Development of Online Science Learning Devices Cooperative Model Type STAD Assisted by Video Media to Improve Learning Outcomes of Elementary School Students

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Sections Info	ABSTRACT
Article history: Submitted: June 16, 2020 Final Revised: August 07, 2020 Accepted: August 08, 2020 Published online: October 31, 2020 *Keywords:* Cooperative Elementary School Science Online Learning Devices STAD Video Media Learning Outcomes	The research aims to produce STAD cooperative model online learning tools with the help of video media to improve student learning outcomes in elementary schools. The development of learning tools used the 4D model and was tested on 40 students. The results showed that online science learning tools were valid with validation results in the very valid category; practical in terms of implementing lesson plan is categorized as very good and obstacles during learning can be overcome; effective in terms of positive student responses, student activity is categorized as very good, and student learning outcomes increase knowledge competence with an average N-gain of 0.75 in the high category. In the Independent T-test indicates that there is no difference in the average learning outcomes between groups. then on the Paired T-test indicates an increase in learning outcomes. The conclusion of this study, that the online science learning devices cooperative model type STAD assisted by video media is appropriate to be used to improve learning outcomes of elementary school students.

INTRODUCTION

In pedagogical competence, teachers must have planned, carrying out learning, and conducting assessments. An interesting learning process challenges teachers to compete in creating an effective classroom atmosphere (Elpisah & Bin-Tahir, 2019). The concrete manifestation of competence is the ability of the teacher to develop learning tools in integration and then implement them in the teaching and learning process in the classroom (Rahayu et al., 2017). Teaching preparation is a measure of the success of a teacher in teaching (Elpisah & Bin-Tahir, 2019). Failure in planning is the same as planning failure. This shows how important it is to prepare for learning through the development of learning tools.

The results of studies on scientific achievements, Indonesia's position is still below international standards. This is evidenced by the results of the TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment) studies that show that education in Indonesia in the field of science is still far behind that of other countries (Herman, 2014). The fact that was found was based on a preliminary study of researchers at State Elementary School of Wonorejo III/ 314 Surabaya interview techniques and opinion questionnaire findings of problems that did not match expectations in online science learning. This can be made possible because of the sudden influence of technological change in the learning system (Khusniyah & Hakim, 2019). Students felt that science material was difficult to understand (Lubis, 2017). This was supported by data obtained by researchers that the

science learning outcomes were still low, which was less than the Minimum Criteria of Mastery Learning (KKM).

Based on the instruction of the Minister of Education regarding the follow-up on the COVID 19 outbreak that is currently taking place in Indonesia and various country which requires all student learning activities to be carried out from home, the learning activities are also carried out online (Dhawan, 2020). However, due to the teacher's limited knowledge about online learning so that teachers have difficulty implementing online learning (Sadikin & Hamidah, 2020). During online learning that has been carried out, the teacher gives questions to students through WhatsApp or office 365 and students answer these questions and then send answers via photos sent using the application WhatsApp.

Based on these problems, it is obvious that online learning is needed to improve student learning activities (Dhawan, 2020) and outcomes (Sadikin & Hamidah, 2020). One of the solutions that teachers can do to improve learning by improving the learning process and practice student skills. Learning improvement is carried out by the teacher through compiling learning plans to improve students' activeness, increase social potential (Gambari et al., 2015), and learning outcomes in online learning by applying online learning to STAD type cooperative models assisted by online video media. Online learning is learning done through an internet network (Singh et al., 2019). Online learning is done online from home to prevent the spread of the COVID-19 coronavirus.

The STAD cooperative learning model is carried out in groups with diverse group members (Munawarah, 2013), consisting of male and female, different ethnic groups, and diverse intelligence in each group. Besides, team members must also discuss (Berlyna & Purwaningsih, 2019) and help one another in working on the activity sheets (Gambari et al., 2015). Students must help each other in the quiz so that the score obtained by the group can be maximized. Qismullah (2015) stated that assigning roles must be entrusted to students to increase their responsibility towards fulfilling group assignments.

