topics such as linear programming. However, many students experience difficulties in understanding assignment-based problems due to the complexity of mathematical models and the lack of effective visualization in the learning process. Traditional teaching methods that rely on lectures and static materials are often insufficient to facilitate deep conceptual understanding and student engagement (Arsyad, 2016; Nurseto, 2011). As a result, students tend to have low motivation and limited ability to apply mathematical concepts in problem-solving contexts (Netriwati, 2016; Susilo, 2017).

The integration of learning media has been widely recognized as an essential component in improving the quality of mathematics education. Learning media not only function as tools for delivering information but also play a significant role in enhancing students' motivation, interaction, and conceptual understanding (Arsyad, 2013; Ega Rima Wati, 2016). Previous studies have shown that the use of interactive and multimedia-based learning media can significantly improve students' learning outcomes and engagement in mathematics learning (Masykur et al., 2017; Nugroho et al., 2017). In addition, the development of appropriate instructional materials is crucial to ensure that learning objectives are achieved effectively (Bilfaqih, 2009).

Recent developments in educational technology have introduced various innovative tools to support learning, including animation-based media such as Sparkol VideoScribe. This technology enables the presentation of learning content through dynamic visualizations and storytelling approaches, which can simplify complex mathematical concepts and make them more accessible to students. Studies have indicated that VideoScribe-based media can enhance students' interest, understanding, and retention of learning materials (Octavianingrum, 2016; Pratiwi, 2017; Making & Hariyanto, 2016). Furthermore, multimedia learning theory suggests that the integration of visual and auditory elements significantly improves cognitive processing and knowledge construction (Mayer, 2014; Clark & Mayer, 2016).

From a pedagogical perspective, effective mathematics learning requires the integration of problem-solving strategies and meaningful learning experiences. The use of appropriate learning models and media can support students in developing higher-order thinking skills, including critical and creative thinking (Anggoro, 2015; Rochmad, 2012). In the context of linear programming, students must be able to translate real-world problems into mathematical models, which requires both conceptual understanding and visualization skills. Therefore, the use of interactive media becomes essential in supporting this process.

Despite the growing use of technology in education, the development of Sparkol VideoScribe-based learning media specifically designed for assignment topics in linear programming remains limited. Most existing studies focus on general multimedia learning or other mathematical topics, without addressing the specific challenges associated with assignment-based problem-solving in linear programming. This indicates a clear research gap in the development and evaluation of innovative learning media tailored to this context.

Moreover, previous studies have not comprehensively evaluated the feasibility of such media in terms of validity, practicality, and effectiveness through a systematic development process. Research and Development (R&D) approaches provide a structured framework to ensure that educational products are designed, validated, and tested before implementation (Sugiyono, 2012; Borg & Gall, 2003). Through this approach, learning media can be developed to meet both pedagogical and technological requirements.

Based on these considerations, this study aims to develop Sparkol VideoScribe-based mathematics learning media for assignment problems in linear programming and to evaluate its

validity, practicality, and effectiveness. The findings of this study are expected to contribute to the advancement of technology-enhanced mathematics learning and provide practical implications for educators in designing innovative and engaging instructional media.

B. Methods

This study employed a Research and Development (R&D) approach to develop Sparkol VideoScribe-based mathematics learning media for assignment problems in linear programming. The development procedure adopted the model proposed by Sugiyono, which consists of systematic stages including identifying potential and problems, data collection, product design, design validation, design revision, product testing, product revision, usage testing, final revision, and product dissemination.

In the initial stage, a needs analysis was conducted to identify learning problems related to students' difficulties in understanding linear programming assignment concepts. Data were collected through observations and interviews to explore the characteristics of learners and instructional needs. Based on these findings, the product design stage was carried out by developing a storyboard and instructional structure integrated into Sparkol VideoScribe media.

The designed product was then validated by experts in mathematics content, instructional design, and media development to assess its feasibility in terms of content accuracy, language clarity, and visual presentation. Feedback from experts was used to revise and improve the product before implementation.

