Journal of Educational Sciences
Journal homepage: https://jes.ejournal.unri.ac.id/index.php/JES

P-ISSN 2581-1657
E-ISSN 2581-2203

Development of Learning Media Assisted by iSpring Suite with Discovery Learning Model to Facilitate Mathematical Understanding Ability

Rosilawati Kusuma Ningrum*, Elfis Suanto, Nahor Murani Hutapea
Riau University, Pekanbaru, 28296, Indonesia

ARTICLE INFO

Article history:

Received: 06 Jan 2024
Revised: 01 July 2024
Accepted: 04 July 2024
Published online: 24 July 2024

Keywords:

Learning Media;
Discovery Learning;
Mathematical Comprehension Ability

A B S T R A C T

The purpose of this research is to produce learning media that can facilitate students' mathematical understanding abilities on circle material assisted by iSpring Suite 10 software with a Discovery Learning model that can be accessed on Android smartphones and laptops and has met the valid and practical requirements. The development model used is the 4D model, with the stages of define, design, develop, and disseminate. The learning media was validated by three media experts, and the research subjects involved three students in one-on-one activities, six students in small group trials, and 30 students in large group trials. The research instruments included validation sheets and student response questionnaires. The results of validation by experts obtained an average of 90.6% with very valid criteria. Feedback and suggestions obtained from validation and one-to-one were used as improvement materials. Furthermore, small group and large group trials were carried out, each of which obtained an average of 91.87% and 91.58% with very practical criteria. This iSpring Suite 10 assisted learning medium with the Discovery Learning model on circle material to facilitate the mathematical understanding ability of junior high school students has met the valid and practical criteria.

1. Introduction

Mathematics is a basic science that plays an important role in efforts to master science and technology. The importance of mathematics in science and technology makes this subject necessary to be taught to all levels of society, especially to students in formal schools (Utami et al, 2021: 2). Mathematics, as a discipline, has several learning objectives. One of the objectives of learning mathematics, according to Permendikbud number 58 concerning the 2013 curriculum, is for students to have mathematical understanding skills, namely the

* Corresponding author.
E-mail: rosilawati.kusuma3586@student.unri.ac.id Doi: https://doi.org/10.31258/jes.8.3.p.325-335

competence to explain the relationship between concepts and apply concepts or algorithms flexibly, accurately, efficiently, and precisely in problem solving.

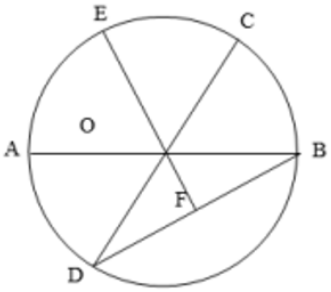
Mathematical understanding ability underlies all mathematical abilities, so it can be said that mathematical understanding ability is a very important aspect to master in learning mathematics as reported by Heny Irawati (Susanti et al, 2015). The indicators of mathematical understanding ability, namely restating a concept, classifying objects according to certain properties in accordance with the concept, giving examples and not examples of concepts, and presenting concepts in various forms of mathematical representation (Warmi, 2019: 299)

Mathematical understanding ability is very important for students to have, but the facts on the ground show that mathematical understanding ability is still relatively low. This can be seen from the international mathematics achievement conducted by Trends in Mathematics and Science Study (TIMSS), showing that Indonesia ranks 38 out of 42 countries with a score of 386, while the standard score is 500. This result is the lowest score that Indonesia has achieved since participating in TIMSS in 1999. Indonesia's mathematics achievement has decreased. This is due to the fact that the learning of mathematics in Indonesia emphasizes more memorizing formulas and calculations, while in TIMSS, the tests given are oriented to understanding, reasoning, and higher-level thinking skills.

The low mathematical understanding ability of students is also seen in the results of previous research conducted by Warmi (2019) regarding the analysis of mathematical understanding ability on Circle material. Students were given a mathematical understanding ability test in the form of a description with five questions. The highest score was obtained with a score of 17, where the ideal score was 25, and the lowest score was a score of 4. If examined by each indicator based on the question number, there are still many students who can be said to be lacking in understanding mathematical concepts. Afroz (2024) Continuing Professional Development is provided institutionally, teachers will get the opportunity to develop professionally, and students will also be benefited through it.

