Application of the Video-Assisted Problem Based Learning Model to Increase Student Learning Motivation in Virus Material

Yuli Ananda[1], Hafnati Rahmatan[1*], Samingan[1], Ismul Huda[1], Mudatsir[1]

[1] Program Studi Pendidikan Biologi Program Pascasarjana, Universitas Syiah Kuala, Banda Aceh, Indonesia.

Abstract: Learning activities are strongly empowered by the use of appropriate teaching models and media. If learning activities are not well designed and correct, it will affect learning outcomes. motivation are indicators in improving the quality of education. The problem in virus material is the demand to understand concepts and imagine abstract things. Therefore, it is necessary to apply the video-assisted Problem Based Learning model to virus material. The purpose of this study is to determine the application of the video-assisted Problem Based Learning model to improve student learning outcomes, to determine differences in the application of the video-assisted Problem Based Learning model to student motivation and the relationship between learning outcomes and motivation as a result of applying the Problem Based Learning model at MAN 1 Aceh Besar and MAN 3 Aceh Besar. This research is Quantitative with a Quasi-Experimental approach with a nonrandomized control group design, pretest-posttest design only. The research sample is 121 students, the instruments used in this study are test instruments for learning outcomes and non-test instruments ARCS motivation questionnaire for motivation. The data on students' learning outcomes and motivation is analyzed by using the Independent t-test. The results shows that the value of motivation shows at the level of t (119) = 14.173, p<0.01) which means there is a difference in motivation between control and experimental classes, and there is a positive relationship between learning outcomes and motivation. The conclusion in this study is that the application of the video-assisted Problem Based Learning model has a significant effect on motivation of students in the control class and experimental class.

Keywords: Problem Based Learning; Motivation; Learning Outcomes

Introduction

Virus material is studied on the topic of microbiology which includes studying viruses, bacteria and fungi. The material is abstract because when explaining its very small size, its structure and replication makes it difficult for students to understand it. Students often make mistakes when differentiating between viruses and bacteria, including when they have to classify names with the diseases they cause (Baram-Tsabari et al., 2010). The location of the difficulty in learning materials in biology lies in the difficulty when you have to understand concepts and imagine abstract things such as when studying viruses (Simon et al., 2017)

Based on the results of observations and interviews with teachers and class XI students that have been conducted at MAN I Aceh Besar and MAN 3 Aceh Besar there are various problems in the learning process on virus material that hinders the achievement of learning objectives, one of which is that students are less active in participating in the learning process. learning, low motivation of students to learn. This of course has a direct impact on student learning outcomes, namely around 40% of students who can achieve the minimum completeness criteria for biology subjects that have been set at 75.

How to Cite:

The low learning outcomes are due to the ability of students who still experience difficulties when they have to solve questions that require analysis and understanding of concepts in teaching material. The use of inappropriate learning models also makes students' learning motivation low and affects student learning outcomes. Based on the results of interviews with teachers of MAN 1 Aceh Besar and MAN 3 Aceh Besar, when teaching virus material using various learning models but the media still uses image media, this is one of the reasons students find it difficult to understand the characteristics, replication and role of viruses.

It is important to identify innovative teaching strategies that increase motivation to learn by considering the link between motivation and education (Blanco-marigorta & Jos, 2023). The application of the Problem Based Learning model allows students to understand and explore each material being taught, students are more motivated to solve existing problems themselves through group discussions and literature studies (Pritasari et al., 2015). By applying the Problem Based Learning model it can stimulate students to learn based on surrounding problems and solve problems so that students' intellectual abilities increase and help students understand and understand the content of learning.