Video media is interesting for students in the classroom (Suryansyah & Suwarjo, 2016). So far, teachers usually use image media so that the use of video media is expected to be effective in attracting the attention of students (Suryansyah & Suwarjo, 2016). Subiyantari et al. (2019) stated that the use of video in learning is very effective in both classical, independent, and group learning. Many video media provide information because students can see directly an object. The video also displays images and sounds, so students feel like they are in a situation like in the video. Shinta et al. (2019) stated in her journal proved that video media had a significant impact on student achievement in the experimental group. The experimental group students became more active (Mariati et al., 2017) and concentrated on participating in learning. They also had an increased understanding of the material by connecting everyday life so students can easily understand and develop their knowledge optimally (Higgins et al., 2018). This is because when watching videos students can express emotions so that they can experience material enjoyment and are motivated to explore the material (Higgins et al., 2018); Bayne, (2012).

Based on the explanation above, it is necessary to conduct an in-depth study of a scientific online learning device development. Therefore, the topic of this study is the development of an Online Learning Kit for STAD Cooperative Models assisted with

Video Media to improve the learning outcomes of Natural Sciences in class V State Elementary School of Wonorejo III / 314 Surabaya.

The general research problem formulation is How is the feasibility of the Online Learning Tool Cooperative Model type STAD assisted by Video Media to improve the learning outcomes of Natural Sciences in class V of Primary School? By the general problem formulation, the following research questions are made: 1. What is the validity of the STAD type Cooperative Model online learning device assisted by Video Media to improve the learning outcomes of Natural Sciences in class V of Primary School? What can be known from: (a) How is the validity of the syllabus, Lesson Plan, Student Teaching Materials (BAS), Student Activity Sheet (LKPD), and Student Learning Outcomes Evaluation Sheet (PHB) developed? (b) How is the readability of the Student Teaching Materials (BAS) developed? 2. How is the practicality of STAD type Cooperative Model Online Learning Tools assisted with Video Media to improve the learning outcomes of Natural Sciences in class V of Primary School? What can be known from: How is the implementation of online learning activities in the STAD Cooperative Model assisted by Video Media to improve the learning outcomes of Natural Sciences in class V of Primary Schools? What are the obstacles encountered during the online learning activities of the STAD type Cooperative Model assisted by Video Media to improve the learning outcomes of Natural Sciences in class V of Primary Schools ?. 3. What is the effectiveness of the STAD type cooperative learning model assisted by Video Media to improve the learning outcomes of Natural Sciences in class V of Primary School? can be known from: a. How do students respond to online learning using STAD type cooperative learning tools assisted by video media to improve science learning outcomes in grade V in elementary school? b. How do students' learning activities use online learning tools of the STAD type cooperative model assisted by video media to improve science learning outcomes in grade V of elementary school? c. How do student learning outcomes use online learning tools of the STAD type cooperative model assisted by video media to improve science learning outcomes in grade V of Elementary School?

This is consistent too with the results of research by Atik Miftachul Rohmah (2018) which proves that doing learning with the STAD cooperative model assisted by video media can increase the learning activities of students.