Based on the results obtained, no one reached the maximum score or was at the ideal score. Thus, it can be said that students' understanding of mathematical concepts in solving circle problems is still low. One of the obstacles faced by students in answering test questions is when asked to mention the elements of the circle, but students do not understand the elements of the circle, meaning that understanding of the elements of the circle is still low and the indicator of restating the concept is not met. The circle material covered in the scope of geometry is a material that is widely encountered and applied to everyday problems. Nevertheless, it turns out that not a few students have difficulty learning and understanding circle material (Putri & Dewi, 2020: 32). According to Budiyono, Kusumaningsih, and Albab (2019: 38), circle learning in schools tends to be teacher-centered, where students are given circle material directly by the teacher while students are only limited to remembering the material that has been given. This can be seen from the students' answers in Figure 1 below.

Problem 1: From the figure below, state and explain what is included in: a) Radius; b) Diameter; c) Center of the Circle; d) Arc Cord; e) Arc; f) Apothema; g) Juring; h) Corners.



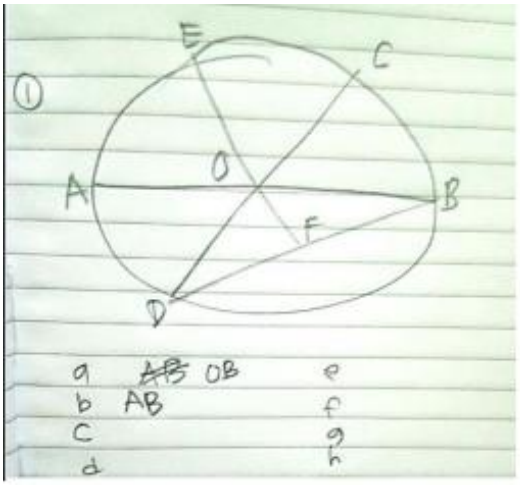


Figure 1. Student Questions and Answers

Recognizing the relationship between experiential learning and real-world problems with the development of students' concept understanding, it is absolutely necessary to have learning that involves more student activeness during the learning process. Sutrisno (Trianingsih, Husna & Prihatiningtyas., 2019: 3) states that discovery learning is a learning process that emphasizes students finding concepts so that students can find concepts independently and will have a positive impact on mathematical understanding ability. Purwaningrum (2016: 151) states that discovery learning is learning that guides students to find a mathematical concept through several stages, namely: stimulus; problem identification; data collection; data processing; proof; and conclusion drawing. The application of the Discovery Learning model in mathematics learning has a positive impact on students' mathematical understanding skills. This is stated based on the results of research conducted by Susanti, Murni & Anggraini (2015) showing that the application of Discovery Learning can improve the learning process and students' mathematical understanding skills.

One of the innovations in learning is the use of technology and information-based learning media. In mathematics learning, the utilization of technology by using media is very helpful for teachers in the learning process. Learning media that involve students directly in learning can help deliver material and meet students' needs in distance learning or learning outside the classroom to facilitate students' understanding abilities (Maranthika, 2016). Bella (2023) Education is the most important factor in a person's life, because it can distinguish a person's ability to think. In the current era of modernization, technology in the field of telecommunications is experiencing rapid development, especially smartphones and tablets. Based on data from the Central Statistics Agency (BPS) in 2019, the use of smartphones in accessing the internet was 96.95%, while the use of laptops and computers was 15.78%. Based on the BPS data in 2019, the researchers saw an opportunity to develop learning media in an effort to maximize the use of smartphones and laptops/computers for learning.

The learning media that researchers will develop in this study use iSpring Suite software integrated with Microsoft PowerPoint. According to Mutrikoh, Marzuki & Sabri (2020), the use of media in the iSpring Suite makes learning more interesting, interactive, and fun and can be used as a variety of learning tools. iSpring Suite is software for creating presentation-based learning media that can be used in the learning process by containing aspects of media, audio, visual, and various types of evaluations that have been provided. The product produced by iSpring Suite is in the form of a website (.html) that can be used on a laptop or computer, then converted into an application (.apk) so that it runs well on an Android smartphone.

Based on the descriptions above, the researchers conducted research with the aim of producing iSpring Suite-assisted learning media with the Discovery Learning model on circle material to facilitate mathematical understanding skills. iSpring Suite-assisted learning media can be used by students when learning in class or outside the classroom, both online and offline, and can also be operated using a laptop, computer, or Android smartphone without using an internet network.