PBL aims to engage students in problem-solving activities that are relevant and meaningful to them, while emphasizing the authentic features of learning in context (Kumar, 2010). Problem Based Learning can also develop students' ability to analyze situations, apply knowledge, recognize facts and opinions, prove and draw their own conclusions about the processes they experience, learning is more fun making students more motivated so as to improve learning outcomes (Angkol et al., 2017). Practice-based learning environments can help develop teachers' professional insight into important incidents in class through case-based learning from videos as well as problem-based learning. Case-based learning using recorded video lessons has proven to be a valuable method for increasing classroom management knowledge and skills for both prospective and experienced teachers. (Barth et al., 2019). Boye & Agyei, (2023) This process arouses curiosity and deepens the learner's knowledge of the subject. Collaboration in small groups also enhances learners' capacity to work in teams, an important skill in professional practice. This method aligns with a constructivist approach to teaching that encourages learner-centredness. In this teaching method, students actively construct their knowledge and understanding with the help of their facilitator.

Efforts that can be made by teachers to increase student learning motivation is the selection of effective media. Several studies have concluded that video media

can increase student learning motivation, because (1) video is a fun medium for students so that it can generate curiosity and enthusiasm for learning (Irfan et al., 2016), (2) the video has sound in the form of music, explanatory illustrations, and sound taken from real conditions (Suryansah & Suwarjo, 2016), so that the video has its own charm for students, (3) videos can explain something that is abstract to make it seem real (Pebriani, 2017), Therefore, video is very effective for students who are still at the concrete operational stage. These three advantages can underlie the effectiveness of using video as a learning medium. Video is part of technology and technology is a tool that helps learners and educators achieve certain educational goals. They add that technology has created opportunities for interaction, situation-attached learning, and support for learning outside of formal contexts (Aksel & Gürman-Kahraman, 2014). Because in general, motivational factors can be grouped into extrinsic, intrinsic, and community factors. And video can be said to come from extrinsic (Gutiérrez-Páez et al., 2023).

Video application is an innovative medium that can be used in the learning process, by using video the teacher is able to overcome the limitations of the material and the teacher's ability to follow technological developments (Sagumi & Arwansyah, 2021). By using more effective learning video media, teachers can create a more active and enthusiastic learning atmosphere because students not only read the material provided, but can also watch videos while explaining the material presented so as to increase students' understanding to increase motivation and learning outcomes learners (Mengga et al., 2021). The advantage of using video media is that the message conveyed is easy to understand and retain in memory so that it will have a real effect on motivation and increase student learning outcomes (Pradilasari et al., 2019).

Results of research Supryadi et al., (2013), states that (1) learning activities using video media can provide a pleasant and not boring atmosphere for students so that students' attention is focused on videos that contain information about learning material, (2) video media can present events that are physically impossible to present into class, so as to meet the understanding of all students who have different learning style characteristics. Some students like learning styles with audio, visual or audio-visual. Integrating videos in the stages of learning Problem Based Learning can be used as a source of information, presenting problems, solving problems and presenting the results of solving problems that arise in the learning process (Balslev et al., 2005 ; Kumar, 2010 ; Basu Roy & McMahon, 2012 ; Rasi & Poikela, 2016 ; Barth et al., 2019)

Viral material that is understanding is more appropriate if using the Problem Based Learning learning model combined with video because the learning process exposes students to a real problem that spurs them to research, describe and seek solutions. Understanding material requires an interactive and active model so that students can understand the material being studied (Argaw et al., 2017). For this reason, various variations are needed in learning activities, using problem based learning learning models, learning is more active and not saturating so that students can improve their learning outcomes and will have a positive impact on students' learning motivation (Angkol et al., 2017; Pradasti et al., 2019 ; Putri et al., 2021). Motivation has a strategic role in learning activities, because learning motivation is very influential on student learning outcomes both directly and indirectly. High learning outcomes can influence with good learning motivation (Wu & Tai, 2016). The same statement was also stated by Nugraha et al., (2021) that there is a relationship between learning outcomes and motivation, that the higher the learning outcomes, the better the effect on students' learning motivation.

Based on the description of these problems, it is very necessary to do so that it can help test the extent to which the video-assisted PBL learning model can increase the effectiveness of learning on viral material. With this method, it is hoped that students will be more actively involved in problem solving, increase their understanding of the material and develop critical skills which will later have a direct impact on increasing student motivation and learning outcomes. Video-assisted Based Learning to increase and motivate students' learning on viral material.

