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Research Article

Development of video learning media assisted by Sparkol Videoscribe to facilitate the ability to understand mathematical concepts of students

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ABSTRACT

This study aimed to develop and produce video learning media assisted by Sparkol Videoscribe that are valid, practical, and able to facilitate understanding of mathematical concepts. This type of research is development research using the ADDIE model which includes five steps, namely: analysis, design, development, implementation, and evaluation (evaluation).This study was conducted at the Junior High School (SMP) Islam Terpadu Abdurrab Pekanbaru. The subjects of this study are learning materials experts and educational technology experts, as well as VIII grade students of Junior High School (SMP) Islam Terpadu Abdurrab Pekanbaru and the object of this study is video learning media assisted by Sparkol Videoscribe. Data collection techniques include questionnaires and concept understanding ability tests. The data analysis technique used is the descriptive data analysis technique. Based on the results of validation by a team of validators consisting of 2 learning material experts and 3 Education technology experts. The validation results from the learning material expert validators show that the resulting learning videos have very valid criteria with a percentage level of validity of 98%, and the assessment of educational technology experts has very valid criteria with a validity percentage of 84%. Then the results of the practicality test that was tested on VIII grade students of SMP Islam Terpadu Abdurrab were grouped into two groups, namely a small group with a total of 8 students respondents obtaining a score of 86.9% with a very practical category, and a limited group with a total of 34 students receiving a score of 85, 73% with very practical category. Furthermore, from the posttest results, the male class got an average score of 86.38% with high criteria, and the female class got a score of 90.5% with high criteria. Next, a t-test was conducted on the posttest results for male and female classes, with the results tcount (-1.444) < ttable(1.694), with the conclusion that there was no significant difference between male and female classes.

Keywords: learning media; video learning; sparkol videoscribe; mathematical concepts;

1. INTRODUCTION

Mathematics is one of the subjects taught at every level of education in Indonesia, from Elementary School (SD), Junior High School, to Senior High School (SMA). In detail, in Permendiknas number 22 of 2006, it is explained that the purpose of learning mathematics in schools is so that students have the ability, one of which is understanding concepts (Minister of National Education, 2006). In order to achieve the objectives of learning mathematics, namely understanding concepts and applying concepts or algorithms in a flexible, accurate, efficient and precise way in problem solving, a pleasant atmosphere is needed. Therefore, a teacher must strive for pleasant situations and conditions. However, teaching materials circulating in the field emphasize procedural skills but less emphasis on understanding concepts. Therefore, learning innovations are needed that can improve student learning outcomes and support the strengthening of mathematical concepts. Learning that is able to support this, among others, is with the help of learning media that can improve understanding of concepts.

Understanding the concept consists of two words, namely understanding and concept. The word understanding comes from the word understanding which in the Big Indonesian Dictionary means smart and understands correctly (about something). While understanding is a process, the act of understanding or understanding (KBBI Online, 2019). According to Hamalik in Hendriana et al, understanding is the ability to see the relationship between various factors or elements in a problematic situation (Hendriana, 2017). The word concept in the Big Indonesian Dictionary has the meaning of an idea or understanding that is abstracted from a concrete event (KBBI Daring, 2019). In general, concepts can be defined as abstractions or ideas obtained from the results of summarizing and organizing knowledge (observations) or a fact/reality stated in terms (terms) that are generally accepted and are unique (Mustafa, 2013).

Regulation of the Director General of Primary and Secondary Education Number 506/C/Kep/PP/2004, details indicators of understanding mathematical concepts as being able to:

1) Restate a concept.
2) Classify objects according to certain according to their nature.
3) Provide examples and non-examples of a concept.
4) Presenting concepts in various forms of mathematical representation.
5) Develop necessary or sufficient conditions of a concept.
6) Use and utilize and choose certain procedures or operations.
7) Apply concepts or algorithms in problem solving. (Hendriana, 2017).

Literally, media means an intermediary, namely an intermediary between the message source (a source) and the message recipient (a receiver) (Indriana, 2011). According to Gerlach & Ely in Arsyad, the media if understood broadly are human, material, or events that build conditions that make students able to acquire knowledge, skills or attitudes (Arsyad, 2013). Next, they explain that teachers, books, and the school environment are media. More specifically, the notion of media in the teaching and learning process tends to be defined as graphic, photographic, or electronic tools for capturing, processing, and rearranging visual or verbal information (Arsyad, 2013).

