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Tik-tok application: Development of mathematics learning media for lines and series materials to increase learning interest of high school students

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Abstract: *Learning media is an educational innovation that continues to grow. This is related to learning mathematics using the tik-tok application. This application is an innovation made for the purpose of expression, but in the context of tik-tok learning, it can be used as a digital space to take advantage of technological developments and make it freely accessible to students of SMA YALC Pasuruan. Therefore, the purpose of this research is to create learning media with the help of tiktok applications to increase student interest in class XI. This development study uses the ADDIE methodology (Analysis, Design, Develop, Implementation, Evaluation) but this research is limited only to the develop stage. The results showed that the learning media of animated video with an overall average score of 3.44 after validation by a Material Expert and an average score of 3.78 after validation by a Media Expert. So that the learning media in this tiktok application is feasible to use*.

Keywords: *Sequence and series; Learning Media; Interest to learn; tik-tok*.

Aplikasi Tik-Tok: Pengembangan Media Pembelajaran Matematika Materi Barisan dan Deret Untuk Meningkatkan Minat Belajar Siswa SMA

Abstrak: Media pembelajaran merupakan inovasi pendidikan yang terus berkembang. Hal ini terkait dengan pembelajaran matematika menggunakan aplikasi *tik-tok*. Aplikasi ini merupakan inovasi yang dibuat untuk tujuan berekspresi, tetapi dalam konteks pembelajaran *tik-tok*, dapat digunakan sebagai ruang digital untuk memanfaatkan perkembangan teknologi dan membuatnya dapat diakses secara bebas oleh siswa SMA YALC Pasuruan. Oleh karena itu, tujuan dari penelitian ini adalah untuk membuat media pembelajaran berbantu aplikasi tiktok untuk meningkatkan minat belajar siswa kelas XI. Studi pengembangan ini menggunakan metodologi ADDIE (Analisis, design, Develop, Implementasi, Evaluasi) namun penelitian ini terbatas hanya sampai tahap develop. Hasil penelitian menunjukkan bahwa Media Pembelajaran video animasi dengan skor rata-rata keseluruhan 3,44 setelah validasi oleh Ahli Materi dan skor rata-rata 3,78 setelah validasi oleh Ahli Media. Sehingga media pembelajaran pada aplikasi tiktok ini layak untuk digunakan.

Kata Kunci: Barisan dan Deret; Media pembelajaran; Minat Belajar; *tik-tok*

INTRODUCTION

The societal shift in the 5.0 era is a progression of the Industrial Revolution. 4.0 which focuses on technological developments that are increasingly rapidly every day, technology becomes important in various aspects of life (Kim et al., 2019; Kováts & Takács, 2022). Technology is a design that creates a product and increases efficiency in all human activities. Technology is gradually changing people's lifestyles and mindsets, especially among teenagers

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(Darmayanti et al., 2022; Humaidi et al., 2022), especially in its use as a learning resource that can increase students' interest in learning (Effendi et al., 2022; Lei et al., 2021; Sugianto et al., 2022)

Interest plays an important role in learning mathematics (Tafonao, 2018; Wicaksana, 2020). Students who are interested in learning are able to use higher cognitive processes to study, learn, and master the material presented to them (Leyva et al., 2022). They try to understand the material, improve their performance, seek challenges, and continue to perform tasks even when they fail (Woolfork, 1990). One of the factors that influence students' interest in learning mathematics is the use of learning media (Osman & Hamzah, 2020; Sah et al., 2023; Sulasteri et al., 2021; Yeh et al., 2019). The use of interesting learning media increases students' interest in learning (Ardıç & İşleyen, 2018; Fauza et al., 2022; Sekaryanti et al., 2022) and encourages students to successfully understand the material provided (Belser et al., 2018). Most students still have difficulty in understanding each material presented. This is inefficient because the only means used are textbooks and students have to pay a lot of money to get them. One of the media that can help increase student interest in learning is by using social media (Darmayanti et al., 2022; Sugianto et al., 2022)

Social media is a technology product that is often used to exchange information online. Social media is a type of *online* where users can easily participate, share and create content. Including blogs, social networks, wikis, forums, and cyberspace (Ishihara & Oktavianti, 2021). Social media has a positive impact and benefit in the advancement of science and technology, such as making it easier to communicate, finding and accessing information, developing relationships, adding friends, and so on (Darmayanti et al., 2022; Rahmah et al., 2022; Sugianto et al., 2022). There are many *platforms* that can be used as learning media, including Instagram, *YouTube*, and the most popular among Indonesians in the last two years, *tik-tok* (Bahri et al., 2022).

