JPPIPA 9(12) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of E-worksheet of Coordination System in Human Based on Learning Cycle 7E to Improve Critical Thinking Ability and Student Motivation

Shesilya[1*], Suyitno Aloysius[1]

[1] Biology Education, Faculty of Mathematics and Natural Sciences, Yogyakarta State University, Yogyakarta, Indonesia.

Received: October 31, 2023
Revised: November 4, 2023
Accepted: December 20, 2023
Published: December 31, 2023

Corresponding Author:
Shesilya
shesilya.2021@student.uny.ac.id

DOI: 10.29303/jppipa.v9i12.5907

© 2023 The Authors. This open access article is distributed under a (CC-BY License)

Abstract: Nowadays, the ability to think critically and motivation in learning is something that must be owned by students. One of the learning models that can improve both is learning cycle 7E combined with e-worksheet. The purpose of this research is to develop e-worksheet based on learning cycle 7E to improve critical thinking skills and learning motivation of grade XI high school students as seen from the results of feasibility and practicality tests. This research is a Research and Development (R&D) study with the ADDIE model which is applied until the development stage only. The feasibility of the product was assessed by one material expert lecturer and one media expert lecturer and the practicality of the product was assessed by 5 biology teachers. The results obtained based on the product quality assessment, obtained a value from a material expert lecturer with an ideal percentage of 83.9% in the feasible category, a media expert of 83.3% which is in the feasible category, and the results of the practicality test by the teacher obtained an average ideal percentage of 94.5%. Therefore, e-worksheet based on learning cycle 7E can be used to improve critical thinking skills and student learning motivation.

Keywords: Critical thinking skills; E-worksheet; Learning cycle 7E; Learning motivation

Introduction

Higher order thinking skills are now a prerequisite for students. Higher order thinking skills can support each student's ability to be a solution for each other and the environment (Brierton et al., 2016; Facione, 2011). Higher order thinking skills can support each student's ability to be a solution for each other and the environment (Brierton et al., 2016). Learning that is based on higher-order thinking is thought to improve students' ability to psychologically prepare themselves to solve complex problems in an accelerating era and live a more sociable life (Benyamin et al., 2021; Chetty, 2015).

TMSS and PISA results show that the quality of education in Indonesia is relatively low (Norhasanah, 2018). The low level of critical thinking skills can be influenced by various things, one of the causes is that the learning activities in the classroom that have been carried out by the teacher are nothing but the delivery of information (lecture method), by activating the teacher more, while the students passively listen and copy, where occasionally the teacher asks and occasionally the students answer (Agnafia, 2019; Prasetyani et al., 2016; Rohimah et al., 2020). Then the teacher gives example problems, followed by giving routine practice problems and not training students' ability to think critically (Fortuna et al., 2021; Rusydi et al., 2018). Therefore, learning that incorporates higher-order thinking skills is needed to be developed (Martawijaya et al., 2023; K. Sari et al., 2019).

An educator must have efforts to develop students' critical thinking skills, for example by using innovative learning models that are suitable for improving students' critical thinking skills. One of the innovative and appropriate learning models to improve students' critical thinking skills is the 7E learning cycle model. The learning cycle 7E model is based on the constructivism theory and was developed by Karplus in 1960 (Kusumawardani et al., 2020). The theory of constructivism explains that knowledge is constructed

How to Cite:
Shesilya, & Aloysius, S. (2023). Development of E-worksheet of Coordination System in Human Based on Learning Cycle 7E to Improve Critical Thinking Ability and Student Motivation. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 11568–11575. https://doi.org/10.29303/jppipa.v9i12.5907

by the learner in their mind. One constructivist principle considers learning as the interaction between preexisting knowledge and new knowledge, so previous knowledge plays an important role in later learning (Ghufrooni et al., 2019). Efforts to build knowledge students themselves will undoubtedly encounter difficulties, which encourages teachers to act as facilitators by assisting students in building their knowledge (Ahmadurifai, 2020).

Learning cycle 7E is a learning model that includes 7 phases including Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend (Eprilia et al., 2021). According to Eisenkraft, each syntax of the learning cycle 7E model will direct students to critical thinking skills. Each stage of the learning cycle 7E involves the active role of students to conduct experiments in finding a concept to be learned. Students are required to think critically in solving a problem both problems during experiments and questions given by the teacher, students also learn to make decisions in solving a problem. From all learning activities with the 7E learning cycle model, students will hone their critical thinking skills from the beginning to the end in doing the evaluation test (Eprilia et al., 2021).

