

Analysis of Students' Skills in Developing Mathematics Learning Videos Using ICT-Based Learning Media

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ABSTRACT

The development of ICT-based learning media can improve the quality of learning. The availability of ICT-based learning media is still limited, while the Merdeka curriculum demands the application of ICT-based learning media in learning. Therefore, prospective teachers must be equipped to develop ICT-based learning media, one of which is learning videos. The type of research is a case study with 29 research subjects (students/prospective teachers) from the mathematics education study program at Malikussaleh University. Data collection is carried out through assessing learning videos made by students. Then, the assessment data is analyzed using a student skills analysis sheet in creating/designing a learning video. The assessment results show that students have reached the "Very Skilled" level in the indicators: the material is presented coherently and systematically, the language used is easy to understand, and the media delivery strategy makes it easier to understand and master the material. Students also reach the "Skilled" level in indicators: delivering material with correct intonation and precise articulation, learning the material presented, and having excellent and appropriate time management in providing the material. However, there are several differences in the results of assessing students' levels by the three assessors on the indicators: media used for the material taught, effective and efficient use of learning media, creativity in learning media and learning media used.

INTRODUCTION

Current technological developments influence the world of education, primarily as learning media is used in the learning process. Learning media is a means that allows the realization of a direct relationship between the work of a subject developer and students (Melinda, 2017). Learning media is also a tool or resource to help a teacher convey messages to students. Ideally, teachers are expected to manage the learning process in a way that can motivate students, be creative, and constantly innovate in providing learning materials and media for students (Suseno et al., 2020). That is necessary, especially in mathematics, where most students quickly feel bored following the learning process. This condition indicates that technology, media, innovation, and creativity have a close relationship in providing a good mathematics learning process and can maximize students' potential (Asrial et al., 2020).

A teacher should develop skills to create a good learning process. One of the eight basic teaching skills is the skill of providing variation. Teaching variation skills is essential to maintain a learning climate that attracts attention so that students are active and participate in every learning step (Setiyaningsih, 2020). According to Sanjaya (2011), a teacher makes variations by changing learning activities to reduce students' boredom and saturation in the learning process. According to Slameto (2015), interest is a feeling of liking and interest in an activity of one's own volition. That is supported by research results from Hasan (2015), which states that a teacher needs the ability to provide variations in the mathematics learning process so that it can attract students' interest and students are

actively involved in the mathematics learning process so that it can have an impact on student learning outcomes. Efforts to develop a better learning process can be made by developing appropriate learning media (Widya et al., 2019).

Learning media can be used to channel messages that can stimulate students so that specific teaching interactions occur (Fuadi, 2021). Learning media in schools helps implement the teaching and learning process. The use of learning media in the learning process also needs to be planned and designed systematically so that learning media is effective. Teachers can choose media appropriate to technological advances through media selection in lesson planning. The use of technology is regulated in Minister of Education and Culture Regulation No. 22 of 2016; one of the principles in preparing learning plans is to apply information and communication technology in an integrated and effective manner according to the situation and conditions (Sudana, 2018). Learning media that has integrated technology is called ICT-based learning media. Information and Communication Technology (ICT)-based learning media is a multimedia computer-based learning aid. ICT-based learning media integrates information and communication technology into the teaching and learning process (Rosary et al., 2018). So, the use of ICT-based learning media is very suitable to be integrated into current learning.

Video media is one of the ICT-based learning media that can reach and is most popular among the wider community. Video is also an electronic medium that combines audio and visual technology to produce dynamic and exciting shows. With these two elements, it is hoped that students will receive, understand, and remember the learning message (Yuanta, 2020). Audiovisual media has the function of (1) clarifying the presentation of the message so that it is not too verbalistic, (2) overcoming limitations of space, time, and sensory power, (3) using educational media appropriately and variedly overcoming the passive nature of students (Sadiman, 2014). Video media can support learning in the classroom, especially in the lower grades, namely in elementary schools. Using appropriate learning media in the classroom learning and teaching process can bring teachers and students success. Apart from that, the role of the teacher is vital in the learning process. Teachers are also required to be able to create creative and innovative media and utilize the learning media available at school.