Bytemod, a technology company from Singapore, presents the *tik-tok*application, a video editing application that encourages the creativity of its users to become content creators. *Tik-tok* is a social media content application that is used for entertainment, self-expression, building creativity, and gaining popularity for users (Fitriana et al., 2021). Furthermore, *tik-tok* allows users to create videos with durations ranging from 15 to 60 seconds, as well as various features such as music, filter stickers, and various other creative features in cyberspace (Miftachul, 2020). *Tik-tok* has an attraction in its development so that it can become a learning space by making learning videos, due to the high number of visitors to this application in the digital world. According to (Nasution et al., 2021), the *tik-tok* widely used by the millennial generation in Indonesia and has become a popular culture so that mathematics learning media can be utilized.

Based on the results of unstructured surveys and interviews with teachers and students at YALC Pasuruan High School, it was found that: 1) most of the students were less interested in learning mathematics because it was not interesting and boring, 2) the number of students at rest was playing *tik-tok,* 3) previous learning where the teacher only used *videos* channels

youtube to provide additional material, namely the material for geometric sequences and series that students had to watch, 4) many students still believed that finding and learning mathematics online was difficult and boring, 5) lack of forums for students to channel their creativity and express themselves in learning, 6) students are more engrossed in their own activities, 7) are less interested in the learning media used. Therefore, it is important for teachers to make changes to the objectives, structure, and content of educational programs and learning media so that learning becomes more interesting, precise, and effective through the use of technology in learning. So that the *Tiktok* can be a good place for teachers to innovate through the development of learning media.

Research related to the development of mathematics learning media on the material of sequences and series as an effort to increase student interest in learning has been carried out by (Angriani et al., 2020; Sani et al., 2017; Saniriati et al., 2021; Setiyani, 2021; Setyadi & Qohar, 2017). In research (Angriani et al., 2020)by developing an Android-based MathSc learning media using App Inventor 2, then (Sani et al., 2017) developing learning media in the form of an interactive learning CD with a contextual approach. Furthermore, research (Saniriati et al., 2021) developed Adobe animate learning media assisted by schoology. (Setiyani, 2021) developed learning media using Adobe Flash CS6. Further research was conducted (Setyadi & Qohar, 2017) by developing *web-based learning media.*

Research related to the *tik-tok* as a learning medium was carried out by (Fatimah et al., 2020; Nugroho, 2018) using the tik-tok application in learning Indonesian language and literature. (Aji, 2020) using the tik-tok application as a learning medium for Maharah Kalam. (Pea et al., 2021) in physics subjects, (Setiyadi, 2020) using the tik-tok application as a medium for learning literary skills. (Bahri et al., 2022) using the tik-tok application in learning English. However, there has been no research where the tik-tok application is used in learning mathematics. Therefore, researchers will develop a tiktok-based learning media for valid mathematics learning in mathematics learning on sequences and series material as an effort to increase student interest in learning.

METHOD

The type of research conducted is research and development (RnD). The process of developing this research uses learning design using the ADDIE model which was developed by Robert Maribe Brach in 2009. The ADDIE model is an extension of analysis, design, development and implementation. and assessment (evaluation/feedback). Below is a description of the ADDIE development model.