The development of technology and information in recent years has grown rapidly, one of the fields that has had a significant impact with the development of this technology is education (Indah, 2022). So that the media in its development appears in various types, such as print modules, films, television, computers, animated videos and so on. Each with its own characteristics and abilities. Therefore, researchers want to create a media that follows the times that are packaged in video form. The term video comes from the Latin word vidi or visium , which means seeing or having vision. Video is a technology for capturing, recording, processing, storing, transferring, and reconstructing still image sequences by presenting scenes in motion electronically (Munir, 2013). Agnew and Kellerman in Munir, define video as a digital media that shows an arrangement or sequence of images and gives illusions, images and fantasies to moving images (Munir, 2013).

Utilization videos in the learning process at school is no longer something strange. Currently, many schools already have and utilize video learning programs in schools. Video media has many advantages over OHP (Overhead Projector), slides, and audio. As an audio-visual medium, video can display sound, image, and movement at the same time. So that this media is effective for presenting various lesson topics that are difficult to convey through verbal information (Mahnun, 2014). Animated videos can be used to present and visualize math problems in a more real and challenging way, with the aim of improving conceptual understanding, reasoning, problem solving abilities, and even increasing students' curiosity and creativity. The mathematical concepts and skills presented in this animated video can involve students in thinking and doing math learning activities more effectively, faster, and more deeply, than the traditional way which is done only by reading books, as well as through regular face-to-face learning in the classroom. class. One way to make learning videos is to use the help of the Sparkol VideoScribe application.

Sparkol VideoScribe is software that we can use to create white background animation designs very easily. software was developed in 2012 by sparkol (one of the companies in the UK). And exactly a year after it was released and published, this software already has more than 100,000 users (Air, 2014). Videoscribe is another name for Whiteboard animation videos or often referred to as sketch videos, doodle videos, video scribing or explanatory videos, but most of us are comfortable calling it Whiteboard animation (whiteboard animation) (Pratiwi, 2019). Whiteboard animation is where an artist sketches images and text on a blackboard, or perhaps paper or canvas, to illustrate a particular script or narrative (Darmawan, 2014). Based on the explanation above, it can be concluded that Sparkol VideoScribe is an application developed by Sparkol that helps users create animated whiteboards and descriptive videos. These videos typically feature a narration that describes a story, product, or idea along with an image that looks like the image on the screen while the video is playing.

The advantages of Sparkol VideoScribe as quoted from Moch Wahib Dariyadi include:

1) Videoscribe can be used as a means of promotion. (Promotion of public)
2) Videoscribe can be used for online business activities. (like marketing business)
3) Videoscribe can be used as a means of introductory learning for teachers; lecturers; or other learning (Dariyadi, 2018)

Based on the description presented above, researchers are encouraged to conduct study on the Development of Video Learning Media assisted by Sparkol VIdeoScribe that is valid, practical and able to facilitate students' mathematical concept understanding abilities.

2. RESEARCH METHOD

2.1 Type of Research

Type of study used in this study is research and development (RnD). In simple terms, R&D can be defined as a study method that is intentionally, systematically, aimed / directed to find, formulate, improve, develop, produce, test the effectiveness of products, models, methods /strategies/methods, services, certain procedures that are superior, new, effective, efficient, productive, and meaningful (Putra, 2015). Furthermore, according to Trianto R&D is a study method to develop products or improve products. These products can be in the form of objects or hardware (hardware), such as books, modules, learning aids in the classroom or or in the laboratory or also software (software) such as computer programs, learning models, and others (Trianto, 2011).

2.2 Development

Model the study development model that the researcher uses is the ADDIE model. ADDIE is a learning system design model that shows the basic stages of a simple and easy-to-learn learning system (Pribadi, 2009). This model, as the name implies, consists of five phases or stages, namely (A) analysis, (D) design, (D) development, (I) implementation, and (E) evaluation.