Current technological developments have influenced teachers to continue to innovate in learning. The Merdeka Curriculum demands ICT-based learning in the learning process (Jufriadi et al., 2022). However, the availability of ICT-based learning media in the form of learning videos in schools is still limited (Vannisa et al., 2017). However, the availability of ICT-based learning media in the form of learning videos in schools is still limited (Vannisa et al., 2017). Therefore, the Department of Mathematics Education at Malikussaleh University equips students to design learning processes by utilizing ICT-based learning media. Students from the Department of Education at Malikussaleh University are prospective teachers who are trained from an early age to be skilled and accustomed to using ICT-based learning media so that they can then be developed. The initial picture of students' ability to create ICT-based learning media is still low; most students do not recognize the types of ICT media and do not understand how to develop ICT media. In the learning media course, students are taught to make ICT-based learning media, one of which is learning videos. Learning videos are the choice of most students because they consider the tendency of students at school to like to learn through videos (Yuanta, 2020). So, in this research, students' skills in developing learning videos will be analyzed. The subjects of this research were students at the Malikussaleh University Mathematics Education Study Program, so the learning videos reviewed were mathematics learning videos. The components of student skills that will be analyzed are the presentation of material, the language used, media delivery strategies, and creativity in the media presentation. This research aims to determine the extent of students' skills in developing mathematics learning videos using ICT-based learning media.

METODE

This research is a qualitative case study with research subjects consisting of 29 students from Class A1 of the Mathematics Education study program at Malikussaleh University. The selection of research subjects used a Purposive Sampling Technique where the research subjects were chosen based on consideration of the tendency of mathematics subjects, which are still often considered difficult by students at school so that it requires an innovative learning media developed by prospective teachers and able to overcome the problem of mathematics learning difficulties for school students (Lestari, 2022). In this research, descriptive data was collected from data collection through observation, interviews, and documentation.

Malikussaleh University mathematics education Prospective Teachers have made mathematics learning videos when taking ICT-based Mathematics Learning Media lectures. The learning videos

that have been made are assessed by the lecturer, and then the students will develop and perfect the learning videos to be suitable for publication. This research conducted an analysis and assessment of the quality of mathematics learning videos that students had developed using ICT-based learning media tools.

In analyzing and assessing the quality of students' mathematics learning videos, we saw the extent of students' skills in developing these videos. The assessment was carried out by one media expert, one material expert, and users consisting of 1 high school student. These high school students were students recommended by teachers at one of the high schools in the city of Lhokseumawe and were believed to be able to provide good assessments. The mathematics learning videos were assessed using a skills questionnaire for developing learning videos, which contains indicators of a person's skills in making learning videos. The questionnaire used is a validated questionnaire. After the assessment, researchers conducted questionnaire data analysis and interviews with all students who had developed mathematics learning videos using ICT-based learning media. Interview data will be used to strengthen the results of data analysis for each indicator of student skills. The indicators contained in the questionnaire were:

- [1]. The material is presented sequentially and systematically,
- [2]. The language used is easy to understand,
- [3]. Delivery of material with correct intonation and clear articulation
- [4]. Master the material presented,
- [5]. Time management for delivering material is excellent and appropriate,
- [6]. The media used is appropriate to the material being taught,
- [7]. Media delivery strategies facilitate understanding and mastery of material, concepts, or skills,
- [8]. Effective and efficient use of learning media
- [9]. Creativity in utilizing learning media,
- [10]. The learning media used are varied (Fauzan & Rahdiyanta, 2017)

From the ten indicators above, researchers classified these indicators into two types of expertise: indicators 1 - 5, which indicate students' skills in conveying mathematics material in videos. Meanwhile, indicators 6 - 10 indicate the type of student expertise in utilizing ICT-based learning media as a medium for delivering learning.

The questionnaire assessment of skills in developing learning videos was carried out using a Likert Scale of 1 – 4 (Pranatawijaya et al., 2019). The questionnaire assessment guidelines and criteria for skills in developing learning videos are shown in Tables 1 and 2 below.