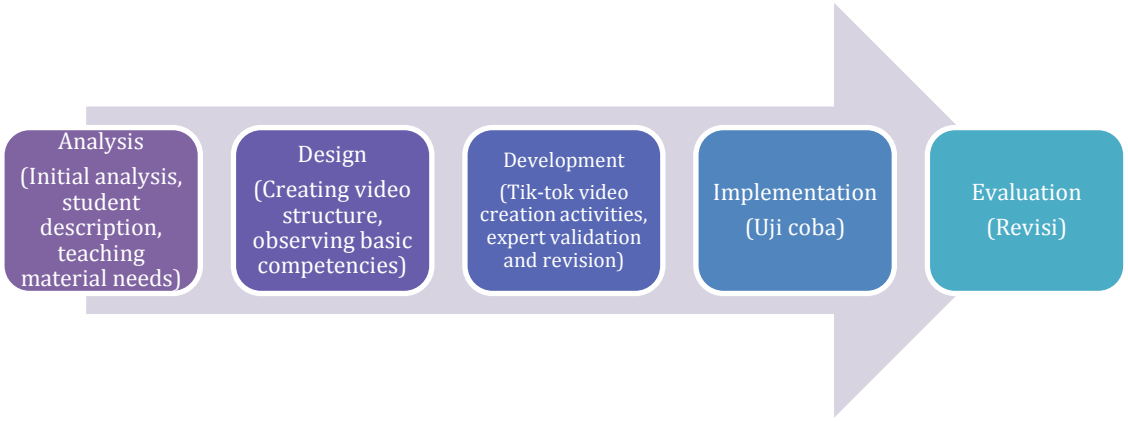


Figure 1. ADDIE model development

Then the processes that will be carried out are: (1) *analysis* (the formation process which includes initial and final observations, student observations, task observations and formulation of learning objectives), (2) *design* videos *tiktok* that are *sync* with the line material and series in the 2013 curriculum, (3) *develop* (manufacturing process which includes expert validation and product revision), (4) Implementation (product testing process). The last process is the evaluation*)* of the product after use.

repairlearning media for mathematics in sequences and series using the *tiktok* on interest in learning for class XI students at SMA YALC Pasuruan through data using qualitative descriptive techniques after using the tiktok application for mathematics learning tools in the form of student responses through questionnaire sheets and learning outcomes tests through test sheets. Student response sheets and test sheets were given to 15 students of class XI of the Assyfa Learning Center Foundation which were then quantified to get the results in the form of numbers that would be measured in making tiktok videos as teaching materials. The Likert scale is used as an evaluation tool to check the effectiveness of the media used. Validation was carried out to determine the feasibility of the learning media developed before testing with learning activities

Table 1. likert scale

Pilihan Jawaban	Skor
Strongly disagree	1
Disagree	2
Disagree	3
Agree	4
disagree	5

Source: Kustandi & Sutjipto (2013)

Material Validation

Validation was carried out by two validators (two math teacher).

Table 2. Material validation sheet lattice

Number	Point of view	Instructions	Item
1	Material integration	suitability, questions,	1, 2
	Material	sample questions	
		Shape and size	3, 4
2	Contents	Illustration	5, 6, 7
		storyline	8, 9, 10, 11
3	Language	compilation languages	12, 13, 14, 15

Source: Kustandi & Sutjipto (2013)

Media Validation

Validation is carried out by two validators (one mathematics teacher and one computer teacher)

Table 3. Grid of teaching material validation sheets

Number	Point of View	Instructions	Item
1	Contents of the video	Clarity the purpose and suitability of learning indicators	1, 2, 3
		The suitability of the material, the suitability of the illustration with the material, the systematic presentation of the material	4, 5, 6, 7,8
		The language used	9, 10, 11
2	Display	Video display	12, 13, 14
		Appropriateness of fonts and font size	15, 16
		Accuracy of video accompaniment music, text legibility, image quality, sound quality	17, 18, 19, 20
		Selection of video animation, color, attractiveness	21, 22, 23, 24, 25