2. Methodology

This type of research is development research (research and development) and applies the development model by Thiagarajan known as the 4-D development model, which includes 4 stages, namely defining, designing, developing, and disseminating. At the development stage, a formative evaluation is carried out, which is adopted from Tessmer (in Apriyani, 2018).

The define stage is the initial stage to establish and define development requirements that include all needs analysis and data collection activities. The main initial phase is analysis, because through analysis, the developer can find out the learning objectives and limitations. The design stage is a stage for designing products that are developed in accordance with the data that has been obtained from the analysis of the defined stage. In the development stage, Thiagarajan states that the purpose of this stage is to modify the product prototype. The disseminating stage is the preparation of products that are suitable for use to be distributed to teachers and students.

In this study, interviews and observations were conducted by researchers at MTs Fadhillah Pekanbaru and SMP Negeri 40 Pekanbaru. Data collection techniques used include validation questionnaires to test the feasibility of learning media and student response questionnaires to see the level of practicality of using learning media. Validation was carried out by three validators who are experts in the field of mathematics learning media. The trial subjects involved 3 VIII grade students in one-to-one activities, 6 students of SMP Negeri 40 Pekanbaru in small group trials, and 30 students in large group trials. Validators validated the learning media based on the face aspect, content aspect, and construct aspect. The determination of the assessment score uses a Likert scale of 1 to 4, where 4 categories strongly agree, 3 categories agree, 2 categories disagree, and 1 category

strongly disagrees. Data analysis of validation results and student response questionnaire results was adopted from Butar-butar, Murni & Roza (2020).

$$P = \frac{T_{se}}{T_{sh}} \times 100\% \quad (1)$$

Description: percentage; T_{se}: total empirical score; T_{sh}: total maximum expected score. The average obtained is converted into qualitative data. Learning media is said to be valid and can be continued to the trial stage if it obtains an average value of more than 71% in accordance with the validity level criteria in Table 1.

Table 1. Validity Level Criteria

Interval	Criteria
86% < $P \leq$ 100%	Very Valid
71% < $P \leq$ 85%	Valid
56% < $P \leq$ 70%	Quite Valid
41% < $P \leq$ 55%	Less Valid
25% < $P \leq$ 40%	Invalid

Validation is carried out together with one-on-one activities. The validation stage and one-on-one were carried out to obtain suggestions and input as improvements to the learning medium. After making improvements, researchers carried out trial activities. The results of the trial activities were analyzed using the formula in equation (1). The average obtained was converted into qualitative data. Learning media is said to be practical if it obtains an average value of more than 70.01% in accordance with the validity level criteria in Table 2.

Table 2. Criteria For The Level Of Practicality

Persentase	Criteria
85,01% < $P \leq$ 100%	Very Practical
70,01% < $P \leq$ 85%	Practical
50,01% < $P \leq$ 70%	Practical enough
0,1% < $P \leq$ 50%	Less Practical

3. Results and Discussion

Define

The defined stage carried out by researchers includes initial and final analysis, student analysis, material analysis, concept analysis, and specification of learning objectives. At the initial analysis stage, interviews were conducted with teachers, and information was obtained that the teacher only conducted learning with the lecture method due to the teacher's limitations in developing learning media. This has an impact on learning because it involves fewer students, and students have not received sufficient space to construct their own knowledge.

Based on this initial analysis, a solution to the problems found is the availability of learning media with the Discovery Learning model, where learning with the

Discovery Learning model is a learning process that emphasizes students finding concepts so that students can find concepts independently and will have a positive impact on mathematical understanding skills. Furthermore, student analysis was carried out by observation and obtained the fact that students tend to be passive in learning when the teacher only uses the lecture method. Students already know how to use laptops and computers, and they already have personal Android smartphones, so they are familiar with technology and the digital world.

The material analysis stage is carried out to find out the mathematics learning material that is still difficult for students. At the concept analysis stage, researchers analyzed the basic competencies (KD) related to the circle material to be arranged systematically. The material compiled refers to the 2013 curriculum, which is developed based on the basic competencies for circle material. Finally, the researcher formulated learning objectives based on the GPA of the circle material.