RESEARCH METHOD
General Background
The research model of developing this learning device uses a model prepared by Thiagarajan, the 4D model. This model consists of 4 stages of development, namely defining, designing, developing, and disseminating. The design flow of this research development can be seen in the following figure:
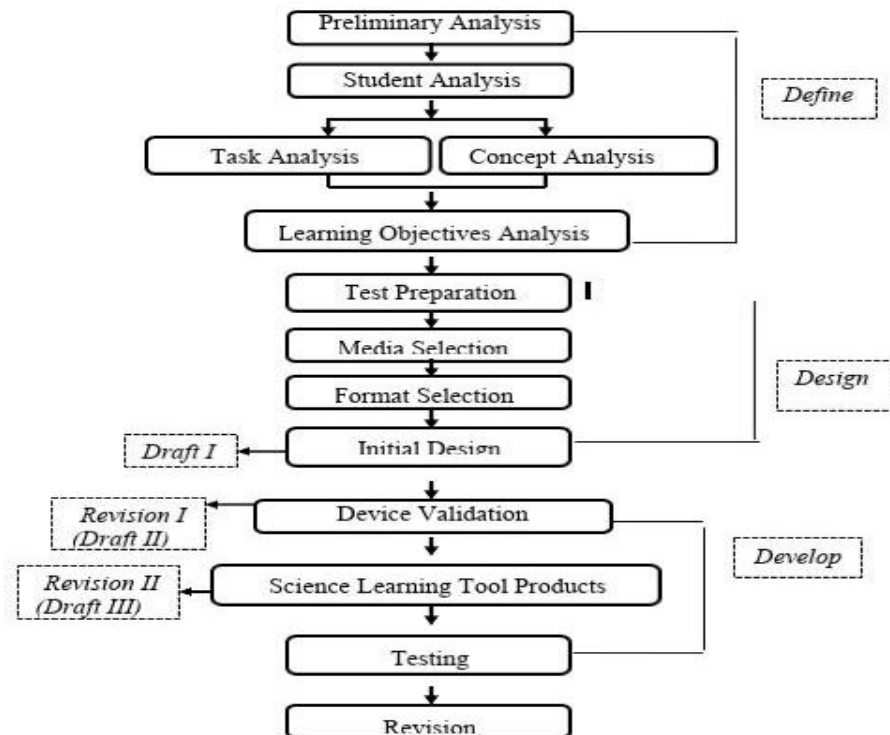
Figure 1. Model development procedure 4-D (Modification).

The research trial was conducted on students of class V A and V B at State Elementary School of Wonorejo III / 314 Surabaya in semester 2 of the 2019-2020 school year using the One-Group Pretest-Postest Design research design. The research instrument was validated by two expert lecturers. Data collection techniques in this study were observation, tests, and questionnaires. The material developed in this study was heat transfer.

Sample / Participants / Group
Subjects in this study were developed learning tools consisting of syllabus, Lesson Plan, Student Teaching Materials (BAS), Student Activity Sheet (LKPD), and Student Learning Outcomes Evaluation sheet (PHB). The limited test (trial 1) was conducted at State Elementary School of Wonorejo III / 314 with the test subjects being 20 VA class students and 20 VB class students.

Data Analysis
To find out the quality of the learning tools assessment results from expert lecturers, then from the initial data in the form of qualitative data was converted into quantitative data, namely by finding the average value given by the validators. As a guideline for converting scores to qualitative values in this study. Development learning tools are feasible to be used in learning if they get a minimum grade of "B" in either category. To find out the feasibility of the learning kit, the researcher made an observation sheet for the implementation of the science learning cooperative model of STAD type assisted by video media as material for practicality analysis of the validity of the learning device. Analysis of the effectiveness of learning tools includes analysis of student response

questionnaire results, analysis of student activity observation results, and analysis of Student Learning Outcomes Tests (Pre-test and Post-test). Learning outcomes are calculated using a statistical test using SPSS 16.0. The statistical test step is 1) prerequisite test which includes the normality test and the homogeneity normality test, in this normality test the data is said to meet the assumption of normality or normally distributed if the Shapiro Wilk significance value> α (0.05), in the Homogeneity test the data is said to be homogeneous if the significance data is> 0.05. 2) hypothesis test, i.e. Independent test T-Test and paired T-test. The basis of decision making in the Independent T-test is if the significance value of 2-tailed> 0.05, then there is no difference in average learning outcomes, if the significance value of 2-tailed <0.05, then there is a difference in the average learning outcomes (Sugiono, 2018). In the paired samples test the Sig. (2-tailed) <0.005 indicates a significant difference in the pre-test and post-test learning aspects of knowledge, on the contrary, if the paired samples test scores Sig. (2-tailed)> 0.005 indicates a significant difference in the pre-test and post-test learning aspects of knowledge.