The formula calculates the average validation score using the formula (average instrument score) by summing the score of each unit is then divided by the number of validators. The results of these calculations are then converted to validity by taking into account the following options: 1) if the score is more than 4.6 and less than equal to 5 (very valid), 2) if the score is more than 3.6 and less than equal to 4.5 (valid), 3) if the score is more than 2.6 and less than equal to 3.5 (fairly valid), 4) if the score is more than 1.6 and less than equal to 2.5 (invalid), and finally if the score is more than 0.0 and less than equal to 1.5 (can not be used). If the results show a minimum value with a "valid" category, then the product can be used in the learning process

Student Response

Table 4. Student Response Questionnaire Grid

Number	Point	Item
1	Interest in tiktok media	1, 2, 3, 4, 5, 6
2	material retention	7, 8, 9, 10
3	Appearances	11, 12, 13

Source: Adaptation from Sari (2016)

The formula calculates the average validation score using the formula (mean instrument score with a percentage system) with the total score of response responses in each unit divided by the total total response of each unit. The results of these calculations are then converted for practicality by taking into account the following options: 1) if the percentage score is more than 80 percent and less than equal to 100 percent (very practical), 2) if the percentage score is more than 60 percent and less than equal to 80 percent (practical), 3) if the percentage score is more than 40 percent and less than equal to 60 percent (pretty practical), 4) if the percentage score is more than 20 percent and less than equal to 40 percent (not practical), and the last if the percentage score is more than 0 percent and less than equal to 20 percent (very impractical). If the results show a minimal value in the "practical" category, then the product can be said to be practical.

Student Interests

As for the effectiveness index, we surveyed students before and after using the Tiktok media *to* detect changes in students' interest in learning the developed Tiktok media. Aspects and indicators of student interest in learning are shown in Table 5.

Table 5. Grid of indicators of student interest in learning

Number	Aspect	Indicator	**Item**
1	Attention in learning	Does not speak for itself when learning takes place. Not sleepy when learning takes place. Do not disturb friends when learning takes place. Do not play alone when learning takes place. Focus on tiktok media to completion	1, 2, 3, 4, 5, 6, 7
2	Participation in learning	Answering questions given by the teacher Asking the teacher about material that is not understood	8, 9, 10, 11, 12, 13
3	Feelings happy with learning	Feel happy using tiktok learning media. Feeling enthusiastic in learning when using the Etiktok learning media. Not bored with the learning process using tiktok	14, 15, 16, 17, 18, 19, 20

Source: Adaptation from (Firdaus & Nisa, 2019)

Due to the limited time of the researcher, this research is only limited to the development stage.

RESULTS AND DISCUSSION

Learning media in the *tiktok* developed using the ADDIE model. The model consists of five stages, namely the definition stage, the design stage, the development stage, the implementation and evaluation stages. The explanation is described as follows:

Analysis

Phase The analysis phase is carried out starting from analyzing the overall problems that arise in learning, consulting with mathematics teachers at the Assyfa *Learning Center*, in learning mathematics activities using the *Lesson Study*. Problems found during learning activities in the form of lack of interest in learning in students and lack of interpretation and perception of high school students. High school subjects at the Assyfa Learning Center Foundation are students who attend different schools. There are those who go to public, private, and boarding schools. Students are bored with schools that still use *videos* from other people's YouTube to be studied at school and at home by students, because the videos used are not interesting and do not match the problems that exist at school. Videos whose delivery methods are not understood by students because they are too fast and difficult to understand. The examples of illustrations used are also not related to students' real lives such as approaches in a cultural context so that they can attract students' attention and make student learning outcomes low. This is evidenced by the many complaints from students that if mathematics is difficult, the teacher only gives a *link* learning for students to watch without explanation or feedback from the teacher to review the material, teachers do not understand how to use technology-based media because almost all of their mathematics teachers lack knowledge about technology, teachers are forced to spend time and energy because they have to teach so they don't have time to make learning media. or learning videos.

Description of students, observing how to learn mathematics in class XI SMA Foundation Assyfa *Learning Center Pasuruan.* Students stated that they could learn and understand well when they were able to make connections between the questions and the previous material and were able to apply what they had learned in solving mathematical problems. It was found that the students had problems that were lack of interest or pleasure in learning mathematics.