2.3 Development Procedure

At the analysis conducted curriculum analysis and needs analysis. Curriculum analysis is carried out to find out and examine the curriculum that applies to schools and to determine the competencies in which teaching materials will be developed (Atika, 2016). Needs analysis is needed to determine the abilities or competencies that students need to learn to improve learning performance or achievement (Perbadi, 2009). At the design researcher will design learning videos and the required study instruments, such as instruments for validity, practicality, and posttest for understanding concept abilities. The video design process is carried out in several stages, namely designing video designs, and writing scripts and audio recordings. The evaluation of this design stage is a learning video that will be made, it should be designed with an attractive and systematic appearance both in making learning videos and in presenting material to make it easier for students to understand. stage development, researchers will combine or edit videos that have been designed in the previous stage. After the video is finished editing, the video is given to the validator for validation. The validators consist of learning material experts and Education technology experts. Learning videos must be declared valid and feasible by these experts before being implemented in learning. The data from the evaluation results from each expert was then analyzed to determine the level of validity of the learning videos. Input from the validator is used as a reference for revising the learning video. The implementation is the realization of the design and development phase. After the video is declared valid and feasible, then this learning video is implemented in learning activities at school. This trial was carried out in two stages. The first stage of the trial was carried out on small group students with the number of respondents being 8 students and the second stage of the trial on limited group students with 34 students as respondents. Input from respondents is used as a reference for revising the learning video. The evaluation is a process carried out to provide value to the learning program (Perbadi, 2009). In this study, evaluation was carried out at each stage starting from the analysis stage to implementation. The evaluation was obtained from the results of questionnaires from students, teachers, validators, and input from supervisors.

2.4 Data Collection and Data Analysis

Techniques The data collection techniques used by researchers in evaluating the learning videos developed were questionnaires, and concept understanding ability tests. The data analysis technique used in this study is descriptive analysis and inferential analysis. Descriptive analysis is an analysis that describes a data that will be made either alone or in groups (Riduwan & Sunarto, 2011). Inferential statistics is a statistical technique used to analyze sample data and the results are applied to the population. This statistic will be suitable for use if the sampling technique from the population is done randomly (Sugiyono, 2013). Analysis of the results of the validity test of the developed learning video can be carried out in several steps, namely providing an answer score with the criteria of Very Valid (score 5), Valid (score 4), Sufficiently Valid (score 3), Less Valid (score 2), Invalid (score 2) score 1); give the percentage value with the formula:

$$\text{Validity level} = \frac{Total\ score\ obtained}{Maximum\ score} \text{ x } 100\%$$

Then interpret the data based on the **Table 1.**

Table 1. Data Interpretation of Product Validity

No.	Interval	Criteria
1	81%-100%	Very Valid
2	61%-80%	Valid
3	41%-60%	Sufficiently Valid
4	21%-40%	Less valid
5	0% -20%	Invalid

Source: Riduwan (2012).

The analysis of the practicality test results of the learning video developed can be done in several steps, namely giving a score answers with the criteria of Very Practical (score 5), Practical (score 4), Fairly Practical (score 3), Less Practical (score 2), Not Practical (score 1); give the percentage value with the formula:

$$\text{Practicality level} = \frac{Total\ score\ obtained}{Maximum\ score} \text{ x } 100\%$$

Then interpret the data based on the **Table 2.**

Table 2. Interpretation Of Data Practicality Product

No.	Interval	Criteria
1	81%-100%	Very Practical
2	61%-80%	Practical
3	41%-60%	Fairly Practical
4	21%-40%	Less Practical
5	0%-20%	Not Practical

Source: Riduwan (2012).

The analysis of the ability to understand mathematical concepts was carried out in two stages. The first stage is done by quantitative descriptive to determine the level of students' mathematical concept understanding ability. The results of tabulation of scores obtained by students are then searched for the percentage using the formula:

$$S = \frac{R}{N} x\ 100$$

Description:
S = expected value (searched)
R = total score of items or questions answered correctly
N = maximum score of the test

The percentage results are categorized based on general criteria for the qualification of the ability to understand the following concepts:

Table 3. Data Interpretation Concept Understanding Ability

No	Interval	Criterion
1	81%-100%	High
2	61%-79%	Medium
3	<60%	Low

Source: Hartono and Amir (2010).