RESULTS AND DISCUSSION

The following are the results of a trial of 1 learning device that has been developed and implemented in State Elementary School of Wonorejo III / 314 Surabaya in the form of device validation and BAS readability (Student Textbook). Learning practices, constraints during learning activities, student activities, student learning outcomes, and student responses.

The validity of learning devices

The results of the learning device validation were used as a basis for discussing the validity of the learning tools that had been developed. Learning tools that had been validated by 2 expert validators include syllabus, Lesson Plan, Student Teaching Materials (BAS), Student Activity Sheet (LKPD), and Student Learning Outcomes Evaluation Sheet (PHB). The overall results of the learning device validation are presented in the form of bar charts in the table below:

Table. 1 Learning device validation results.

No	Rated device	V1	V2	R
1	Syllabus	84.6	78.84	81.73
2	Lesson Plan	91.07	82.14	86.6
3	Student Teaching Materials (BAS)	90.69	76.7	83.7
4	Student Activity Sheet (LKPD)	91.17	85.93	88.55
5	Student Learning Outcomes Evaluation Sheet (PHB)	93.09	74.47	83.88
	Average score	90.124	79.62	84.89
	Percentage of Agreement			84.89

The learning tools developed in general were categorized as very valid with an average percentage of agreement of 84.89% and can be used in research. Based on the results of the analysis it can be said that the learning device in the study is said to be valid which is worthy of being used as a research instrument. This is supported by

Wulandari (2019) stated that the validity of the research instrument is feasible to continue as a research instrument and is ready to be trialed to respondents. The validity of the instrument facilitates student learning effectiveness (Suryana & Somadi., 2018; Rohmat et al., 2019)

The practicality of learning devices
The practicality data of the lesson plan was obtained from observations by two observers namely the teacher of class VA and the teacher of class VB at State Elementary School of Wonorejo III / 314 Surabaya. Observations were made during 3 meetings consisting of Lesson Plan 1, Lesson Plan 2, and Lesson Plan 3. The implementation of an online learning plan on the STAD Type cooperative model is assisted by video media. The results of the observation analysis of the implementation of the Lesson Plan are presented in the figure below:
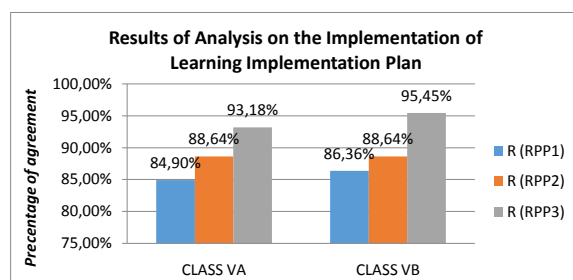

Figure 2. The results of the observation analysis of the implementation of the lesson plan.

Based on the figure above information that in general, the implementation of lesson plans for each class was very good. The average percentage of agreement for the implementation of lesson plans for both classes was 87.26%. The lesson plans used in online learning using the STAD cooperative model assisted by video media also provide opportunities for each student to contribute to friends and groups to progress and succeed together. In line with Subiyantari et al. (2019), the STAD cooperative model can make students effective in exchanging ideas in class. Also supported by Yusuf et al. (2012) stated that the implementation of cooperative learning improves student performance in discussions. Students had the same responsibility for the success of their groups. This is following Slavin (2011) who stated that cooperative learning encourages each of its members to make maximum efforts to achieve success. The success of learning can be seen from the interest of students in the material used (Sadikin & Hamidah, 2020). This is consistent too with the results of research by Munawaroh (2013) concluded that students who received STAD cooperative model lessons in which students were heterogeneously grouped had increased scores when compared with students who were homogeneously

grouped. The constraints encountered during the online learning process especially at the first meeting in this study are presented in Table 2.

Table 2. Constraints during the learning process.