Studying LKS, almost all LKS used in their schools are the same. The teacher does not provide other media besides worksheets, so that through the development of media according to the journals that have been studied in the chapter on geometrical sequences and series, it is very appropriate to use it in making videos on the tiktok application. The results of interviews and discussions with other mathematics teachers who teach at the Assyfa *Learning Center* on the subject of geometric sequences and series should be improved. Furthermore, the integration process of learning activities, according to the 2013 curriculum, uses basic competencies 3.8 and 4.8.

Stage *Design*

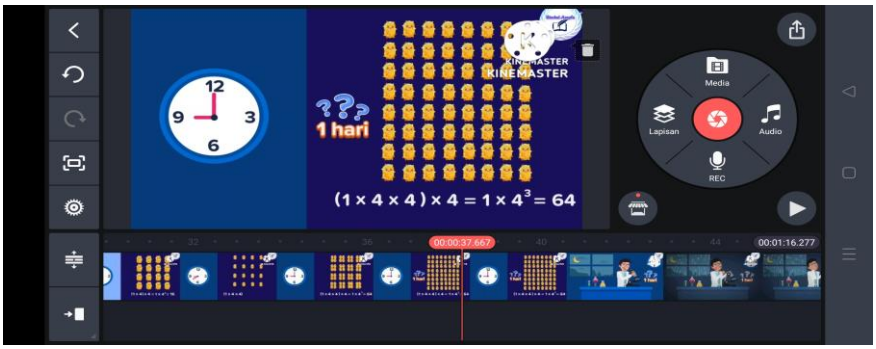
The process of making (models) begins with creating a video structure that will be uploaded to the tiktok application, observing the initial skills or (KD) subjects of arithmetic

sequences and series in the 2013 curriculum. Observation requires more than one time and the formation of initial skills or (KD)) and the instructions used in the comics also get the results that are packaged in table 6.

Table 6. Initial capabilities and index of results.

Initial Ability	Competency Achievement Indicators
3.8 Analyzing sequences based on iterative and recursive patterns, especially including arithmetic and geometric sequences 4.8 Using arithmetic or geometric sequence patterns to presenting and solving contextual problems (including growth, decay, compound interest and annuities)	• Solving problems related to arithmetic and geometric sequences and series • Presenting problem solving related to arithmetic and geometric sequences and series

After determining the initial skills (KD) and yield index, making a video before uploading on the *tiktok*. Make an initial sketch of a video in the *kinemaster*. In this application, stickers, text, layers, music, display effects and other features are available to support video creation. The following applications are used to design tutoring teachers and make videos.



picture 1. Kinemaster application for making videos

Development Stage

In this research, the finished video design is then uploaded to the Tiktok application *by* going through editing and then entering the development stage which consists of expert validation and revision activities. The following is the display of video media on the Tiktok application which contains line and series material to increase student interest in learning.

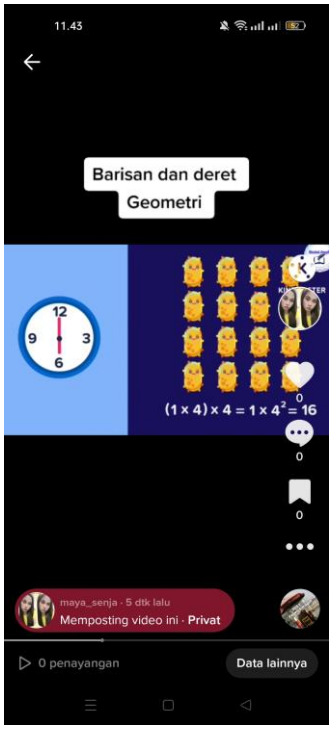


Figure 3. Learning videos on the tiktok application

Expert validation consists of material expert validation and media expert validation. The results of material validation obtained from the two validators are presented in Table 8. While the results of media validation carried out by two validators (two media experts who are experts in their fields). The validator conducts an investigation by filling out the material verification sheet using a four-choice Likert scale (4 = very good, 3 = good, 2 = normal, 1 = a little) is presented in Table 9.