In addition to the ability to think critically to achieve the desired learning objectives, students must also have motivation in learning. Learner motivation has an influence on the success of learning. This is because if students have good learning motivation, the possibility of achieving learning success will be greater. Thus a learner is very important to have learning motivation. Learning motivation is a form of encouragement that comes from within students to learn and improve their knowledge (Nisrinafatin, 2020).

One of the studies conducted by Melinda et al. (2021) showed that the learning motivation of high school students was 14.43% who had low learning motivation (Melinda et al., 2021). This certainly needs to be followed up. The learning motivation of students can be a determinant of success in learning (Nisa' et al., 2020). Motivation is a learner's desire to make changes in behavior to achieve a goal or to meet a need fulfil their needs. Learning motivation is a pattern of learning that (Lesi Ayu et al., 2019). Learning motivation can affect critical thinking skills and learning outcomes, so students who have high learning motivation will have high critical thinking skills and learning outcomes as well (Israil, 2019). Therefore, students who have low learning motivation need to increase their learning motivation (Ammy et al., 2020; M. J. Sari et al., 2023).

Several factors that influence learning motivation, one of which is derived from the students themselves such as having goals to be achieved, the abilities that students have, and the physical and spiritual health of students. In addition, there are external factors such as the classroom environment and teachers (Nasrah et al., 2020). In connection with this, efforts need to be made to increase learning motivation such as arousing student interest, creating a pleasant atmosphere in the learning process, commenting on and praising every student's success and student work, and creating competition and competition and cooperation with friends (Nasrah et al., 2020). Teachers can innovate to improve students concept understanding and increase learning motivation by creating interesting learning materials and using learning models that can shape learning motivation according to students learning styles (Lince, 2022).

In connection with this, the alternative problem solving that can be used is to implement a student centered learning where students are invited to be more active in presenting or communicating their understanding in several steps or cycles through the Learning Cycle 7E learning model. The learning cycle 7E learning model is one of the learning models that provides opportunities for students to optimize learning and develop students' reasoning power. In the learning cycle 7E learning model has advantages, among others, stimulating students to recall the subject matter they have previously obtained, providing motivation for students to be more active and increase students' curiosity, training students to learn to find concepts through experiments, training students to convey orally the concepts they have learned, providing opportunities for students to think, search, find and explain (Eprilia et al., 2021).

The current learning process is still not optimal in utilizing technological sophistication. Learning that is still conventional like this causes students to tend to feel bored during the learning process (Tarihoran et al., 2023). So it is very necessary to make innovations in choosing learning models and media in order to improve students' critical thinking skills and learning motivation. In connection with this, this research will focus on developing learning media in the form of e-worksheet. E-worksheet is an electronic version of student worksheets that contains material for each meeting and is presented practically so that it is easy to use by students in learning activities to form effective learning activities (Syafitri et al., 2020).

Method

This research uses a research and development (R&D) model with the ADDIE design (analysis, design, development, implementation, evaluation) (Sugiyono, 2018). This research is limited to the development stage only. This is because researchers only want to see how feasibility and practicality of the products developed.

The first stage in the development of the ADDIE Model for designing and developing various research programs is the analysis stage. This stage is related to the analysis of activities and environmental work situations so as to be able to find products that must be issued and developed. At this stage, the party used as a source of information related to performance problems and characteristics of students in biology learning activities in class XI is the biology teacher at SMA Muhammadiyah 1 Prambanan.

The design stage is a stage whose activity content is in the form of planning the manufacture of products to be developed. Tahe activities carried out at this stage are: determining the form of the product to be made. Second, designing instructional strategies. Third, mapping the material and designing learning scenarios. Finally, compiling product feasibility and practicality instruments.

The development stage includes several activities, namely collecting materials, making initial products, validating initial products to expert lecturers, and practicality testing to teacher. The experts chosen to be validators in this study are one lecturer of material experts and one lecturer of media experts. Meanwhile, the teacher who will conduct the product practicality test is a teacher from SMA Muhammadiyah 1 Prambanan, totaling one person. In addition, there are also other biology teachers who come from outside the school studied as many as 4 people. The addition was made to strengthen the results of the product practicality test conducted by the teacher.

Product validation data is obtained from comments and suggestions from material experts and media experts. The analysis technique used was qualitative data analysis technique, namely by describing and categorizing the input. In the next step, researchers mapped the input and considered whether or not to use it as material for product revision. Next for data on the practicality and readability of the product is obtained from the responses of teachers. The response results are in the form of letters which are converted into scores using a likert scale. Qualitative data is converted to quantitative data with Likert scale in Table 1.