Design

At the design stage, researchers made validation sheets and student response questionnaires. Aspects outlined on the validation sheet include aspects of face, content, and construct. Aspects outlined in the student response questionnaire include aspects of ease of understanding, time efficiency, and ease of use. After that, format and media selection were carried out with the help of iSpring Suite 10, whose publication results were in ".html" format, which was converted into ".apk" format. The media is designed to contain images, animations, and background sound. The pages in the learning media consist of a home page and a main menu page that contain an introduction, material, quizzes, and the author's profile. The final step of this design stage is to design the initial product, or prototype. Researchers design learning media directly in the assistance software. The following is the design of the initial page display and the main menu page on the developed learning media in Figure 2.

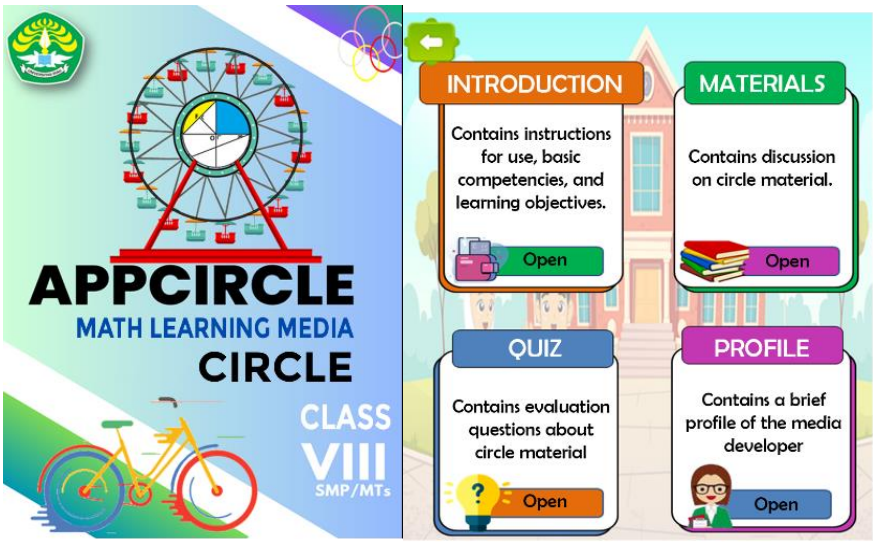


Figure 2. Initial Display Design

Develop

At the development stage, validation, one-to-one tests, small group trials, and large group trials are conducted. Validation is carried out together with the one-to-one test, commonly referred to as the readability test. Validation was carried out on June 6–20, 2023. The results of the validator's assessment on the aspects of face, content, and construct can be seen in Table 3.

Table 3. Learning Media Validation Results

Meeting	Aspect of Validation			Average (%)	Category
	Front	Fill	Construction		
1	95,8	92,7	83,3	90,6	Very Valid
2	95,8	92,7	83,3	90,6	Very Valid
3	95,8	92,7	83,3	90,6	Very Valid
4	95,8	92,7	83,3	90,6	Very Valid
Average (%)	95,8	92,7	83,3	90,6	Very Valid

In the validation activity, there were several suggestions related to the improvement of learning media. There are several suggestions from the validator, namely that the movement of the first slide to the second slide is too fast, the time duration should be extended, and the example questions should be related to contextual questions related to everyday life. Therefore, before the learning media was tested on students, the learning media was revised according to the validator's suggestions.

One-to-one was conducted on June 11, 2023. The researcher involved three students of class VIII junior high school that the researcher reached from the researcher's residence. In this activity, students use learning media from Meeting 1 to Meeting 4. Students use learning media through Android smartphones that researchers have provided. Then, at the end of each meeting, the researcher gave students the opportunity to provide criticism and input related to learning media. At the end of the one-on-one activity, the researcher conducts a discussion with the students. The discussion was carried out with the aim of finding out whether there were still wrong wording, unclear sentences, ambiguous sentences, and sentences that were difficult to understand.

After the learning media is validated and tested one-on-one, the learning media is revised for small group trials. Small group trial activities aim to demonstrate the practicality of learning media. Small group trial activities were carried out at SMP Negeri 40 Pekanbaru, namely in class VIII A. The trial activities were carried out on August 7 and 12, 2023. This small group trial activity involved six students, two each with high, medium, and low abilities. The selection of these students was done with the help of the class math teacher. The trial was conducted in the school environment using each student's Android smartphone. After using the learning media, the researcher conducted a brief discussion with the students. Based on students' suggestions and comments, it was found that students were very happy with learning using digital learning media such as AppCircle media.