Table 1. Guidelines for Assessment of Skills Questionnaires for Developing Learning Videos

Score	Interpretation
4	Strongly Agree (SA)
3	Setuju (S)
2	Disagree (D)
1	Strongly Disagree (SD)

Table 2. Level Criteria for Developing Learning Videos

Skill Value (%)	Level
85-100	Very Skilled
70-85	Skilled
50-70	Less Skilled
0-50	Unskilled

The formula for determining (%) Skill criteria is:

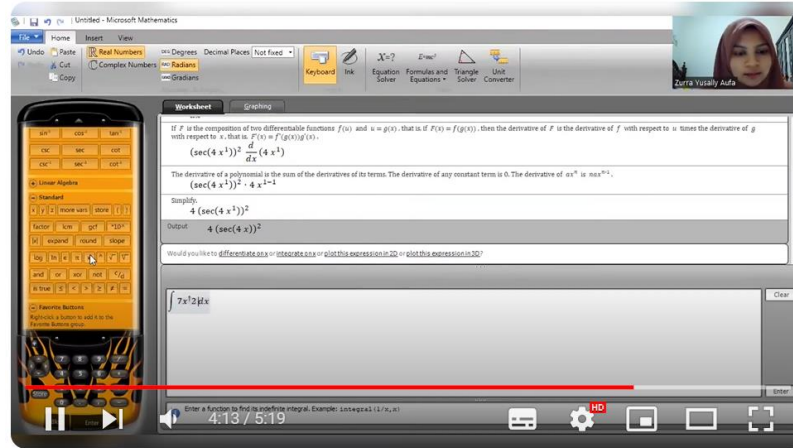
$$skill = \frac{SRe}{SRh} \times 100\%$$

SRe = average value of skills questionnaire results
 SRh = total maximum average of skills questionnaire
 (Sugiyono, 2019).

RESULTS AND DISCUSSION

Result

All students from class A1 developed mathematics learning videos using ICT-based learning media. The following is an image capture from a mathematics learning video that students have developed.



Zurra Yusally Aufa - Mencari Nilai Turunan dan Integral Menggunakan Microsoft Mathematics

Figure 1. Video display of student mathematics learning

The 29 mathematics learning videos students had developed were assessed by one media expert, one material expert, and one user who was a high school student using the Skills for Developing Learning Videos questionnaire. This assessment aims to determine students' levels in developing mathematics learning videos using ICT-based learning media. The following are the results of the assessment carried out by media experts.

Table 3. Recapitulation of Student Skills Assessment by Media Experts

Indicator	Score	Mean	Skills Value	Skills Level
[1]	110	3,79	95%	Very Skilled
[2]	103	3,55	89%	Very Skilled
[3]	95	3,28	82%	Skilled
[4]	95	3,28	82%	Skilled
[5]	93	3,21	80%	Skilled
[6]	100	3,45	86%	Very Skilled
[7]	108	3,72	93%	Very Skilled
[8]	108	3,72	93%	Very Skilled
[9]	102	3,52	88%	Very Skilled
[10]	99	3,41	85%	Very Skilled

Based on the table of results of student skill score assessments in developing mathematics learning videos using ICT-based learning media by media experts, it can be seen that students have reached the "Very Skilled" level in skill indicators number 1, 2, 6, 7, 8, 9, and 10. Meanwhile, in skill indicators numbers 3, 4, and 5, students only reach the "Skilled" level.

Furthermore, material experts also assessed students' skills in developing mathematics learning videos using ICT-based learning media. The results of the assessment carried out by material experts are shown in Table 4.

If we look at the results of the skills score assessment above, it can be seen that the skill scores obtained by students from material experts, namely students, have reached the "Very Skilled" level in the skill indicators number 1, 2, 6, 7, 8, and 9. Meanwhile, in the indicators, skill numbers 3, 4, 5, and 10, students only reach the "Skilled" level.