Subsequently, the revised product was tested through a small-scale trial to evaluate its practicality and initial effectiveness. Further improvements were made based on the results of this trial before conducting a larger-scale implementation involving mathematics students. The usage testing stage aimed to measure the effectiveness of the media in improving students' understanding of assignment problems in linear programming.

Data collection techniques included validation sheets, questionnaires, and learning outcome tests. The validity of the product was determined based on expert evaluation, while practicality was assessed through student responses. Effectiveness was measured by analyzing students' learning outcomes after using the developed media. Data were analyzed using descriptive quantitative techniques with percentage criteria, supported by qualitative data to strengthen the interpretation of findings.

C. Results

The results of this study are presented based on the stages of the Research and Development (R&D) process, which include expert validation and product trials to evaluate the feasibility of the developed Sparkol VideoScribe-based mathematics learning media.

1. Expert Validation Results

The initial product was validated by experts in mathematics content, instructional design, and media development. The purpose of this validation was to assess the appropriateness of the media in terms of content accuracy, language clarity, and visual presentation before implementation.

The validation results indicate that the developed learning media meets the criteria of feasibility in all assessed aspects. The content aspect demonstrates that the material presented in the media is aligned with the learning objectives of linear programming assignment topics. The language

used is considered clear and understandable for students, while the media design is regarded as appropriate in supporting visualization and explanation of mathematical concepts.

Table 1. Results of Expert Validation

Aspect Evaluated	Category
Content	Valid
Language	Valid
Media Design	Valid

Based on expert suggestions, several revisions were made, including improvements in the clarity of explanations, refinement of visual elements, and adjustment of the animation sequence to better support students' understanding.

2. Product Trial Results

After the validation stage, the revised product was tested through small-scale and large-scale trials involving students. The purpose of these trials was to evaluate the practicality and effectiveness of the developed learning media in real learning situations.

Table 2. Results of Product Trials

Evaluation Aspect	Category
Practicality	Practical
Student Response	Very Positive
Learning Effectiveness	Effective

The results of product trials show that the developed media is practical and can be implemented effectively in the learning process. Students were able to use the media without significant difficulties, indicating that the product is user-friendly and well-designed.

In addition, students' responses toward the use of Sparkol VideoScribe-based media were highly positive. They reported that the media was engaging, easy to understand, and helpful in visualizing abstract mathematical concepts. The use of animation and step-by-step explanations contributed to a more interactive and meaningful learning experience.

3. Improvement of Learning Outcomes

The implementation of the developed media showed an improvement in students' learning outcomes, particularly in their ability to understand and solve assignment problems in linear programming. Students demonstrated better performance in constructing mathematical models and interpreting solutions after using the media.

Overall, the findings indicate that the Sparkol VideoScribe-based learning media is valid, practical, and effective for supporting mathematics learning. The integration of visual animation and structured explanations enhances students' engagement and facilitates a deeper understanding of abstract concepts in linear programming.

D. Discussion

The findings of this study indicate that the developed Sparkol VideoScribe-based learning media is valid, practical, and effective in supporting mathematics learning, particularly in linear programming assignment topics. The validation results confirm that the media meets the required standards in terms of content accuracy, language clarity, and visual design. This demonstrates that a systematic development process based on the Research and Development (R&D) approach is essential in ensuring the quality and feasibility of instructional media (Richey & Klein, 2014).

From a content perspective, the validity of the developed media suggests that the material is well-aligned with learning objectives and relevant to students' needs. This finding supports previous studies emphasizing that well-structured instructional content plays a crucial role in enhancing students' understanding of mathematical concepts (Anggoro, 2015; Netriwati, 2016). In the context of linear programming, students are required to translate real-world problems into mathematical models, which demands both conceptual clarity and systematic reasoning. Therefore, the availability of appropriate learning media becomes highly important.