The results of the small group trial of learning media obtained an average score of 91.87% with a very practical category, as shown in Table 4.

Table 4. Small Group Trial Results

Aspect	Student Response Rising Results (%)				Average (%)	Category
	1	2	3	4		
Ease of Understanding	89,16	90,83	89,16	91,67	90,2	Very practical
Time Efficiency	93,05	91,67	93,05	91,67	92,36	Very practical
Ease of Use	93,75	93,05	92,36	93,05	93,05	Very practical
Average (%)	91,99	91,85	91,52	92,13	91,87	Very practical

The stage carried out by researchers after the learning media through small group trials is to make revisions and continue with large group trials. Large group trial activities aim to demonstrate the practicality of learning media on a wider scale. Large group trial activities were carried out at SMP Negeri 40 Pekanbaru, namely in class VIII C. The trial activities were carried out on August 17–18, 2023, involving 30 students with heterogeneous academic abilities. The results of the large group trial of learning media obtained an average score of 91.58% with a very practical category, as shown in Table 5.

Table 5. Small Group Trial Results

Aspect	Student Response Rising Results (%)				Average (%)	Category
	1	2	3	4		
Ease of Understanding	89,33	87	89,16	88,83	88,58	Very practical
Time Efficiency	93,33	94,16	92,23	92,78	93,12	Very practical
Ease of Use	93,05	93,75	92,36	93,05	93,05	Very practical
Average (%)	91,9	91,63	91,25	91,55	91,58	Very practical

Disseminate

At this stage, the learning media is uploaded to a Google Drive link to be shared with teachers and students so that it can be disseminated easily. In the link, there are three folders, namely AppCircle and Guide. In the AppCircle folder, there is an application that can be downloaded on laptops, computers, and Android smartphones. In the Guide folder, there is a guidebook that can be used before starting to use the AppCircle application. AppCircle learning media and its guide can be accessed through the following link: https://bit.ly/MediaPembelajaranAPPCIRCLE.

Learning media assisted by iSpring Suite with a discovery learning model on circle material has been validated and obtained an average score of 90.6%, which is a very valid category and can be said to be feasible to be tested on students. The results of this study are in line with Adhitama's research (2018), which has produced interactive learning multimedia products based on discovery learning models that are very valid and can be used in the mathematics learning process.

The results of the student response questionnaire to the learning media obtained an average value of 91.87% and 91.58%, with a very practical category. This is in line with the research of Melisa, Octaria, and Rohana (2023: 56) that learning media, with the help of the iSpring suite, produce applications on circle material that have been valid, feasible, and very practical to use in learning. The researcher concluded that this learning medium is easy to use and operate by students, so that students can be more efficient in learning circle material because the media can be used anytime and anywhere and they can still understand it well.

Based on the results of comments and suggestions obtained from the student response questionnaire during the trial, this learning medium is very interesting. There are suggestions from students that it would be better if the presentation of the material was accompanied by a voiceover regarding the explanation of the material so that it would be much easier to understand the material.

Researchers conducted an evaluation to see the strengths and weaknesses of the learning medium. The advantages of learning media found by researchers are that it can be used anywhere and anytime without an internet network, so if there are space and time constraints, such as during a pandemic, students can still get interesting learning through this medium and do not need to spend a lot of internet quota. The weakness of this learning medium is that researchers have not been able to include voiceover in the explanation of the material because it will consume a lot of memory, which will make the application heavy and difficult to install. Another weakness is that this application can only be installed on Android smartphones; it cannot be installed on iOS smartphones. Researchers also evaluated the learning process that researchers conducted.

Researchers conducted the learning process with each student holding learning media operated by Android, which made the learning process less conducive because many students had to be held by the teacher. It is better if the use of learning media is done in groups, either by using a laptop or computer or by using one Android smartphone for each group.

4. Conclusion

This developed research produces a product that is a learning media assisted by the iSpring Suite with Discovery Learning model on circle material for class VIII SMP/MTs that can facilitate students mathematical understanding abilities. This learning media fills in the requirements to be valid and practical after going through a validation process by 3 experts, a one-to-one test by 3 students, a small group practical test by 6 students, and a big group practical test by 30 students. In this developed research about learning media, the measurement is limited to the validity and practicality of the learning media. Further research may refer to another aspect of learning math, such as improving student effectiveness. The researcher advises other researchers to develop additional learning media assisted by the iSpring Suite for different materials and levels. This product has filled in

the criteria to be valid and practical. Thus, it can be a reference for teachers in the learning process.