Method

The research was conducted at Madrasah Aliyah, Aceh Besar District, which consisted of 2 Madrasah Aliyah, namely, MAN 1 Aceh Besar and MAN 3 Aceh Besar with accreditation status A. The approach used in this study was a quantitative approach. The effect seen is from the independent variable, namely learning using the Problem Based Learning model with the help of video on the dependent variable, namely motivation. The type of research used in this study, namely applied research, is research that applies the video-assisted Problem Based Learning learning model to problems in student motivation.

The method applied in this research is Quasi-Experiment with Non-randomized control group type, pretest-posttest only design. One of the most widely used quasi-experimental designs in educational research that does not allow random assignment of a source of

subjects to experimental and control groups. This study used two different methods with different classes, each class used a non-randomized control group type, pretest-posttest only design (Ary & Jacob, 2010).

The population in this study were all students of class X at MAN 1 Aceh Besar and X MAN 3 Aceh Besar. The population consists of students with a total of 181 students. can be seen in Table 1. Research population data. The sample is part or representative of the population. Determination of the sample using purposive sampling technique, namely sampling is done by considering the average ability of students. The average ability of students from the population by looking at the pretest results. If the average value is homogeneous or close to the same, then that class is used as the sample class

Table 1. Research Population Data

School	Class	Number of Students
MAN I Aceh Besar	X MIA 1	31
	X MIA 2	30
	X MIA 3	30
MAN 3 Aceh Besar	X MIA 1	30
	X MIA 2	30
	X MIA 3	30

This study used the ARCS learning motivation questionnaire. Questionnaire is a data collection tool or technique that is used by giving a set of questions or written statements to respondents to answer. The questionnaire aims to measure students' learning motivation on viral material which contains 36 questions. The aspects seen in the student learning motivation questionnaire are listed in Table 2.

Table 2. Learning Motivation Indicator

Indicator	Component
Attention	Arouse student learning interest, maintain attention and stimulate student curiosity
Relevance	Develop relevant personal acknowledgments/student goals to effect positive attitudes
Confidence	Generating hope, success, self-confidence and a positive attitude towards students
Satisfaction	Giving rewards to strengthen the achievement of satisfaction and a sense of achievement of students in increased learning experience and results.

Questionnaire measurements were carried out using a Likert scale. The answers to each instrument item using a Likert scale of positive and negative questions consisted of four categories, namely Strongly Agree (SS), Agree (S), Neutral (N), Disagree (TS) and

Strongly Disagree (STS). Scoring for positive and negative statements.

Result and Discussion

Data on students' learning motivation in the experimental class and control class at MAN 1 Aceh Besar and MAN 3 Aceh Besar were obtained from the provision of the ARCS questionnaire. After analyzing the average score of students' learning motivation, it can be seen that the experimental class obtained a higher average score than the control class. The average score of students' learning motivation in the experimental class was 79.53 while the average in the control class was only 71.91. The difference in the average value of learning motivation in the control class and the experimental class of students can be seen in Figure 1, while the mean scores for each indicator of learning motivation in ARCS of students in the control class and the experimental class can be seen in Figure 2.
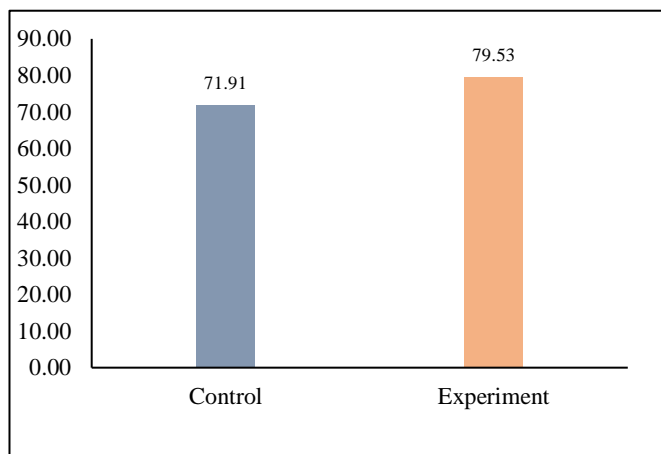