The second stage was carried out with inferential statistics to determine whether there was a difference between male class and female class. Before performing inferential statistics, it is necessary to test the assumptions first. The assumption test carried out is the normality test and the homogeneity test. To perform the normality test, the chi-square test was used and the homogeneity of variance was tested using the-test. If the two data analyzed are data that are normally distributed, then testing with parametric tests, botht andt test can be done (Hartono, 2012). If the data is normally distributed but does not have a homogeneous variance, then the hypothesis testing uses thet. However, if one or both of the analytical data are not normally distributed, then proceed with a non-parametric test, namely the *Mann Whitney*.

3. RESULTS AND DISCUSSION

3.1 Results

At the analysis conducted curriculum analysis and needs analysis. Based on the curriculum analysis and needs analysis, it was found that grade VIII SMP students aged approximately 12-14 years were able to think logically and began to solve problems, although not all of them could do it perfectly because of an immature mindset. At this age too, the average student already has their own gadget, so they can browse various kinds of videos that exist in cyberspace. This learning video is designed to attract students' interest so that it can help students understand mathematical concepts. This video can be used by students at home using their own gadgets, making it easier for students to learn. The design stage is the stage for designing video learning media assisted by Sparkol Videoscribe along with the required instruments, such as instrument validity, practicality, and posttest concept understanding ability. The video design process is carried out in two stages, namely the design of the video design, and the writing of the script and audio recording. The results of the evaluation of this design stage are the learning videos that will be made, should be designed with an attractive and systematic appearance both in making learning videos and in presenting material to make it easier for students to understand. At the development stage, there are two stages, namely merging or editing videos that have been designed in the previous stage and video validation. At the editing video cut to cut (cutting video clips), then combining the video pieces into a complete video. We can also add text, effects, transitions, so the video will look more attractive. After the video is finished editing, the video is given to the validator of learning material experts and educational technology experts for validation. The following are the results of validation from learning material experts.

Table 4. Validation Results Of Learning Materials

No.	Aspects	Value Validation	Criteria
1	Didactic	97.5%	Very Valid
2	Construction Requirements	99.4%	Very Valid
3	Concept Understanding Ability	96.7%	Very Valid
	Overall ideal percentage	97.9%	Very Valid

Based on **Table 4**. it can be seen that the overall percentage of the learning material expert assessment is 97.9%, with very valid criteria. This shows that the sparkol videoscribe-assisted video learning media can be tested without requiring revision, but by following suggestions for improvement from learning material experts. The following is one of the results of the revision based on the advice of the expert validator of learning materials:

Figure 1. Before Revision
(Video Before Trimming the Curved Line of the Bow)

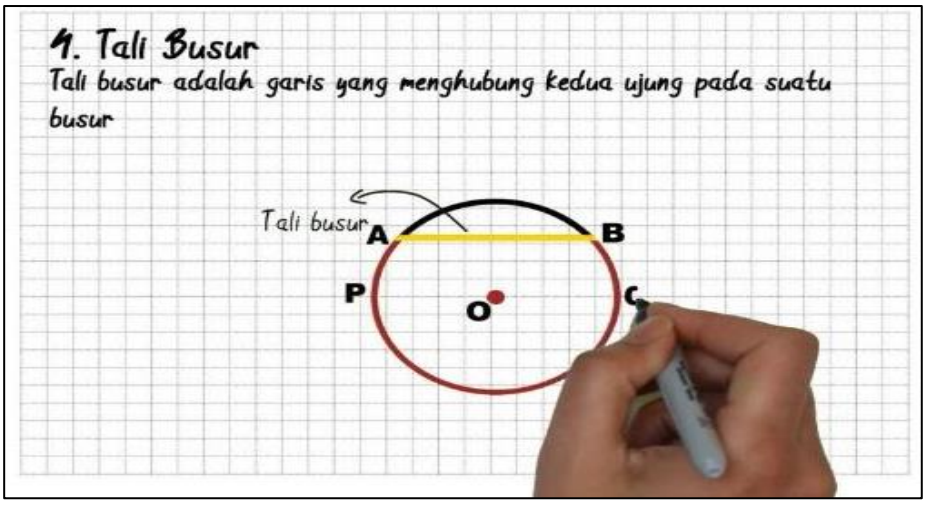

Figure 2. After Revision
(Video After Tidying Up the Curved Line of the Bow)

The following are the validation results from educational technology experts.