References

Adhitama, I. (2018). *Pengembangan Multimedia Pembelajaran Interaktif Model Discovery Learning pada Materi Pokok Teorema Pythagoras untuk Siswa Kelas VIII MTs Al-Furqon Kabupaten Bantul Tahun Ajaran 2017/2018* (Doctoral dissertation, UNS (Sebelas Maret University).

Afroz, R., Ramlan, S. S. A. A., Anny, N. Z., & Afroz, M. N. I. (2024). Using Continuing Professional Development (CPD) for Enhancing Teaching Quality in Higher Education of Bangladesh. *Journal of Education and Learning Research*, *2*(1), 1-15.

Apriyani, R., Sumarni, S., & Rukiyah, R. (2018). Pengembangan Media Pembelajaran Komik Tema Alam Semesta untuk Anak. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, *9*(2), 110-124.

Bella, S., Azhar, A., & Islami, N. (2023). Development of Think-Pair-Share (Tps) Model Based Learning Tools for Global Warming Materials. *Journal of Education and Learning Research*, *1*(1), 20-29.

Budiyono, A., Kusumaningsih, W., & Albab, I. U. (2019). Desain Pembelajaran Luas Lingkaran dengan Konteks Explore Dapur Berbasis Realistic Mathematics Education (RME) di Kelas VIII Sekolah Menengah Pertama (SMP). *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, *1*(4), 37-44.

Butar-butar, M., Murni, A., & Roza, Y. (2020). Praktikalitas Pengembangan Perangkat Pembelajaran dengan Penerapan Model Discovery Learning untuk Meningkatkan Kemampuan Berpikir Kreatif. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *4*(2), 480-486.

Melisa, M., Octaria, D., & Rohana, R. (2023). Pengembangan Media Pembelajaran dengan Aplikasi Android pada Materi Lingkaran. *Laplace: Jurnal Pendidikan Matematika*, *6*(1), 45-58.

Mutrikoh, M., Marzuki, M., & Sabri, T. (2020). Pengembangan Multimedia Power Point berbasis ispring 8 pada Pembelajaran Matematika di Sekolah Dasar. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa (JPPK)*, *9*(4).

Putri, L. A., & Dewi, P. S. (2020). Media Pembelajaran Menggunakan Video Atraktif pada Materi Garis Singgung Lingkaran. *Mathema: Jurnal Pendidikan Matematika*, *2*(1), 32-39.

Purwaningrum, J. P. (2016). Mengembangkan Kemampuan Berpikir Kreatif Matematis Melalui Discovery Learning Berbasis Scientific Approach. Refleksi Edukatika, 6 (2), 145–157.

Setyantoko, M. (2017). Pengembangan Media Pembelajaran Mobile Learning Berbasis Android dalam Pembelajaran Atletik untuk Siswa SMP Kelas VII. *Pendidikan Jasmani Kesehatan dan Rekreasi*, *6*(1).

Susanti, E. S., Murni, A. M., & Anggraini, R. D. A. D. (2015). *Upaya Meningkatkan Kemampuan Pemahaman Matematis Peserta Didik Kelas X MIA 2 MAN 2 Model Pekanbaru Melalui Penerapan Discovery Learning* (Doctoral dissertation, Riau University).

Trianingsih, A., Husna, N., & Prihatiningtyas, N. C. (2019). Pengaruh Model Discovery Learning Terhadap Pemahaman Konsep Matematis Siswa pada Materi Persamaan Lingkaran di Kelas XI IPA. *Variabel*, *2*(1), 1-8.

Utami, N. I., Sudirman, S., & Sukoriyanto, S. (2021). Analisis Kemampuan Pemahaman Konsep Matematis Siswa pada Materi Komposisi Fungsi. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, *10*(1), 1-13.

Warmi, A. (2019). Pemahaman Konsep Matematis Siswa Kelas VIII pada Materi Lingkaran. *Mosharafa: Jurnal Pendidikan Matematika*, *8*(2), 297-306.

How to cite this article:

Ningrum, R. K., Suanto, E., & Hutapea, N. M. (2024). Development of Learning Media Assisted by iSpring Suite with Discovery Learning Model to Facilitate Mathematical Understanding Ability. *Journal of Educational Sciences*, *8(3)*, 325-335.