Figure 1. Mean Score of Learning Motivation in Control Class and Experiment Class
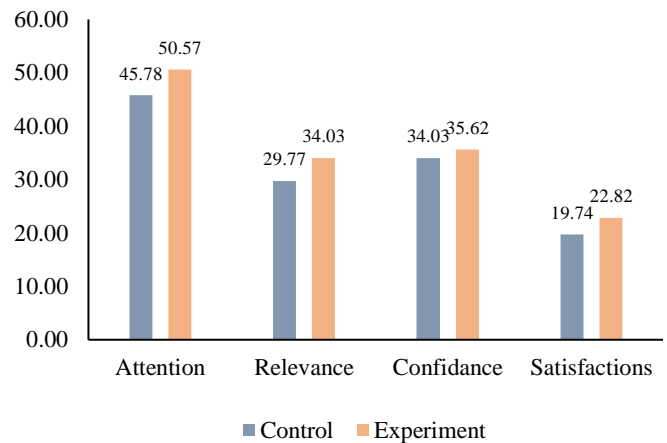

Figure 2. Mean Indicators of Learning Motivation of Students in Control and Experiment Classes

Based on the results shown in Figure 2, it can be seen that the difference in mean scores in the experimental class and the control class. The difference in the average score of each indicator of learning motivation is due to the learning activities in the experimental class applying the video-assisted Problem Based Learning learning model. The learning motivation data of students in the control class and the experimental class were then tested for the average difference using the independent sample t-test. Independent t-test for motivation data for each ARCS indicator can be seen in Table 3.

Based on Table 3, it shows that the ARCS motivation indicators between the control and experimental classes differ significantly. From these results it can be concluded that there are differences in motivation between the control class and the experimental class. The results of the Independent t-test on student motivation data as a whole can be seen in Table 4.

Table 3. Independent T-test on Student Motivation Data for Each ARCS Indicator

Indicators	Class	N	Average	Normality Test*)	Homogeneity Test**)	t- test***)
Attention	Control	61	45.78			(0.000)
	Experiment	60	50.56			
Relevance	Control	61	29.77			(0.000)
	Experiment	60	34.11	0.052	3.313	
Confidance	Control	61	34.03	0.200		(0.002)
	Experiment	60	35.64			
Satisfaction	Control	61	19.74			(0.000)
	Experiment	60	22.84			

Note:

*)   *Kolmogorov-Smirnov Test* (Normal, Sig > α 0.05)

**)   *Levene Test* (Homogen, Sig > α 0.05)

***)   *Independent Sample t-Test* (Ha diterima, Sig < α 0.05)

Table 4. Independent T-test on Student Motivation Data

Class	N	Average	Normality Test*)	Homogeneity Test**)	t- test***)
Control	61	71.91	0.052	3.313	(0.000)
Experiment	60	79.53	0.200		

Note:

*)   *Kolmogorov-Smirnov Test* (Normal, Sig > α 0.05)

**)   *Levene Test* (Homogen, Sig > α 0.05)

***)   *Independent Sample t-Test* (Ha diterima, Sig < α0.05)

Based on Table 4, it shows that the data normality test for the experimental class and control class is normally distributed and homogeneous. The mean of learning motivation between the control and experimental classes was significantly different at the sig. 0.01 <0.05 which means the hypothesis is accepted. From these results it can be concluded that the application of the video-assisted Problem Based Learning model has an influence on students' motivation in viral material and shows learning motivation in the experimental class is better than the control class.

The results of the application of the video-assisted Problem Based Learning model on virus material at MAN 1 Aceh Besar and MAN 3 Aceh Besar show that there is a difference in the average motivation of students between the control class and the experimental class. The average of each indicator shows a difference in the High category after being tested with an independent sample t-test between indicators and between all indicators. Achievement of the average score on the Attention indicator shows the difference in value between the control class and the experimental class, which is 45.78 for the control class then increases by 50.57 in the experimental class, the stages of the Attention indicator of students increase with the implementation of Problem Based Video-assisted learning.