Table 4. Recapitulation of Student Skills Assessment by Material Experts

Indicator	Score	Mean	Skills Value	Skills Level
[1]	111	3,83	96%	Very Skilled
[2]	104	3,59	90%	Very Skilled
[3]	95	3,28	82%	Skilled
[4]	94	3,24	81%	Skilled
[5]	93	3,21	80%	Skilled
[6]	99	3,41	85%	Very Skilled
[7]	108	3,72	93%	Very Skilled
[8]	108	3,72	93%	Very Skilled
[9]	101	3,48	87%	Very Skilled
[10]	98	3,38	84%	Skilled

Assessment of students' skills in developing mathematics learning videos using ICT-based learning media is also carried out by the mathematics learning video user component, namely a high school student. The high school students also assessed all mathematics learning videos that the students had made. The results of the assessments carried out by high school students are:

Table 5. Recapitulation of Student Skills Assessment by Users

Indicator	Score	Mean	Skills Value	Skills Level
[1]	108	3,72	93%	Very Skilled
[2]	100	3,45	86%	Very Skilled
[3]	93	3,21	80%	Skilled
[4]	98	3,38	84%	Skilled
[5]	98	3,38	84%	Skilled
[6]	92	3,17	79%	Skilled
[7]	100	3,45	86%	Very Skilled
[8]	97	3,34	84%	Skilled
[9]	92	3,17	79%	Skilled
[10]	101	3,48	87%	Very Skilled

Apart from the assessments carried out by media experts, material experts, and users, researchers interviewed 29 research subjects, namely students in class A1 of the Mathematics Education Study Program. The interviews focused on discovering the difficulties students experienced in making mathematics learning videos. The results of the interview depicted in Figure 2.

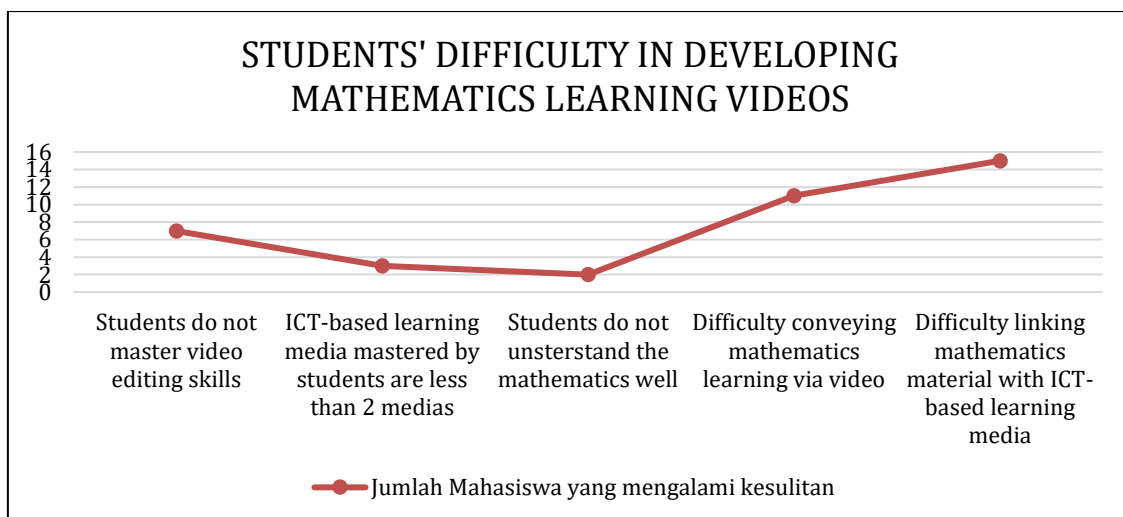


Figure 2. Student Difficulties in Making Mathematics Learning Videos

Discussion

The research results obtained through assessing students' levels in making mathematics learning videos using ICT-based learning media carried out by each media expert, material expert, and user are depicted in Figure 3.