Table 5. Validation Results of Education Technology Experts

No	Aspects	Value Validation	Criterion
1	Use of letters and writing	83.5%	Very Valid
2	Placement of animation, pictures, illustrations and others	82%	Very Valid
3	Video learning media with attractive appearance	83.5%	Very Valid
4	Video-based learning media design	80%	Valid
5	Video-based learning media narration	91%	Very Valid
	Overall ideal percentage	84%	Very Valid

Based on **Table 5**. it can be seen that the overall percentage of educational technology expert assessments is 84%, with very valid criteria. This shows that learning -assisted sparkol videoscribe can be piloted without needing revision, but by following improvement suggestions from educational technologists. These results are relevant to the study conducted by Riyanto (2017). Each of the experts received very good criteria and was declared eligible to be used, but the difference was that this study only reached the stage of the validity test and practicality test, while the study that the author made came to the application of the concept understanding test (Pamungkas, 2018). . The following are the results of the validation of the concept understanding ability test questions. Furthermore, the study that has been carried out by Riyanto et al, was declared feasible to be used by 3 validator experts namely material, media and language with a percentage of 83.3% and was declared valid. The thing that distinguishes it from the study that the author does is on the material, then the study uses 3 validation experts while the author only uses 2 validation experts (Riyanto, 2022). The following is one of the results of the revision based on the advice of a validator of educational technology experts:

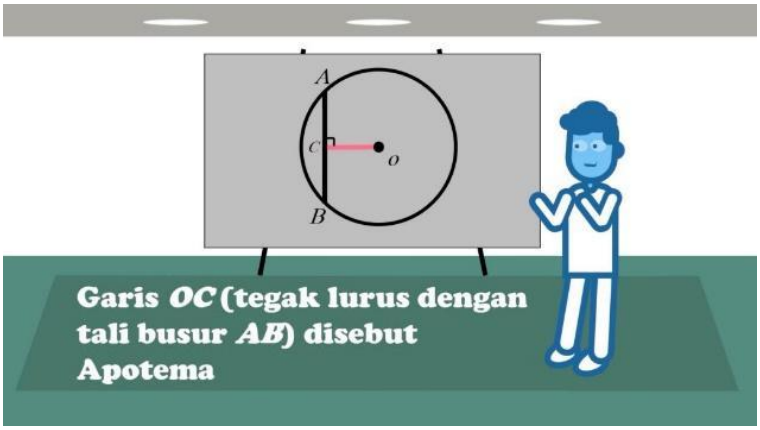

Figure 3. Before Revision
(Video Before Adding Line and Angle Animation)

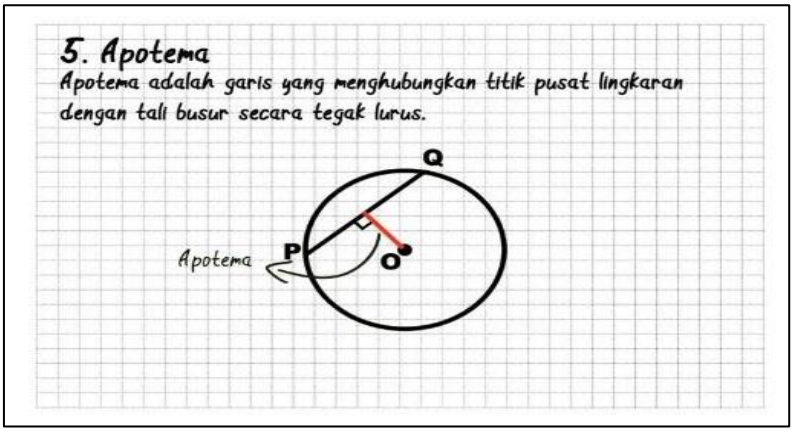

Figure 4. After Revision
(Video Before Adding Lines and Angles Animation)