Based on Keller (2000) in his journal Lin et al., 2021) These three factors (namely attention, relevance, and confidence) in motivational design lead to a satisfactions learning experience. When properly designed and implemented, the four-factor model of the ARCS maintains students' interest and motivation in learning on an ongoing basis. ARCS helps understand and incorporate motivational components into the creation of learning experiences and materials. This model can be used as a guide for analyzing the motivational factors of learners, and can be applied to planning course design strategies that stimulate and maintain student motivation Keller (1999) in (Jääskä et al., 2022). In problem-based learning, a well-designed problem is presented to a small group of students. These issues usually contain descriptions of observable phenomena or events that require explanation. The task of the group is to discuss these issues and come up with tentative explanations for the phenomena, explaining them in terms of the processes, principles, or mechanisms that underlie them (Choi & Yang, 2011).

The first syntax Problem Based Learning learning model is problem orientation, students focus their attention on video media that has been provided by educators, make students pay attention to videos by maximizing their sense of sight and sense of hearing to the maximum and listening to explanations from the teacher with the aim of solving problems . Through video media students involve the five senses of hearing and sight simultaneously which is called audiovisual media so that by applying the Problem based learning model with the help of video can make students more focused and more attentive in learning (Munadi, 2013)

The use of video in learning can reduce the level of misunderstanding that occurs in students in each learning process. The use of video media in learning avoids students from feeling bored, because videos can present fun, funny and relaxed forms and atmosphere, but still the main purpose is learning material (Rachmavita, 2020). Increasing the effectiveness of learning through teaching style concludes that in delivering subject matter, a teacher must be able to determine what method is right according to the material to be delivered so that student learning achievement will be achieved according to the objectives (Masni, 2015).

The second achievement lies in the confidence indicator. The average score of the control class was 34.03 and that of the experimental class was 35.62 but there was a difference between the control and experimental classes although not too significant. The indicator of confidence or self-confidence is because students tend not to be pessimistic and think learning is a very big challenge. The stages of developing and presenting students' work in the video-assisted Problem Based Learning learning model can increase students' self-confidence. Confidence appears when they ask questions, express opinions and are seen when students present their work.

Students in the experimental class were enthusiastic with self-confidence, able to communicate well during discussions and when presenting their work in the form of virus hazard campaigns by creating virus hazard slogans without having to be appointed or

ordered by the teacher and other group members. Confidence is a condition in which students are confident and confident in being able to solve problems by applying the video-assisted Problem Based Learning learning model which contains viral material content. Students believe they can achieve success together with other friends (Susanti & Imbiri, 2020).

The Relevance indicator is in third place with a score of 29.77 for the control class and 34.77 for the experimental class. The relevance indicator ensures that students believe that the learning experience is personally relevant, thus bringing students connected to their environment. In this study, students were able to relate their experiences when solving problems using the video-assisted Problem Based Learning learning model which contains a variety of content, one of which is a disease in humans caused by a virus, namely AIDS disease caused by the HIV virus, so students can connect things what he learns with the environment around him. Relevance results from linking teaching content with learning objectives (Susanti & Imbiri, 2020). Keller (1987) suggests that students feel that the learning experiences they participate in are valuable, useful for their lives. Students are motivated to learn something when what they learn is relevant to their lives and has clear goals.

The satisfaction indicator occupies the lowest position with a score in the control class of 19.74 and the experimental class of 22.82. The lowest score is obtained on the Satisfaction indicator and followed by the relevance indicator, caused by the linkage of relevance with satisfaction, in this study applying the Problem Based Learning learning model which requires students to make relevance, namely being able to link or connect material with problems or with events in the student's environment. Because relevance occupies the second lowest position, it can be interpreted that students are still less able to carry out relevance which will affect the level of satisfaction. Relevance and satisfaction indicators are linked by instant feedback (Izmirli & Sahin Izmirli, 2015). Because indicators of lack of relevance also have an impact on instant feedback such as group percentages, this also directly affects the satisfaction of students who are dissatisfied because they cannot explain optimally when students have to connect with their experiences. Based on observations of ongoing learning activities, it can be seen that the lack of thinking power to solve these problems in the experimental class and control class resulted in students feeling dissatisfied when they had to connect learning experiences with their environment which affected the level of satisfaction of students.