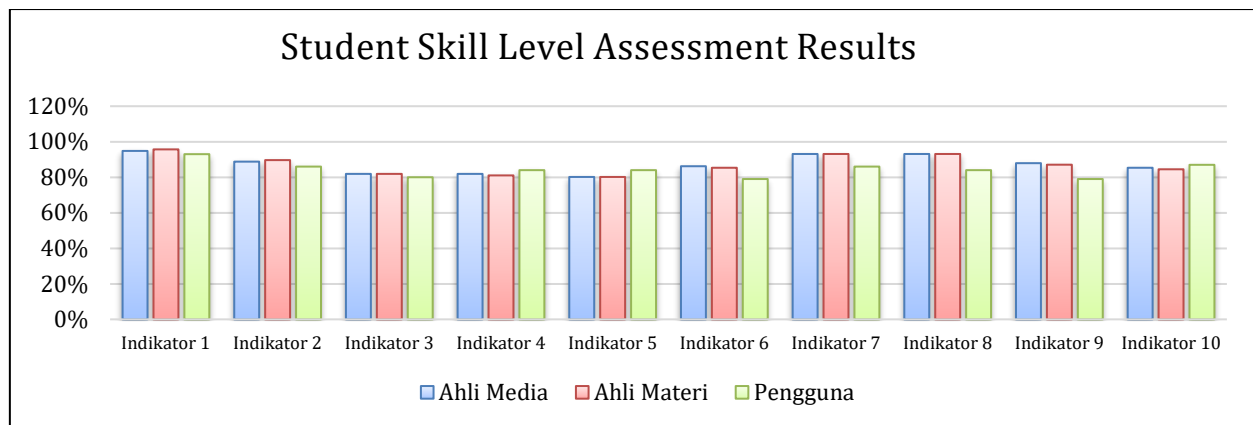


Figure 3. Assessment of Student Skills in Making ICT-Based Mathematics Learning Videos

Based on the results of the assessment of student skills, as depicted in Figure 3 above, all assessors agree that students have reached the "Very Skilled" level in indicators (1). The material is presented sequentially and systematically, (2) The language used is easy to understand, and Media delivery strategies facilitate understanding and mastery of material, concepts, or skills. That indicates that students are proficient in compiling coherent and systematic teaching materials, using excellent and easy-to-understand language, and planning appropriate strategies in conveying material using media—ICT-based learning.

The three assessors also agreed that on the indicators (3) Delivery of material with correct intonation and precise articulation, (4) Mastering the material presented, and (5) Good and appropriate time management for delivering the material, students reached the "Skilled" level. That indicates that students are good at managing intonation in delivering material, mastering teaching material, and managing time, primarily through learning videos. Even though it is considered quite good, these three indicators need to be used as evaluation material for students to make improvements so that they can have even better skills.

The assessment results are diverse and significant in the indicators (6) The media used is appropriate to the material being taught, (8) Effective and efficient in the use of learning media, [9] Creativity in using learning media, and (10) The learning media used is diverse. For some of the same indicators, some assessors consider students to be at the "Very Skilled" level, and others consider students to be at the "Skilled" level. Even though there are some differences in the assessment of these four indicators, students can be said to be minimally skilled in terms of choosing the suitable media according to the material, effectiveness in using media, being creative in using existing media, and being able to master various ICT-based learning media. However, it does not rule out the possibility that these differences in assessments can become evaluation material for students so that they can make improvements and become even better.

The results of assessing students' skills in developing mathematics learning videos using ICT-based learning media are linked to researchers' interviews with 29 students as research subjects. In that case, there is a match in what students need to develop next, namely 1) need to practice more in relating the material mathematics by accurately selecting the ICT-based learning media used and 2) need to become more accustomed to making mathematics lessons to produce the best video quality.

CONCLUSION

The assessment results show that students have reached the "Very Skilled" level in the indicators: The material is presented sequentially and systematically, the language used is easy to understand, and the delivery media strategy makes it easy to understand and master the material, concepts, or skills. Students also reach the "Skilled" level in delivering material with correct intonation and precise articulation, mastery of the material presented, and reasonable and appropriate time management in delivering the material. However, there are several differences in the results of assessing students' levels by the three assessors on the indicators of media used according to the material being taught, effectiveness and efficiency in using learning media, creativity in using learning media, and varied learning media used.