Table 1. Likert Scale

Score	Quality
1	Very Less
2	Less
3	Good
4	Very Good

Form of quantitative data is converted into qualitative criteria according to the ideal score category as presented in Table 2.

Table 2. Classification of Quantitative Score Acquisition

Score Range	Quality Category
x > xi + Sbi	Very Less
xi < x ≤ xi + Sbi	Less
xi – SBi < x ≤ xi	Good
x ≤ xi – Sbi	Very Good

Information:
x = Actual average score
xi = Average of ideal scores
= 1/2 (Ideal highest score + lowest ideal score)
Sbi = 1/6 (Ideal highest score - ideal lowest score)
Ideal highest score = Σ scoring item x highest score
ideal lowest score = Σ scoring item x lowest score

$$\text{Percentage of ideality} = \frac{actual\ average\ score}{maximum\ score} x\ 100\% \quad (1)$$

Result and Discussion

The research and development of e-worksheet based on learning cycle 7E is conducted by referring to the ADDIE development model, which in this study consists of three stages, namely analysis, design, and development. The data on the result of each stage carried out are as follows:

Analysis Stage

The analysis stage is the stage of identifying the causes of learning problems, which aims to collect information about problems in learning biology at the secondary school level (Hidayat et al., 2021). The analysis in this stage includes five sub-stages. The first stage: the beginning-end analysis stage, analyzing the field situation to obtain information about student characteristics, problems faced in the learning process, student learning needs, and learning strategies applied by teachers. Through interviews with biology teachers, the results obtained that students' critical thinking skills have not been optimally applied in biology learning because the understanding of the concept of biological material in class XI in semester two is too much, where four chapters and seven KD in one week of four lesson hours for two meetings, so that the material delivered to students is less than optimal, and critical thinking skills require replacement of KD to continue the next material, and critical thinking skills require replacement of KD to continue the next material. Students are less active in learning, less enthusiastic in expressing opinions and asking questions. On the contrary, the learning model that students need can help them to be more active when discussing so that they can exchange ideas with other friends.

The next step is to analyze the learners. The results of the interviews showed that students are less active in

the learning process and are not so eager to express their opinions and ask questions. Therefore, the developed student worksheet should contain activities that can encourage students to be more active in the learning process, enthusiastic to ask questions and express their opinions, discuss with other friends and be interactive (Utami, 2021). The student analysis stage is done, the next stage is the concept analysis stage, namely identifying the material to be presented. The task analysis phase identifies indicators of students' critical thinking ability and learning motivation, which are synthesized to be framed into question items and questionnaires that define the key competencies and core competencies that will be achieved by the students as a result of learning the material on the coordination system in humans. The final step is to analyze the learning objectives, identify performance indicators based on the analysis of the material on the human coordinate system, and analyze the curriculum.

Design Stage

There are three sub-stages in the design stage: test standardization, criterion-referenced test construction, format selection, and preliminary design. The first stage is the preparation of instruments that are used as a benchmark for compiling questions in worksheets based on the 7E learning cycle. The instruments used are critical thinking questions to assess the level of students' critical thinking skills based on the coordination system in humans (Ginting et al., 2021). The second stage is the format selection stage based on the needs of technology use. This stage involves designing quality learning tools by developing the appearance and content of the 7E electronic learning cycle worksheets used, starting from the initial appearance, content, and closing. The last stage is the initial design stage, where the developed product is adjusted by the supervisor in accordance with the suggestions given, so that the initial design of the learning cycle 7E-based electronic worksheet product is obtained. This product will upload in google site.

Development Stage

The development stage is the stage of making E-worksheet based on the strategy that has been designed in the previous stage. Material collection is carried out based on the needs of learning materials which will then be developed into the form of questions, statements that function to explore, apply, and test students' understanding and add information to complement learning materials. This stage is the stage of making and combining all the necessary parts based on the design that has been made at the design stage so as to produce the initial product. At this stage the researcher uses the google site application so that the initial product is produced in the form of "E-worksheet of the Coordination System in Humans Based on Learning Cycle 7E". This E-worksheet in addition to containing text and questions is also equipped with several color images and videos that can add to the attractiveness for students. In addition, the video in this E-worksheet is also directly connected to the youtube application and for the answer to the question will be directly connected to the google form and each article included will also include a website link to make it easier for students to explore learning resources. Next, for the appearance of this E-worksheet itself, it is made as well as possible by adding some appropriate color components but not too complex and striking, both on the front page, the learning objectives section and other learning activity pages in the E-worksheet.