Even though it is in the lowest position, the satisfaction value proves that there is student satisfaction in applying the video-assisted problem-based learning model in the experimental class compared to the control class. Gagne (1988) suggests that someone who has succeeded in doing something or achieving something feels proud and satisfied with his success. Success and pride become a big reinforcement or motivation for these students to continue achieving the next success. Learning with video media can make learning fun and can increase student motivation. Those who are motivated have passion and enthusiasm for completing tasks, in contrast to those who are less motivated and lack passion and drive to do so (Feng et al., 2023). The video-assisted Problem Based Learning learning model requires students to be more actively involved in learning activities. Video media is also able to encourage the emergence of creative ideas from students with visualization in the form of moving images and sound presented through video media (Pebriani, 2017).

Conclusion

Based on the results of research on the effect of applying video-assisted Problem Based Learning on motivation, it can be concluded that there is a significant difference in student motivation between the control class and the experimental class after applying the video-assisted Problem Based Learning learning model on virus material at MAN 1 Aceh Besar and MAN 3 Aceh Besar, as well as in terms of the positive correlation between learning outcomes and students' learning motivation in the application of the video-assisted Problem Based Learning learning model.

References

Aksel, A., & Gürman-Kahraman, F. (2014). Video Project Assignments and their Effectiveness on Foreign

Language Learning. *Procedia - Social and Behavioral Sciences*, *141*, 319–324. https://doi.org/10.1016/j.sbspro.2014.05.055

Angkol, S., … E. K.-J. (2017). Pengaruh Media Pembelajaran Pada Penguasaan Konsep Materi Virus Menggunakan Model Problem Based Learning (Pbl) Terhadap Keterampilan Berpikir Kritis Di Sma Negeri 1 Tomohon. *Universitas Negeri Manado*, *5*(1). Retrieved from http://ejournal.unima.ac.id/index.php/jsme/article/view/289

Argaw, A. S., Haile, B. B., Ayalew, B. T., & Kuma, S. G. (2017). The effect of problem based learning (PBL) instruction on students' motivation and problem solving skills of physics. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(3), 857–871. https://doi.org/10.12973/eurasia.2017.00647a

Ary, D., & Jacob, L. cheser. (2010). *Introduction To Research in Education Eighth Edition*. Wadsworth Cengage Learning.

Balslev, T., De Grave, W. S., Muijtjens, A. M. M., & Scherpbier, A. J. J. A. (2005). Comparison of text and video cases in a postgraduate problem-based learning format. *Medical Education*, *39*(11), 1086–1092. https://doi.org/10.1111/j.1365-2929.2005.02314.x

Baram-Tsabari, A., Sethi, R. J., Bry, L., & Yarden, A. (2010). Identifying students' interests in biology using a decade of self-generated questions. *Eurasia Journal of Mathematics, Science and Technology Education*, *6*(1), 63–75. https://doi.org/10.12973/ejmste/75228

Barth, V. L., Piwowar, V., Kumschick, I. R., Ophardt, D., & Thiel, F. (2019a). The impact of direct instruction in a problem-based learning setting. Effects of a video-based training program to foster preservice teachers' professional vision of critical incidents in the classroom. *International Journal of Educational Research*, *95*(March), 1–12. https://doi.org/10.1016/j.ijer.2019.03.002

Barth, V. L., Piwowar, V., Kumschick, I. R., Ophardt, D., & Thiel, F. (2019b). The impact of direct instruction in a problem-based learning setting. Effects of a video-based training program to foster preservice teachers' professional vision of critical incidents in the classroom. *International Journal of Educational Research*, *95*(March), 1–12. https://doi.org/10.1016/j.ijer.2019.03.002