Table 6. Validity Test Results of Posttest Questions

No	Aspects	Value Validation	Criterion
1	Question of Concept Understanding Ability	82.22%	Very Valid
Percentage of Overall Ideality		82.22%	Very Valid

Based on the calculations in **Table 6**, it can be seen that the percentage level of validity of the concept understanding test questions is 82.22%, with very valid criteria. The implementation stage is the stage of determining whether the learning video developed is interesting and can be used as a learning resource and tests the effectiveness of the video as a learning resource. Small group practicality assessment can be seen in **Table 7.**

Table 7. Percentage of Practicality During Small Group Trial

No	Aspects	Value Validation	Criterion
1	Student interest in video learning media display	88.67%	Very Practical
2	Use of video learning media	86.14%	Very Practical
3	Ability to understand concepts and materials	84.33%	Very Practical
4	Time	90.00%	Very Practical
	The overall ideal percentage is	87.28%	Very Practical

Based on **Table 7**, it is clear that the overall percentage of student assessments is 87.28% with very practical criteria, so the learning videos developed do not require revision. However, comments and suggestions from students were used as material for improvement to improve this learning video before conducting large group trials. There are some improvements from the suggestions of small group students who have used the developed learning videos such as more examples of questions and more explanations of sound. The assessment of the practicality of the limited group can be seen in **Table 8.**

Table 8. Percentage of Practicality During Limited Group Trial

No	Aspects	Value Validation	Criterion
1	Students interest in video learning media display	85.06%	Very Practical
2	Use of video learning media	84.51%	Very Practical
3	Ability to understand concepts and materials	86.91%	Very Practical
4	Time	87.1%	Very Practical
	The overall ideal percentage is	85.89%	Very Practical

Based on **Table 8**, it is clear that the overall percentage of student assessments is 85.89% with very practical criteria. These results are relevant to the study conducted by Akhmad Danil Miqdad in writing about the videoscribe media which was declared worthy of use as a learning medium and in an effective category to improve learning outcomes (Miqdad and Sumbawati, 2017). This is directly proportional to the authors who produce learning media suitable and effective to improve learning outcomes. Furthermore, study conducted by Yuni Kartika Kountul and Edy Wibowo, with the results that the developed media received a valid category from both material experts and media experts. In the practicality test, the media developed was categorized as very attractive. In the effectiveness test, the developed media received a high category (Kountul and Wibowo, 2021). After learning by using learning videos is complete, a posttest test is carried out. The results of the posttest were then analyzed to determine the understanding of students' concepts according to their respective classes. The following are the results of posttest the male class.

Table 9. Results of Test to Mathematics Concept Understanding Man Class

No	Indicators	Score obtained	Maximum score	Percentage of Idealism
1.	A concept	161	170	94.7
2.	Classify objects according to certain properties according to the concept	170	170	100
3.	Give examples and not examples of concepts	170	170	100
4.	Presenting concepts in the form of mathematical representations	130	170	76.5
5.	Presenting concepts in the form of mathematical representations	132	170	77.6
6.	Using, utilizing, and selecting certain procedures	129	170	75.9
7.	Applying concepts or problem-solving algorithms	136	170	80
	Total	1028	1190	
	Average Percentage of Ideality		86.38%	

Data analysis of posttest students' conceptual understanding ability, it was also found that 13 students were in the high category, and 4 students were in the medium category. This illustrates that the mathematics learning videos developed have facilitated conceptual understanding. The following are the results of posttest the female class.

Table 10. Results of Test Ability to Understand Mathematical Concept For Women's Class

No	Indicators	Score obtained	Maximum score	Percentage of Idealism
1.	a concept	167	170	98.2
2.	Classify objects according to certain properties according to the concept	169	170	99.4
3.	Give examples instead of examples of concepts	170	170	100.0
4.	Presenting concepts in the form of mathematical representations	157	170	92.4
5.	Presenting concepts in the form of mathematical representations	140	170	82.4
6.	Using, utilizing, and selecting certain procedures	144	170	84.7
7.	Applying concepts or problem-solving algorithms	130	170	76.5
	Total	1077	1190	
	Average Percentage of Ideality		90.5%	