The components of the E-worksheet of the coordination system in humans based on the 7E learning cycle consist of 5 web pages, among others: First, the cover page, containing the title, preface, Competency Achievement Indicators, and instructions for using the E-worksheet. Second, activities I and II, consisting of 7 sections in accordance with the stages in the 7E learning cycle model, namely the elicit, egage, explore, explain, elaborate, evaluate, and extend stages. Third, the bibliography and fifth, the development profile.

Figure 1. Learning activity pages I and II

Figure 2. Steps of the 7E learning cycle model

Figure 3. Bibliography and developer profile

The learning device is theoretically validated. Research instruments that are also theoretically validated are practicality test questionnaires while research instruments that are theoretically and empirically validated are critical thinking skills questions and student learning motivation questionnaires.

The learning device in this study that was validated was the lesson plan. The lesson plans made provide 2 meetings a week. Validation of the lesson plan (RPP) was carried out by an expert lecturer. The results of the RPP validation stated that it was feasible to use in the learning process without revision. The practicality test questionnaire was validated by an expert lecturer. This validation was first done before the questionnaire was used to review the practicality of the product according to the teacher. The validation results stated that the practicality test questionnaire was suitable for use in research without revision.

The critical thinking skills questions were theoretically validated by a material expert. The validation results are in the form of qualitative data in the form of input provided by expert lecturers. The validation results state that the questions are suitable for use after making some improvements. The improvements made are adjusting the indicators with the material so that the questions can be used to improve students' thinking skills. Critical thinking skills questions that have been declared theoretically valid are then validated empirically by involving high school students outside the research subjects. Empirical validation along with the question reliability test involved 30 students and the results were analyzed using SPSS. The results of the SPSS calculation show that all items totaling 6 items are empirically valid based on the provisions of r count ≥ r table (sig. 0.05). Next, based on the results of the analysis using the SPSS program, it also shows the reliability value of the critical thinking skills of students that the question has high reliability, which is 0.817. The results of the calculation of the validation and reliability test of the questions stated that all items could be used to measure the critical thinking ability of students.

The learning motivation questionnaire was validated by an expert lecturer and the validation results stated that the questionnaire was suitable for use in research without revision. The learning motivation questionnaire that has been declared theoretically valid is then validated empirically by involving high school students outside the research subject. Empirical validation along with the statement reliability test involved 30 students and the results were analyzed using SPSS. The results of the SPSS calculation show that all 25 statement items are empirically valid based on the provisions of r count ≥ r table (sig. 0.05). Furthermore, based on the results of the analysis using the SPSS program, it also shows the reliability value of the questionnaire for student learning motivation that the statements have high reliability, which is 0.961. The results of the calculation of the validation test and the reliability of the learning motivation questionnaire stated that all statement items can be used to measure students' learning motivation.

Table 3. Result of Product Assessment by Expert

Expert	Types of assessments	Percentage of ideality (%)	Quality Category
Material Expert	Feasibility test	83.9	Feasible
Media Expert	Feasibility test	83.9	Feasible
Teachers of Biology	Practicality test	94.5	Very practically

The results of validation by material experts stated that the E-Worksheet of the coordination system in humans based on learning cycle 7E is feasible to use, but with some improvements. Material experts commented on the sources used in the form of videos and images and learning objectives aligned with the learning cycle 7E work steps. After the researchers made improvements in accordance with the input, the ideal percentage was obtained at 83.9%, which stated that the product was feasible to be applied at school.

The results of the media expert validation provide detailed comments and suggestions to improve the product in terms of instructional design such as the buttons before and after being given a description, the model steps are clarified and the learning activities are given a description of the activities. All suggestions given by media experts were used by researchers as material for improving e-worksheet. After the researchers made improvements in accordance with the input, an ideal percentage of 83.3% was obtained, which stated that the product was feasible to be applied at school.

The next stage after going through the validation and revision process, the product was tested for practicality by 5 biology teachers. Based on the results of the analysis using the ideal standard deviation technique, it is known that the e-worksheet of the coordination system in humans based on the 7E learning cycle is reviewed from the whole obtained the ideal percentage of 94.5% with a very practical quality category.