The practicality of the developed media is reflected in its ease of use and adaptability in the learning process. Students were able to interact with the media without significant difficulty, indicating that the design of the Sparkol VideoScribe-based media is user-friendly and accessible. This finding is consistent with research suggesting that effective learning media should be simple, flexible, and easy to integrate into classroom activities (Arsyad, 2016; Branch, 2018). Practical media can reduce cognitive load and allow students to focus more on understanding the learning material (Sweller, 2011).

Furthermore, the effectiveness of the developed media is evident in the improvement of students' understanding of linear programming assignment problems. The use of animation and step-by-step visualization helps students to better grasp abstract mathematical concepts. This result aligns with multimedia learning theory, which states that the integration of visual and verbal elements can enhance cognitive processing and knowledge construction (Mayer, 2014; Clark & Mayer, 2016). Animated learning media provide dynamic representations that facilitate deeper understanding compared to static instructional materials.

The positive responses from students also indicate that Sparkol VideoScribe-based media can increase engagement and motivation in learning mathematics. Learning motivation is an important factor influencing students' academic performance, particularly in subjects that are perceived as difficult, such as mathematics (Schunk & DiBenedetto, 2020). Interactive and visually appealing media can create a more enjoyable learning environment, which in turn encourages active participation and sustained attention (Hsin & Wu, 2019).

In addition, the findings of this study reinforce the importance of integrating technology into mathematics education. The use of digital learning media, such as VideoScribe, supports the development of 21st-century learning skills, including critical thinking, problem-solving, and digital literacy (Hirsh-Pasek et al., 2015). Previous studies have also shown that technology-enhanced learning environments can significantly improve students' learning outcomes and conceptual understanding (Sung et al., 2016; Kay & Kletskin, 2012).

Despite its strengths, this study has several limitations. The implementation of the developed media was limited to a specific group of students and learning context, which may affect the generalizability of the findings. In addition, the study focused primarily on cognitive learning outcomes, without exploring other aspects such as long-term retention or affective development.

Overall, this study provides empirical evidence that Sparkol VideoScribe-based learning media is an effective tool for improving mathematics learning, particularly in linear programming. The integration of animation, visualization, and structured explanation contributes significantly to enhancing students' engagement and conceptual understanding. These findings highlight the importance of developing innovative and technology-based learning media to support effective mathematics instruction in higher education.

E. Conclusion

This study concludes that the Sparkol VideoScribe-based mathematics learning media developed through a systematic Research and Development (R&D) process is valid, practical, and effective for supporting the learning of linear programming, particularly in assignment-based problem-solving contexts. The validation results confirm that the media meets the required standards in terms of content accuracy, language clarity, and visual presentation.

The implementation findings demonstrate that the media is practical and can be effectively integrated into the learning process. Students were able to interact with the media easily and showed positive responses toward its use. Furthermore, the effectiveness of the media is reflected in the improvement of students' understanding of linear programming concepts, especially in constructing mathematical models and solving assignment problems.

Overall, the integration of animated visualization and structured explanations through Sparkol VideoScribe enhances students' engagement and facilitates deeper conceptual understanding. This study highlights the importance of technology-based learning media in addressing the challenges of abstract mathematics learning in higher education.

F. Recommendations

Based on the findings of this study, several recommendations are proposed. First, educators are encouraged to utilize Sparkol VideoScribe-based learning media as an alternative instructional tool to support the teaching of abstract mathematical concepts, particularly in linear programming. The use of animated visualization can enhance students' engagement and improve their conceptual understanding.

Second, educational institutions should support the integration of technology-based learning media by providing adequate facilities and training for educators. Enhancing teachers' competencies in designing and implementing digital learning media is essential to optimize the learning process.

Third, future researchers are encouraged to expand this study by applying Sparkol VideoScribe-based media to different mathematical topics or educational levels. Further research can also explore its impact on other learning aspects, such as motivation, critical thinking, and long-term retention.

Finally, it is recommended that future studies incorporate more comprehensive evaluation methods, including experimental designs and larger sample sizes, to strengthen the generalizability of findings and provide deeper insights into the effectiveness of technology-enhanced mathematics learning.