Basu Roy, R., & McMahon, G. T. (2012). Video-based cases disrupt deep critical thinking in problem-based learning. *Medical Education*, *46*(4), 426–435. https://doi.org/10.1111/j.1365-2923.2011.04197.x

Blanco-marigorta, A. M., & Jos, A. (2023). Gamification in thermal engineering: Does it encourage motivation and learning?. *Education for Chemical Engineers,* *45,* 41-51. https://doi.org/10.1016/j.ece.2023.07.006

Boye, E. S., & Agyei, D. D. (2023). Effectiveness of problem-based learning strategy in improving teaching and learning of mathematics for pre-service teachers in Ghana. *Social Sciences and Humanities Open*, *7*(1), 100453. https://doi.org/10.1016/j.ssaho.2023.100453

Choi, H. J., & Yang, M. (2011). The effect of problem-based video instruction on student satisfaction, empathy, and learning achievement in the Korean teacher education context. *Higher Education*, *62*(5), 551–561. https://doi.org/10.1007/s10734-010-9403-x

Feng, R., Alsager, H. N., Azizi, Z., & Sarabani, L. (2023). Impact of mind-mapping technique on EFL learners' vocabulary recall and retention, learning motivation, and willingness to communicate. *Heliyon*, *9*(6), e16560. https://doi.org/10.1016/j.heliyon.2023.e16560

Gagné, R. M. (1988). *Essentials of Learning for Instruction (2nd ed.)*. Prentice Hall.

Gutiérrez-Páez, N. F., Santos, P., Hernández-Leo, D., & Carrió, M. (2023). A study of motivations, behavior, and contributions quality in online communities of teachers: A data analytics approach. *Computers and Education*, *201*. https://doi.org/10.1016/j.compedu.2023.104829

Irfan, A., Mashudi, T., & Murtiningsih. (2016). Perbedaan Media Audio Visual dan bukan Audio Visual terhadap Motivasi dan Hasil Belajar IPS Siswa Kelas IV. *Wahana Sekolah Dasar (Kajian Teori Dan Praktik Pendidikan)*, *24*(1), 1–8. Retrieved from http://repository.um.ac.id/104139/

Izmirli, S., & Sahin Izmirli, O. (2015). Factors motivating preservice teachers for online learning within the context of ARCS motivation model. *Turkish Online Journal of Distance Education*, *16*(2), 56–68. https://doi.org/10.17718/tojde.26620

Jääskä, E., Lehtinen, J., Kujala, J., & Kauppila, O. (2022). Game-based learning and students' motivation in project management education. *Project Leadership and Society*, *3*. https://doi.org/10.1016/j.plas.2022.100055

Keller, J. M. (1987). *Application of the ARCS model of motivational design. In C. M. Reigeluth (Ed.), Instructional theories in action: Lessons illustrating selected theories and models*. Lawrence Earlbaum Associates.

Kumar, D. D. (2010). Approaches to interactive video anchors in problem-based science learning. *Journal of Science Education and Technology*, *19*(1), 13–19.

https://doi.org/10.1007/s10956-009-9154-6

Masni, H. (2015). Strategi meningkatkan motivasi belajar mahasiswa. *Jurnal Ilmiah Dikdaya*, *5*(1), 34–45. Retrieved from http://dikdaya.unbari.ac.id/index.php/dikdaya/article/view/64

Mengga, D. T., Rompas, P. T. D., & Olii, D. (2021). Model Pembelajaran Berbasis Aplikasi Video Maker Pada Mata Pelajaran Teknik Pengolahan Audio Dan Video Di Smk. *Ismart Edu: Jurnal Pendidikan Teknologi Informasi, 2*(2), 63-70. Retrieved from http:/ejurnal.unima.ac.id/index.php/ismartedu/article/view/3196

Nugraha, D. Y., Nugraha, D., & Widyastuti. (2021). The Correlation between Learning Motivation and Learning Outcomes on Mathematics Subjects in XII Science Class Senior High School 4 Bone. *Anatolian Journal of Education, 6*(1), 157-166. Retrieved from https://eric.ed.gov/?id=EJ1291070