Conclusion

According to the assessment of media experts and material experts, this e-worksheet is feasible to use, because this product can assist teachers in presenting human coordination system subject matter, can be used to increase student learning motivation in learning biology independently or in groups using experimental and demonstration methods, and can also be used as an assessment tool to determine the improvement of students' critical thinking abilities. This product is not only feasible, but also has a very practical quality based on the results of the practicality test by the teacher. This is because e-worksheet based on learning cycle 7E has the advantage that it can be used for learning anywhere in the classroom, outside the classroom or at home, thus enabling the delivery of effective and efficient learning. Researchers recommend further research to determine the effectiveness of e-worksheet in improving critical thinking skills and student learning motivation.

Acknowledgments

We would like to thank SMA Muhammadiyah 1 Prambanan for the permission given to conduct this research. We would also like to thank the Department of Biology Education, Faculty of Mathematics and Natural Sciences, Yogyakarta State University for their support in the publication of this article.

Author Contributions

The first author conceptualized the research idea and designed the research methodology as well as collected and analyzed data, performed statistical analysis, and interpreted the results. while the second author oversaw the entire research process and contributed to the literature review and provided critical feedback throughout the research process. Both authors jointly contributed to the writing, reviewing, and editing the manuscript for intellectual content.

Funding

This research was funded by the authors themselves and received no external funding. Both the first and second authors have contributed equally to the financial and research support required for the publication of this article.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

References

Agnafia, D. N. (2019). Analisis Kemampuan Berpikir Kritis Siswa Dalam Pembelajaran Biologi. *Florea: Jurnal Biologi Dan Pembelajarannya*, *6*(1), 45. https://doi.org/10.25273/florea.v6i1.4369

Ahmadurifai. (2020). Meningkatkan Aktivitas dan Hasil Belajar Kimia Siswa Melalui Penerapan Model Learning Cycle. *Indonesian Journal of Educational Development*, *1*(2), 210–220. https://doi.org/10.5281/zenodo.4003892

Ammy, P. M., & Wahyuni, S. (2020). Analisis Motivasi Belajar Mahasiswa Menggunakan Video Pembelajaran Sebagai Alternatif Pembelajaran Jarak Jauh (Pjj). *Matematics Paedagogic*, *1*(1), 27–35. Retrieved from http://jurnal.una.ac.id/index.php/jmp/article/view/1354.

Benyamin, B., Qohar, A., & Sulandra, I. M. (2021). Analisis Kemampuan Berpikir Kritis Siswa SMA

Kelas X Dalam Memecahkan Masalah SPLTV. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(2), 909–922. https://doi.org/10.31004/cendekia.v5i2.574

Brierton, S., Wilson, E., Kistler, M., Flowers, J., & Jones, D. (2016). A comparison of higher order thinking skills demonstrated in synchronous and asynchronous online college discussion posts. *North American Colleges and Teachers of Agriculture*, *60*(1), 14–21. Retrieved from http://search.proquest.com/docview/921358994?accountid=14645

Chetty, N. (2015). Teaching Teachers to Teach Physics to High School Learners. *Procedia - Social and Behavioral Sciences*, *174*, 1886–1899. https://doi.org/10.1016/j.sbspro.2015.01.852

Eprilia, I., & Puspitawati, R. P. (2021). Pengembangan LKPD Mollusca Berbasis Learning Cycle 7E untuk Melatih Keterampilan Berpikir Kritis. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *10*(3), 655–662. https://doi.org/10.26740/bioedu.v10n3.p655-662

Facione, P. (2011). *Critical Thinking: What It Is and Why It Counts*. The California Academic Press.

Fortuna, I. D., Yuhana, Y., Keguruan dan Ilmu Pendidikan, F., Sultan Ageng Tirtayasa, U., & Raya Palka Km, J. (2021). Pengembangan Lembar Kerja Peserta Didik dengan Problem Based Learning untuk Kemampuan Berpikir Tingkat Tinggi. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *05*(02), 1308–1321. https://doi.org/10.31004/cendekia.v5i2.617

Ghufrooni, R., Darwis, Z., & Kurniadewi, F. (2019). Analisis Minat Belajar Kimia Siswa melalui Penerapan Model Pembelajaran Learning Cycle 5E menggunakan Cerita Misteri pada Materi Asam Basa. *JRPK: Jurnal Riset Pendidikan Kimia*, *9*(2), 80–86. https://doi.org/10.21009/JRPK.092.04