Data analysis of posttest students' ability to understand concepts, it was also found that 15 students were in the high category, and 2 students were in the medium category. This illustrates that the mathematics learning videos developed have facilitated conceptual understanding. After the data from the posttest results for the male and female classes were obtained, the two data were compared with the aim of finding out whether there were significant differences between the two data, in accordance with the assumptions described in the previous chapter. After the normality test for the male class was obtained, D (0.089) < K (0.318) with the conclusion that Ho is accepted, the male class data is normally distributed. Furthermore, for the female class obtained D (0.112) < K (0.318) with the conclusion that Ho is accepted, the data for the female class is normally distributed. Followed by the homogeneity test F_{count} (1.259) < F_{table} (2.333) with the conclusion that Ho is accepted, the data is homogeneous.

Table 11. Results of T-test

	Male	Female
Mean	86.38655462	90.50420168
Variance	77.07082833	61.20948379
Observations	17	17
Pooled Variance	69.14015606	
Hypothesized Mean Difference	0	
df	32	
t Stat	-1.443754676	
P(T<=t) one-tail	0.079263853	
t Critical= one-tail	888748	
(T<two-tail	0.158527706	
t Critical two-tail	2.036933343	

Based on the **Table 11**, it can be seen that t_{count} (-1.444) < t_{table} (1.694), with the conclusion that Ho is rejected, there is no significant difference between male and female classes. In conducting this study the author has several shortcomings so that this study is still not carried out properly. The limitations are as follows:

1) Due to time constraints, this study was only conducted in one school which only had two sample classes, namely one male class and one female class, with a total sample size of only 34 students, so this study did not have a class. control for comparison. Ideally, this study will be conducted in several schools with an experimental class and a control class.outbreak Covid-19 also made it difficult for researchers to find schools for this research.
2) The material in the learning video is only limited to circle material for class VIII junior high school students.
3) There are suggestions for improvement from small group students that the author has not been able to revise due to limited time and the author's ability to make learning video products that the author developed.

4. CONCLUSION

Based on the results of the study that has been described in the previous chapter, it can be concluded that the video learning media assisted by Sparkol-Videoscribe to facilitate the students' mathematical concept understanding ability that was developed was declared to be very valid in terms of the validity of learning materials and in terms of the validity of educational technology. Furthermore, the learning video assisted by Sparkol-Videoscribe to facilitate the ability to understand the remaining mathematical concepts developed was stated to be very practical in small group and large group trials. Furthermore, the results of the students' mathematical concept understanding ability that was developed, the average percentage of the posttest value of the male class students' mathematical concept understanding was included in the high category. Furthermore, the posttest score for understanding mathematical concepts of female class students also received a high category. This shows that the learning videos developed have been able to facilitate students' understanding of mathematical concepts. Finally, from the conclusion of the t-test there is no significant difference between male and female classes.

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AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

REFERENCES

Arsyad, Azhar. (2013). *Learning Media*, Jakarta: PT Raja Grafindo Persada

Atika, Nur and Zubaidah Amir MZ. (2016). "Development of RME-Based *Worksheets* for Developing Students' Mathematical Critical Thinking Ability", *Suska Journal of Mathematics Education* Vol 2, No 2

Dariyadi, Moch Wahib. (2018). "Using "Sparkol Videoscribe" Software as an ICT-Based Arabic Learning Media", *Proceedings: National Conference on Arabic* No. 4

Darmawan, Rohmat Dipo. (2014). *Design and Production of Advanced Multimedia Learning Videos Using Whiteboard Animation Video Techniques. Publication manuscript.* Yogyakarta: College of Informatics and Computer Management Amikom Yogyakarta

Hartono. (2012). *Statistics For Research*. Pekanbaru: Zanafa Publishing.