Table 8. *Results of Data Analysis of Material*

point of view	Validation Average	of Information
Cohesiveness material	3.41	Very Good
Contents	3.27	Good
Language	3.65	Very Good

Overall, the average overall validation of the material in the table above is 3.44 which is a very useful (valid) category. In short, the video media on the tiktok application contains quality material and deserves to be tested.

Table 9. Results of Media Validation Data Analysis

Instructions	Average Validation	Information
Video Content	3.74	Very Good
Display	3.82	Very Good

Overall, from the table above, the average total media validation is 3.78 with a very good category (very valid), which means the video media on the tiktok application is feasible to be

tested. Based on the validation process that has been carried out, there are several criticisms and suggestions for improving video media on the tiktok application.

Learning media on the tiktok application This has been validated by a lecturer at IAIM NU Metro Lampung and a teacher at SMA YALC Pasuruan with a result of 3.78 with the criteria "*very valid".* This is in line with research conducted by (Bahri et al., 2022; Fanaqi, 2021; Herdiati et al., 2021; Susilowati, 2018) showing that the results of the assessment conducted by validators on learning media using *the tiktok application* are feasible to be used as learning Media.

Furthermore, the use of the tiktok application as a medium for learning mathematics, TikTok was chosen as the right sequence and series learning media for high school teachers at YALC Pasuruan. Teachers can use the *tiktok* to create varied and interesting learning media in the form of videos. This is consistent with the assertion that the application is a program designed to fulfill the user's vision (Lupita et al., 2021). In addition, the Tiktok application. has a positive impact on YALC Pasuruan teachers

a. *Makes it easier for teachers to motivate their students*. Previously, online learning was not in demand and students were less motivated than face-to-face learning. For example, in online learning assignments, math assignments are sent directly to the teacher via Google Classroom or the teacher's WhatsApp. As a result, students will not be able to see the results of their respective assignments, and students will feel that they have no competitors and will not want to develop. Use the TikTok app to create a sense of competition. This is because each student's work can be accessed, observed, and commented on by other students. This makes it easier for teachers to motivate their students.
b. *Learning using the tik-tok application can also be used in distance learning*, which allows teachers to more easily analyze students' interests and talents. It is known that distance learning makes it difficult for teachers to see how their students are doing. It is difficult for teachers to foster students' interests and talents. Teachers can gain a better understanding of each student's talents and interests by using TikTok. For example, by using the TikTok application, the teacher can determine that participant A has talent in delivering material even though it is only in the form of voice but does not have direct skills in arguing in class. Meanwhile, participant B is good at designing videos and taking videos, but in the classroom these students tend to be quiet and not enthusiastic in learning mathematics. Things like this allow the teacher to obtain the results of the analysis, which is very useful for the development of students in the future.
c. *Teachers are closer to students*. Teachers and students at YALC Pasuruan use the TikTok application to interact in the comments section of student or teacher learning videos. In face-to-face learning activities, students are often unwilling or not even interested in expressing their opinions, not knowing the material, or responding to the material that has been explained by the teacher. When students participate in online learning through Whatsapp or Google Classroom media, they feel passive. However, it was found that when

using the TikTok application, students communicated with teachers or with each other more often.

d. *Facilitate the delivery of learning materials by teachers*. Teachers can deliver material more easily with the TikTok application. Teachers can use the features of the TikTok application to describe material that is easier or more interesting when combined with sound effects in learning mathematics which tends to be boring.
e. *According to the Independent Learning policy, this is one of the teacher's steps towards the transition of the education system to the 5.0 era.* One of the teacher's choices for implementing independent learning policies is to use the TikTok application as a learning medium. The TikTok application can be used as a means of succeeding the Free Learning policy by utilizing technology and various sources of information. In addition to the advantages that make the TikTok application the best music learning media for high school teachers at YALC Pasuruan.

In addition to finding positive effects, negative effects were also found in using the tiktok application as a medium for learning mathematics. For teachers, that is, teachers cannot monitor what students see when using TikTok outside of class hours. According to the researcher, this is a disadvantage because students can see negative content on the TikTok application and can apply or try it themselves. This of course will harm teacher learning activities because of the shift in students' negative attitudes caused by non-educational content.