No	Type of Constraints	Alternative Solution
1	Students were not accustomed to implementing KBM online with the STAD Cooperative model assisted by video media. This is indicated by the findings of the following constraints: a. Students were not accustomed to learning with Zoom meetings b. Discussion activities had not run smoothly when discussions with Zoom meetings were still dominated by students who were actively speaking c. Students were not accustomed to carrying out the activities of the presentation of the results of group discussions	Provide information to students about the syntax/learning phases using the STAD cooperative model Provide information about online learning using the Zoom meeting Provide information about the instructions for discussion activities to work on the Student Activity Sheet (LKPD) Guide students to prepare presentations that will be displayed and motivate students to be confident in carrying out presentations
2	Inappropriate time allocation (lack of time during online learning)	Time management is needed that refers to the allocation of time in the lesson plan so that learning is timely

The constraints encountered in the first meeting began to decrease when learning at meeting 2 and meeting 3 took place. Of some of these obstacles, it is in line with Esminarto (2016) that STAD learning requires a relatively long time.

The Effectiveness of Implementing Learning Devices
1. Student Response

Table 3. Data on student responses to the development of learning tools.

No.	Description	Percentage of Response		Average
		A	B	
1	Students like the student teaching materials, the student worksheets, the learning atmosphere, and the way the teacher teaches	100	95	97.5
2	Students feel new with the study material, student teaching materials, student worksheets, learning atmosphere, and the way the teacher teaches	90	85	87.5
3	Students are interested in covers, contents, pictures in teaching materials used in the learning process, as well as the language used in teaching materials that are easy for students to understand	85	85	85
4	Students are interested in covers, contents, images on students' worksheets used in the learning process, and the language used in students' worksheets is easy for students to understand	80	85	82.5

No.	Description	Percentage of Response		Average
		A	B	
5	Students feel that the media used in the learning process is new, interesting and easy to use	95	90	92.5
6	Students feel new with the STAD type Cooperative model assisted by video media	100	95	97.5
7	Students feel the explanation and guidance given by teachers when teaching and learning activities take place are easily understood by students	90	80	85
8	Students feel that after participating in STAD type cooperative learning assisted by video media the learning outcomes are increased, more enthusiastic, more daring to respond to opinions, give opinions, ask questions, and answer questions	85	85	85
9	Students are interested in using the STAD type Cooperative learning model aided by video media on other subjects and other subjects	90	85	87.5
	Total	815	785	800
	Average percentage	90.56	87.22	88.89
	Category	SB	SB	SB

The trial results had an average percentage of student responses of 88.89% > 81% and were categorized very well. This concludes that students' interest were quite high in online learning of STAD type cooperative models assisted by video media. The high interest of students was shown from the response of students who feel happy with the learning that is applied and is new to students. Online learning of STAD type cooperative models assisted by video media can increase students' interest in learning heat transfer taught to 40 students of State Elementary School of Wonorejo III / 314 Surabaya to improve student learning outcomes. This is per the Ministry of Education and Culture (2014b) that good learning should have characteristics including (1) interactive and inspirational, (2) Fun, challenging. and motivating students to participate actively; (3) Contextual and collaborative; (4) Provide sufficient space for student initiative, creativity, and independence; and (6) Following the talents, interests, abilities, and physical and psychological development of students. Then in line with Wulandari (2019) stated that presenting videos in the learning process increases interest and interest in creative thinking about the material obtained by students.

2. Students Activity

Table 4. The results of student activities observation.

No	Activity	Group A			Group B		
		Meeting			Meeting		
		1	2	3	1	2	3
1	Pay attention to the teacher's explanation	96.25	97.5	97.5	95	96.25	95

No	Activity	Group A Meeting			Group B Meeting		
		1	2	3	1	2	3
2	Make groups according to instructions given by the teacher	88.75	90	90	87.5	90	88.75
3	Carry out discussions according to the procedure on the student worksheet	98.75	98.75	98.75	91.25	97.5	98.75
4	Presentation of the results of the discussion	86.25	87.5	87.5	85	87.5	86.25
5	Ask questions/opinions	90	95	95	88.75	93.75	95
6	Answer the question	86.25	88.75	88.75	86.25	92.5	91.25
7	Make conclusions	90	91.25	91.25	90	92.5	91.25
	Average of each meeting	**90.89**	**92.68**	**92.68**	**89.11**	**92.86**	**92.32**
	Average of *agreement percentage*						**91.76**