References

- Abidin, M. M., Purnama, B. E., & Nugroho, G. K. (2013). Pembangunan media pembelajaran teknik komputer jaringan kelas X semester ganjil berbasis multimedia interaktif. *IJNS-Indonesian Journal on Networking and Security*, 4(3).
- Anggoro, B. S. (2015). Pengembangan modul matematika dengan strategi problem solving untuk mengukur tingkat kemampuan berpikir kreatif matematis siswa. *Al-Jabar: Jurnal Pendidikan Matematika*, 6(2).
- Arsyad, A. (2016). *Media pembelajaran* (Edisi revisi). PT Raja Grafindo Persada.
- Bilfaqih, Y. (2009). *Esensi penyusunan materi pembelajaran*. CV Budi Utama.

- Borg, W. R., & Gall, M. D. (2003). *Educational research: An introduction* (7th ed.). Allyn & Bacon.
- Branch, R. M. (2018). *Instructional design: The ADDIE approach*. Springer.
- Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction* (4th ed.). Wiley.
- Ega Rima Wati. (2016). *Ragam media pembelajaran*. CV Solusi Distribusi.
- Hirsh-Pasek, K., Zosh, J. M., Golinkoff, R. M., Gray, J. H., Robb, M. B., & Kaufman, J. (2015). Putting education in educational apps: Lessons from the science of learning. *Psychological Science in the Public Interest*, 16(1), 3–34.
- Hsin, C. T., & Wu, H. K. (2019). Using narrative-based approaches in learning. *Educational Psychology Review*, 31(3), 635–658.
- Kay, R. H., & Kletschin, I. (2012). Evaluating the use of problem-based video podcasts. *Computers & Education*, 59(2), 619–627.
- Making, M. Y., & Hariyanto, V. L. (2016). Pengembangan media pembelajaran mekanika teknik berbasis VideoScribe dan Aurora 3D Presentation. *E-Journal Pendidikan Teknik Sipil dan Perencanaan*, 4(1).
- Masykur, R., Nofrizal, N., Syazali, M., Nugroho, A. A., Yunian Putra, R. W., & Putra, F. G. (2017). Pengembangan media pembelajaran matematika dengan Macromedia Flash. *Al-Jabar: Jurnal Pendidikan Matematika*, 8(2).
- Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). Cambridge University Press.
- Netriwati. (2016). Analisis kemampuan mahasiswa dalam memecahkan masalah matematis menurut teori Polya. *Al-Jabar: Jurnal Pendidikan Matematika*, 7(2).
- Nugroho, A. A., Yunian Putra, R. W., Putra, F. G., & Syazali, M. (2017). Pengembangan blog sebagai media pembelajaran matematika. *Al-Jabar: Jurnal Pendidikan Matematika*, 8(2).
- Nurseto, T. (2011). Membuat media pembelajaran yang menarik. *Jurnal Ekonomi & Pendidikan*, 8(1).
- Octavianingrum, D. (2016). *Pengembangan media audio visual Sparkol VideoScribe dalam pembelajaran* (Doctoral dissertation, Universitas Sebelas Maret).
- Pratiwi, E. D. (2017). *Pengembangan media pembelajaran fisika berbasis Sparkol VideoScribe* (Doctoral dissertation, UIN Raden Intan Lampung).
- Richey, R. C., & Klein, J. D. (2014). *Design and development research*. Routledge.
- Rochmad. (2012). Desain model pengembangan perangkat pembelajaran matematika. *Kreano: Jurnal Matematika Kreatif-Inovatif*, 3(1).
- Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemporary Educational Psychology*, 60, 101832.
- Sugiyono. (2012). *Metode penelitian dan pengembangan*. Alfabeta.
- Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). Effects of mobile learning. *Computers & Education*, 94, 252–275.
- Susilo, T. A. B. (2017). Pengaruh sikap siswa pada matematika terhadap hasil belajar matematika. *Jurnal Pendidikan Matematika*, 3(1).
- Sweller, J. (2011). Cognitive load theory. *Psychology of Learning and Motivation*, 55, 37–76.