The use of the TikTok application as a medium for learning mathematics for students is considered very useful. By using the TikTok application, students are greatly facilitated by the ability to make videos. For example, when entering a song, students simply enter the background music in the video composition section of the TikTok app. In addition, most students are used to using the TikTok application as a learning medium. As is known, the TikTok application is widely used by Indonesian teenagers. Therefore, it is not difficult to apply TikTok as a learning medium for students. The TikTok app has also brought about a positive attitude change among students. Below, the researcher explains the changes in student attitudes due to the use of TikTok as a medium for learning mathematics at YALC Pasuruan.

a. *Students are more confident psychologically*. Self-confidence, according to Lauster, is an attitude or belief in taking action. so that the perpetrator does not question his actions (Puadi, 2020). Positive responses from friends and teachers to videos uploaded by students on the TikTok application will increase students' self-confidence. This happened at SMA YALC Pasuruan, where a positive response was received to support his friend's work. The number of video likes by students shows this. Student videos receive an average of hundreds of likes.

b. *Students are now more enthusiastic and appreciate the work of their friends*. Researchers observed that the videos uploaded by @bimbelassyfapasuruan reached 500 to 1000 views, with 300-400 likes per video. The researcher found from this data that the number of likes on each video exceeds the number of eleventh graders who use the TikTok

application as a learning medium. This means that students appreciate the learning videos made by their peers. Furthermore, the process of making videos that students feel is one of the factors that students appreciate the work of their friends more, because students know what difficulties and obstacles their friends face when making assignments using the TikTok application.

c. *TikTok contributes to improving the ability of students and teachers to use technology.* Based on the research findings, teachers and students at YALC Pasuruan have improved their ability to use technology. Of course, in this day and age, the use of technology is very important to improve the quality of human resources in Indonesia. Students and teachers at YALC Pasuruan are accustomed to using technology when completing study assignments thanks to TikTok. This is in accordance with the principle of independent learning which states that teachers must be able to provide technology-based assignments to improve student performance.

The use of the TikTok application in music learning activities has a positive impact on the foundation. Below, the researcher describes the positive impact of using TikTok as a learning medium for schools. 1) As one of the school's steps to implement Learning Activity 5.0 under the Independent Learning Policy. The Independent Learning Policy expects the Foundation to implement Learning 5.0 using technology. Improving human capacity in Indonesia. The use of the TikTok application is considered one of the steps for schools to implement a self-learning policy. By using the TikTok application, students will be introduced to how to use technology to improve their information and technology skills. 2) As a medium to promote the Foundation. By using the TikTok application as a learning medium, videos created by students and teachers can be seen by YALC Pasuruan teachers and students, not only YALC Pasuruan residents, but all TikTok users. As a result, schools benefit from being promoted to teachers and students through videos created and uploaded by teachers and students. If there is a negative impact on students, for example B. Changes in attitudes that affect learning success, of course, also affect the foundation. Schools face setbacks when teachers are lazy to apply TikTok in their learning. Therefore, schools need to play a major role in using TikTok activities such as: Holding seminars on the good and correct use of TikTok in learning activities with speakers who are experts in this field. With several explanations, the researcher said that the use of the TikTok application as a medium for learning mathematics at YALC Pasuruan was considered very appropriate for teachers, students, and foundations.

CONCLUSION

Based on the description above, the learning media in the application of tiktok material in sequences and series to increase students' learning motivation has obtained very valid results with a total average of 3.44 for material experts. Meanwhile, media experts stated that it was valid with a total average of 3.78. Due to time constraints, this research has only reached the development stage and has not been tested. Saran untuk peneli, diharapkan penelitian ini dapat dilanjutkan hingga tahap ujicoba sehingga dapat diketaui kepraktisan serta keefektifan

media pembelajaran berbasis aplikasi tiktok ini dalam pembelajaran matematika pada materi barisan dan deret.

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