The average percentage of agreement of student activities during learning activities with the STAD cooperative model assisted by video media was 91.76% categorized as very good. In the sense that student activities in the learning principle run smoothly. This is following Suryana et al. (2018) that through cooperative learning STAD can increase student understanding and activity because it can eliminate class. Student activities that were not relevant at the first meeting had a higher percentage when compared to the percentage value at the second and third meetings. This shows that at the first meeting students were not familiar with STAD cooperative learning online with the help of video media (Kusniyah & Hakim, 2019). Supporting data that leads to students not being accustomed to learning STAD cooperative models with the help of video media, namely the lack of relevant student activities such as paying attention / listening to teacher explanations, experimenting with procedures contained in student activity sheets, conducting data analysis through group discussions, asking questions/opinions and answering questions, and making conclusions at the first meeting when compared to the percentage of activities at the second and third meetings.

Learning at the first meeting showed students who were shy to carry out presentations. The teacher's role is also needed in this regard. The teacher needs to convince students to be confident that students can fulfill their responsibilities in completing the given task, one of which is to explain the results of the group discussion (Mariati et al., 2017). Learning at the second and third meetings, students started to get used to the presentation activities. Students became more fluent in conveying ideas or the ideas of their group work. The delivery of ideas or ideas through presentations can optimize students' skills in communicating in public which will improve students' character and confidence. The high average agreement percentage of student activities in VA and VB classes is due to the relevant activities being carried out entirely by students with guidance from the teacher. Besides, it is also supported by the results of research from Rohmah et al.

(2018) which proves that learning with the STAD cooperative model assisted by video media can increase student learning activities.

3. Student learning outcomes

The results of assessing aspects of student knowledge inform that the mean score of pre-test students' knowledge is still low at 37.35 (VA) and 46.95 (VB) with each classical completeness of 0%. Based on Table 4.20. The results of the post-test of students' knowledge in class I trial VA obtained an average value of 85.1 with classical completeness of 100%, and the VB class gained an average value of 89.15 with classical completeness of 100%. Paired t-test results for the pre-test and post-test scores of students' knowledge showed that there was a significant increase in learning outcomes at a significance level of 5%. Table 4.23 informs that the average N-Gain score for all students classically in the VA class is 0.72 and the VB class is 0.77 with each high category. This concludes that after implementing learning using the STAD type cooperative learning model assisted by video media there is a significant increase in learning outcomes at a significance level of 5% with high category N-Gain. Cooperative learning can improve student learning outcomes (Rohmat et al., 2019). In line with (Berlyna & Purwaningsih, 2019). The improvement in learning outcomes is supported by the skills observation data that shows the classical completeness of students in the learning outcomes of the aspects of skills.

The predicate of students' attitudes consists of both good and very good predicates with the percentage of classical completeness of attitude aspects in each class of 100%. This shows the strengthening of the character of discipline, responsibility, and confidence at each learning meeting. Learning outcomes do not only recognize aspects of student knowledge but include aspects of student attitudes and skills. In line with Azmin's (2016) research, it helps students to appear better. These three aspects constitute a unity that shapes learning outcomes. Understanding students recognize a learning material in this study using BAS and worksheets with nuanced learning models used, which in the use of BAS and worksheets in this learning is a means and a way that directs students to conduct a learning experience directly. obtained from these activities the implementation of learning directs students to work and learn so that students interact with the learning environment one of which is another student (his friend). This interaction then raises social attitudes in students to be disciplined and accountable to themselves and to the group and foster student confidence to be active in learning to achieve mutual success. STAD can improve student learning (Esminarto et al., 2016).