REFERENCES

- Asrial, A., Syahrial, S., Maison, M., Kurniawan, D. A., & Piyana, S. O. (2020). Ethnoconstructivism E-Module To Improve Perception, Interest, and Motivation of Students in Class V Elementary School. *JPI (Jurnal Pendidikan Indonesia)*, 9(1), 30. <https://doi.org/10.23887/jpi-undiksha.v9i1.19222>
- Fauzan, M. A., & Rahdiyanta, D. (2017). Pengembangan Media Pembelajaran Berbasis Video pada Teori Pemesinan Frais. *Jurnal Dinamika Vokasional Teknik Mesin*, 2(2), 82. <https://doi.org/10.21831/dinamika.v2i2.15994>
- Fuadi, A. (2021). *Media Pembelajaran: Konsep Dan Aplikasi*. Surakarta: Tahta Media Group.
- Hasan, H. (2015). Kendala Yang Dihadapi Guru Dalam Proses Belajar Mengajar Matematika Di Sd Negeri Gani Kabupaten Aceh Besar. *Jurnal Pesona Dasar*, 1(4), 40–51.
- Jufriadi, A., Huda, C., Aji, S. D., Pratiwi, H. Y., & Ayu, H. D. (2022). Analisis Keterampilan Abad 21 Melalui Implementasi Kurikulum Merdeka Belajar Kampus Merdeka. *Jurnal Pendidikan Dan Kebudayaan*, 7(1), 39–53. <https://doi.org/10.24832/jpnk.v7i1.2482>
- Lestari, F. L. (2022). ANALISIS PROBLEMATIKA DAN PENCAPAIAN SISWA DALAM PELAKSANAAN AKM PADA PTM TERBATAS. *JPG: Jurnal Pendidikan Guru*, 3(1), 1. <https://doi.org/10.32832/jpg.v3i1.6193>
- Pranatawijaya, V. H., Widiatry, W., Priskila, R., & Putra, P. B. A. A. (2019). Penerapan Skala Likert dan Skala Dikotomi Pada Kuesioner Online. *Jurnal Sains Dan Informatika*, 5(2), 128–137. <https://doi.org/10.34128/jsi.v5i2.185>
- Rosary, P., Stevanus, I., & Jaya, A. (2018). Pengaruh Penggunaan Media Berbasis Information And Communications Technology (ICT) Terhadap Hasil Belajar Peserta Didik The Influence Of Information And Communication Technlogy/ ICT-Based Learning Media Towards The Students Learning Outcomes. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, 2, 195–201.
- Sadiman, A. S. (2014). *Media Pendidikan*. Jakarta: PT Raja Grafindo Persada.
- Setiyaningsih, S. (2020). Analisis Keterampilan Guru Mengadakan Variasi Untuk Menumbuhkan Minat Belajar Matematika. *Joyful Learning Journal*, 9(3), 144–149. <https://doi.org/10.15294/jlj.v9i3.39940>
- Slameto. (2015). *Belajar dan faktor – faktor yang mempengaruhi Hasil Belajar*. Jakarta: Rineka Cipta.
- Sudana, D. N. (2018). Pelatihan dan Pengembangan Perangkat Pembelajaran Berdasarkan Permendikbud Nomor 22 Tahun 2016 pada Guru-Guru di Gugus V Kediri, Kecamatan Kediri Kabupaten. *International Journal of Community Service Learning*, 2(1), 22. <https://doi.org/10.23887/ijcsl.v2i1.13680>
- Sugiyono. (2019). *Metode penelitian pendidikan pendekatan kuantitatif dan kualitatif dan R&D*. Bandung: Alfabeta.
- Suseno, P. U., Ismail, Y., & Ismail, S. (2020). Pengembangan Media Pembelajaran Matematika Video Interaktif berbasis Multimedia. *Jambura Journal of Mathematics Education*, 1(2), 59–74. <https://doi.org/10.34312/jmathedu.v1i2.7272>
- Vannisa Aviana Melinda. (2017). *Pengembangan media video pembelajaran berbasis virtual field trip (VFT) pada mata pelajaran IPS kelas V SDNU Kraton Kecamatan Kencong Kabupaten Jember*. Universitas Negeri Malang.
- Widya, W., Indrawati, E. S., & Mulyani, D. E. (2019). Preliminary analysis of learning materials development based on creative solving model integrated by anticorruption characters. *Proceeding ASEAN Youth Conference*.
- Sanjaya, Wina. (2011). *Model Pembelajaran Berorientasi Standar Proses Pendidikan*. Jakarta: Kencana.
- Yuanta, F. (2020). Pengembangan Media Video Pembelajaran Ilmu Pengetahuan Sosial pada Siswa Sekolah Dasar. *Trapsila: Jurnal Pendidikan Dasar*, 1(02), 91. <https://doi.org/10.30742/tpd.v1i02.816>