Pebriani, C. (2017). Pengaruh penggunaan media video terhadap motivasi dan hasil belajar kognitif pembelajaran IPA kelas V. *Jurnal Prima Edukasia*, *5*(1), 11–21. https://doi.org/10.21831/jpe.v5i1.8461

Pradasti, K. Z., Susilowati, S. M. E., & Bodijantoro, F. P. M. H. (2019). The Effectiveness of Problem Based Learning Model on Virus Material of Senior High School on Science Process Skills and Student Learning Outcomes. *Journal of Biology Education*, *8*(3), 266–278. https://doi.org/10.15294/jbe.v8i3.30084

Pradilasari, L., Gani, A., & Khaldun, I. (2019). Pengembangan Media Pembelajaran Berbasis Audio Visual pada Materi Koloid Untuk Meningkatkan Motivasi dan Hasil Belajar Siswa SMA. *Jurnal Pendidikan Sains Indonesia*, *7*(1), 9–15. https://doi.org/10.24815/jpsi.v7i1.13293

Pritasari, A. C., Dwiastuti, S., Probosari, R. M., & Sajidan. (2015). Problem based learning implementation in class X MIA 1 SMA Batik 2 Surakarta. *Jurnal Pendidikan IPA Indonesia*, *4*(2), 158–163. https://doi.org/10.15294/jpii.v4i2.4185

Putri, W. E., Sunarno, W., & Marzuki, A. (2021). Analysis of The Students' Argumentative Skills of Senior High School in Covid-19 Pandemic using Problem Based Learning in Static Fluid. *Jurnal Penelitian Pendidikan IPA*, *7*(3), 335–343. https://doi.org/10.29303/jppipa.v7i3.735

Rachmavita, F. P. (2020). Interactive media-based video animation and student learning motivation in mathematics. *Journal of Physics: Conference Series*, *1663*(1). https://doi.org/10.1088/1742-6596/1663/1/012040

Rasi, P., & Poikela, S. (2016). A review of video triggers and video production in higher education and continuing education PBL settings. *Interdisciplinary Journal of Problem-Based Learning*, *10*(1), 5–6. https://doi.org/10.7771/1541-5015.1609

Sagumi. (2021). *Pengembangan Media Pembelajaran Interaktif Berbasis Aplikasi Movie Maker Dalam Pembelajaran Teks Cerita Fantasi Kelas VII SMP Negeri 1 Kasihan Bantul,*. UNY PGRI Press.

Simon, U. K., Enzinger, S. M., & Fink, A. (2017). The evil virus cell: Students' knowledge and beliefs about viruses. *PLoS ONE*, *12*(3). https://doi.org/10.1371/journal.pone.0174402

Supryadi, P. E., Jampel, I. N., & Riastini, P. N. (2013). Penerapan Media Video Pembelajaran sebagai Aplikasi Pendekatan Contekstual Teaching Learning untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V [Application of Learning Video Media as an Application of Contextual Teaching Learning Approach to Improve Scie. *Mimbar PGSD Undiksha*, *1*(1), 1–10.

Suryansah, T., & Suwarjo, S. (2016). Pengembangan Video Pembelajaran Untuk Meningkatkan Motivasi Dan Hasil Belajar Kognitif Siswa Kelas Iv Sd. *Jurnal Prima Edukasia*, *4*(2), 209. https://doi.org/10.21831/jpe.v4i2.8393

Susanti, L., & Imbiri, C. (2020). Implementasi Motivasi Model ARCS (Attention, Relevance, Confidence, and Satisfaction) dalam Pembelajaran Pendidikan Agama Kristen. *DUNAMIS: Jurnal Teologi Dan Pendidikan Kristiani*, *4*(2), 254–263. https://doi.org/10.30648/dun.v4i2.284

Wu, T. J., & Tai, Y. N. (2016). Effects of multimedia information technology integrated Multi-Sensory instruction on students' learning motivation and outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, *12*(4), 1065–1074. https://doi.org/10.12973/eurasia.2016.1552a