After the research results were analyzed, the students' learning outcomes were following the research results Qismullah et al. (2015). The results of the research of Taufik (2015) showed that there is an increase in student learning outcomes in the affective and cognitive aspects after getting learning using the STAD type cooperative model. Based on the description that has been described, it can be concluded that in general learning using cooperative STAD type assisted by video media can improve learning outcomes (Hariadi et al., 2016; Tiantong & Temuangsai, 2013; Rattanatumma, 2016). STAD cooperative learning type can improve student learning outcomes (Munawar, 2019).

CONCLUSIONS

Online science learning tools use STAD type cooperative learning models assisted with video media that are developed appropriately to improve student learning outcomes on the heat transfer material. Teaching instruments that are developed (lesson plans, student activity sheets, student learning materials, and assessment sheets of learning outcomes) in this study successfully fulfill the criteria for validity, practicality, and effectiveness. The validity of teaching instruments includes conceptual validity, readability, and difficulty levels. The practicality of teaching instruments includes the implementation of learning, the student activity, and the obstacle during learning activities. Learning effectiveness involves the improvement of learning outcomes and the student responses to learning activities. Based on the fulfillment of validity, criteria, and effectiveness criteria, the teaching instruments developed are appropriate for use in the learning process. The research implication is that STAD cooperative learning models assisted online by video media can be used to enhance the learning outcomes of elementary school students in science learning. Further research that can be done is to prove the quality of The research implication is that STAD cooperative learning models assisted online by video media of practicality and effectiveness to increase learning outcomes in larger samples.

ACKNOWLEDGEMENTS

REFERENCES

Azmin, N.H. (2016). Effect of the jigsaw-based cooperative learning method on student performance in the general certificate of education advanced-level psychology: An exploratory Brunei case study. *International Education Studies, 9*(1), 91-106.

Bayne, G.U. (2012). Capturing essential understandings of the urban science learning environment. *Learning Environment Research, 15*(1), 231–250.

Berlyana, M.D.P., & Purwaningsih, Y. (2019). Experimentation of STAD and Jigsaw learning models on learning achievements in terms of learning motivation. *International Journal of Educational Research Review, 4*(4), 517-524.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5-22.

Elpisah, E., & Bin-Tahir, S.Z. (2019). Student team achievement division (STAD) Model in increasing economic learning outcomes. *International Journal of Scientific & Technology Research*, *8*(10), 3089-3092.

Esminarto., Sukowati., Suryowati, N., & Anam, Khoirul. (2016). Implementasi model STAD dalam meningkatkan hasil belajar siswa. *Jurnal Riset dan Konseptual, 1*(1), 16-23.

Gambari, A.I., Yusuf M.O., & Thomas, D.A. (2015). Effects of computer-assisted STAD, LTM and ICI Cooperative learning strategies on Nigerian secondary school students' achievement, gender and motivation in physics. *The Malaysian Online Journal of Educational Science, 3*(4), 11-26.

Hariadi., Bambang., & Wurijanto, T. (2016). Influence of web based cooperative learning strategy and achiever motivation on student study outcome. *International Journal of Evaluation and Research in Education*, 5(3), 189-199.

Herman, T. (2014). *Trend s in international mathematics and science study*. Universitas Pendidikan Indonesia.

Higgins, J., Moeed, A., & Eden, R. (2018). Video as a mediating artefact of science learning: cogenerated views of what helps students learn from watching video. *Asia-Pacific Science Education, 4*(6), 1-19.

Munawar, H.M. (2019). The application of STAD-cooperative learning model: Efforts to increase motivation and learning outcomes of students in Class 5 SDN 07 Ledok Salatiga in Mathematics subject in Folding Symmetry and Rotating Symmetry topics. *Jurnal Kajian Pendidikan Islam, 11*(2), 144-135.

Khusniyah, N.L., & Hakim, L. (2019). Efektifitas pembelajaran berbasis daring: sebuah bukti pada pembelajaran bahasa inggris. *Jurnal Pemikiran dan Penelitian Pendidikan, 17*(1), 19-33.