Hartono and Amir, Z. (2010). *The Effect of Learning with an Open-Ended Approach on Creative Thinking Skills for Students of the Tarbiyah and Teacher Training Faculty of UIN Sultan Syarif Kasim Riau*. Research Report [Unpublished]. Research and Development Institute of *UIN Sultan Syarif Kasim Riau*

Hendriana, Heris. (2017). *Students' Mathematics Hard Skills and Soft Skills,* Bandung: PT Refika Aditama

Indah, Rizka Aprilia Putri. (2019). Development of Edutainment-Assisted Sparkol Learning Media on Social Arithmetic Materials for Class VII SMP/MTs*" Proceedings: National Seminar on Mathematics and Mathematics Education 2019 Vol 2, No 1*. http://ejournal.radenintan.ac.id/index.php/pspm/ article/view/3954

Indriana, Dina. (2011). *Variety of Teaching Media Aids,* Jogjakarta: DIVA Press.

KBBI Online. (*https://kbbi.kemdikbud.go.id/entri/paham*), accessed on April 12, 2019.

KBBI Online. (*https://kbbi.kemdikbud.go.id/entri/pemahaman*), diakses pada 12 April 2019.

Kountul, Yuni Kartika dan Edy Wibowo. (2021). "Pengembangan Media Pembelajaran Video *Sparkol VideoScribe* Pada Materi Lingkaran dalam Meningkatkan Kemampuan Pemecahan Masalah Matematika" *Jurnal Ilmu Pendidikan Volume 5, No. 2.*

Mahnun, Nunu. (2014). *Media dan Sumber Belajar Berbasis Teknologi Informasi dan Komunikasi*. Yogyakarta: Aswaja Pressindo

Menteri Pendidikan Nasional. (2006). *Peraturan Menteri Pendidikan Nasional Republika Indonesia No 22 Tahun 2006 Tentang Standar Isi untuk Satuan Pendidikan Dasar dan Menengah*. Jakarta: Kemendiknas.

Miqdad, Akhmad Danil, dan Meini Sondang Sumbawati. (2017). "Analisis Pengembangan Model Pembelajaran Berbasis Project Based Learning Dengan Berbantu Media Audio Visual Videoscribe Dalam Pembelajaran Komputer Dan Jaringan Dasar Kelas X Smk Unitomo Surabaya", *Jurnal IT-Edu*. Vol. 2 No. 2

Munir. (2013). *Multimedia Konsep dan Aplikasi dalam Pendidikan*. Bandung: Alfabeta

Mustafa, Zainal. (2013). *Mengurai Variabel hingga Instrumentasi*. Yogyakarta: Graha Ilmu.

Pamungkas, Aan Subhan dkk. (2018). "Video Pembelajaran Berbasis Sparkol Videoscribe: Inovasi Pada Perkuliahan Sejarah Matematika" *Prima: Jurnal Pendidikan Matematika Jilid* 2, No. 2

Pratiwi, Erlia Dwi dkk. (2019). "Pengembangan Media Pembelajaran Fisika Menggunakan Sparkol Videoscribe*", Indonesian Journal of Science and Mathematics Education*, Vol 2, No. 3

Pribadi, Benny A. (2011). *Model Desain Sistem Pembelajaran.* Jakarta: Dian Rakyat

Putra, Nusa. (2015). *Research & Development Penelitian dan Pengembangan : Suatu Pengantar*. Jakarta: Rajawali Pers

Riduwan. (2012). *Skala Pengukuran Variabel-variabel Penelitian*. Alfabeta: Bandung.

Riduwan dan Sunarto. 2011. *Pengantar Statistika untuk Penelitian: Pendidikan, Sosial, Komunikasi, Ekonomi, dan Bisnis.* Bandung: Alphabeta.

Riyanto, R., Arifin, A., S., Ardiyansah, B. (2017). Pengembangan Media Karikatur Berbasis Sparkol Video Scribe Pada Mata Kuliah Genetika Mahasiswa S1 Biologi IKIP Budi Utomo Malang," *Seminar Nasional Pendidikan IPA 2017, Vol* 2 http://pasca.um.ac.id/conferences/index.php/ipa2017/article/view/1108

Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D.* Bandung: Alphabeta.

Trianto. (2011). *Pengantar Penelitian Pendidikan Bagi Pengembangan Profesi Pendidikan dan Tenaga Kependidikan*. Jakarta: Kencana.

Water, Jon. (2014). *Video Scribing How Whiteboard Animation Will Get You Heart.* Bristol, UK.: Sparkol Books.