Lubis, M.A. (2017). The Implementation of Cooperative Learning Model STAD to Students Learning Outcome at SMA N 8 Padangsidimpuan. *Journal of Education and Practice, 8(33),* 91-96

Mariati, P.S., Betty, M.T., & Sehat, S. (2017). Problem solving learning model by using video recording on experiments of kinematics and dynamics to improve the students cognition and metacognition. *Jurnal Pendidikan Fisika Indonesia, 13*(1), 25-32.

Munawaroh. (2013). The effect of type STAD cooperative learning model, the way of learning, and learning motivation toward enterpreneurial attitudes (A case study in SMK N I Jombang). *IOSR Journal of Research & Method in Education, 3*(5), 38-44.

Qismullah, Y.Y., Natsir, Y., & Hanum, L. (2015). A teacher's experience in teaching with student teams achievement division (STAD). *Tekchnique International Journal Instruktion, 8*(2), 99-112.

Rahayu, T., Syafril, S., Wati, W., Yuberti. (2017). The application of STAD- cooperative learning in developing integrated science on students' worksheet. *Jurnal Ilmiah Pendidikan Fisika Al-BiRuNi, 6*(2), 247-254.

Rattanatumma, T. (2016). Assessing the effectiveness of STAD model and problem based learning in mathematics learning achievement and problem solving ability. *Journal of Education and Practice*, 7(12), 194-199.

Rohmah, A.M., Riyanto, Y., & Setyowati, R.N, (2018). Application of STAD cooperative learning of primary. *Advances in Social Science, Education and Humanities Research, 212,* 37-39.

Rohmat., Hakim, L., Sakti, N.C. (2019). Implementation of Jigsaw type cooperative learning model to improve economics learning results. *International Journal of Educational Research Review, 4*(3), 350-357.

Sadikin, A., Hamidah, A. (2020). Pembelajaran daring di tengah wabah Covid-19. *Jurnal Ilmiah Pendidikan Biologi, 6*(2), 214-224

Shinta, A.H. (2019). Motion graphic animation videos to improve the learning outcomes of elementary school. *European Journal of Educational Research, 8*(4), 1245-1255.

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education, 33*(4), 289–306.

Slavin, R.E. (2011). Cooperative learning teori, riset dan praktik. Bandung. Nusa Media.

Subiyantari, A.R., Muslim, S., & Rahmadyanti, E. (2019). Effectiveness of Jigsaw cooperative learning models in lessons of the basics of building construction on students learning 'outcomes viewed from critical thinking skills. *International Journal for Educational and Vocational Studies, 1*(7), 691-696.

Suryana, Y., & Somadi, T.J. (2018). Kajian model pembelajaran kooperatif tipe STAD (Student Teams Achievement Division) dalam upaya meningkatkan efektifitas proses belajar mengajar akuntansi. *Jurnal Kajian Pendidikan Ekonomi dan Ilmu Ekonomi, 2*(2), 133-145.

Suryansyah, T., & Suwarjo. (2016). Pengembangan video pembelajaran untuk meningkatkan motivasi dan hasil belajar kognitif siswa kelas IV SD. *Jurnal Prima Edukasia, 4*(2), 209-221.

Taufik. (2015). Pemanfaatan model pemebelajaran tipe STAD dapat meningkatkan prestasi belajar IPA-Biologi. *Jurnal UNEJ Saintifika*, *17*(1), 49-68.

Tiantong, & Temuangsai. (2013). Student teams achievement devision (STAD) technique through the moodle to enhance learning achievement. *International education studies*, *6*(4), 85-92.

Wulandari, D., & Madlazim. (2019). Penerapan model pembelajaran inkuiri terbimbing metode STEM untuk meningkatkan keterampilan berfikir kreatif pada materi pemanasan global. *Inovasi Pendidikan Fisika, 8*(3), *779-783.*

Yusuf, M.O., Gambari, I.A., & Olumorin, C.O. (2012). Effectiveness of computer-supported cooperative learning strategies in learning physics. *International Journal of Social Science & Education, 2*(2), 94-109.

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