Ginting, N., Pradesyah, R., Amini, A., & Panggabean, H. S. (2021). Memperkuat Nalar Teologi Islam Moderat Dalam Menyikapi Pandemi Covid-19 Di Pimpinan Ranting Pemuda Muhammadiyah Bandar Pulau Pekan. *Martabe : Jurnal Pengabdian Kepada Masyarakat*, *4*(1), 30. https://doi.org/10.31604/jpm.v4i1.30-40

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation And Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Israil, I. (2019). Implementasi Model Pembelajaran Cooperative Learning Tipe STAD untuk Meningkatkan Motivasi Belajar Siswa dalam Pembelajaran IPA di SMP Negeri 1 Kayangan. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *5*(2), 117. https://doi.org/10.33394/jk.v5i2.1807

Kusumawardani, R., Suhaiya, & Muflihah. (2020). Difference in Learning Outcomes Between High School Student Taught Using Learning Cycle 5E and Learning Cycle 7E on Colloid Subject. *Proceedings of the 2nd Educational Sciences International Conference (ESIC 2019)*, 127–128. https://doi.org/10.2991/assehr.k.200417.028

Lesi Ayu, G. F., Koryati, D., & Jaenudin, R. (2019). Analisis Motivasi Belajar Peserta Didik Kelas X Program Lintas Minat Pada Mata Pelajaran Ekonomi di SMA Negeri 16 Palembang. *Jurnal PROFIT Kajian Pendidikan Ekonomi dan Ilmu Ekonomi*, *6*(1), 69–79. https://doi.org/10.36706/jp.v6i1.7876

Lince, L. (2022). Implementasi Kurikulum Merdeka untuk Meningkatkan Motivasi Belajar pada Sekolah Menengah Kejuruan Pusat Keunggulan. *Prosiding Seminar Nasional Fakultas Tarbiyah dan Ilmu Keguruan IAIM Sinjai*, *1*, 38–49. https://doi.org/10.47435/sentikjar.v1i0.829

Martawijaya, M. A., Rahmadhanningsih, S., Swandi, A., Hasyim, M., & Sujiono, E. H. (2023). The Effect of Applying the Ethno-STEM-Project-based Learning Model on Students' Higher-order Thinking Skill and Misconception of Physics Topics Related to Lake Tempe, Indonesia. *Jurnal Pendidikan IPA Indonesia*, *12*(1), 1–13. https://doi.org/10.15294/jpii.v12i1.38703

Melinda, S., Purwanto, A., & Putri, D. H. (2021). Analisis Motivasi Belajar Siswa Tingkat SMA dalam Pembelajaran Fisika secara Online. *Jurnal Ilmiah Pendidikan Fisika*, *5*(3), 388. https://doi.org/10.20527/jipf.v5i3.4052

Nasrah, N., & Muafiah, A. M. A. (2020). Analisis motivasi belajar dan hasil belajar daring mahasiswa pada masa pandemik Covid-19. *JRPD (Jurnal Riset Pendidikan Dasar)*, *3*(2), 207–213. Retrieved from https://journal.unismuh.ac.id/index.php/jrpd/article/view/4219

Nisa', R., & Fatmawati, E. (2020). Kerjasama Orang Tua dan Guru dalam Meningkatkan Motivasi Belajar Peserta Didik. *IBTIDA'*, *1*(2), 135–150. https://doi.org/10.37850/ibtida.v1i2.147

Nisrinafatin. (2020). Pengaruh Game Online Terhadap Motivasi Belajar Peserta didik. *Jurnal Edukasi Nonformal*, *1*(1), 115–22. Retrieved from https://ummaspul.ejournal.id/JENFOL/article/view/427

Norhasanah. (2018). Kemampuan Berpikir Kritis Siswa SMA dalam Pembelajaran Biologi. *Jurnal*

Pembelajaran Biologi, *5*(1), 105–109. Retrieved from https://ejournal.unsri.ac.id/index.php/fpb/article/view/7054/pdf

Prasetyani, E., Hartono, Y., & Susanti, E. (2016). Kemampuan Berpikir Tingkat Tinggi Siswa Kelas XI dalam Pembelajaran Trigonometri Berbasis Masalah di SMA Negeri 18 Palembang. *Jurnal Gantang*, *1*(1), 34–44. https://doi.org/10.31629/jg.v1i1.4

Rohimah, D., Suhendar, & Ramdhan, B. (2020). Profil Kemampuan Berpikir Kritis Siswa MTs Kelas VIII. *Jurnal Bioeducation*, *7*(2), 45–55. https://doi.org/10.29406/.v7i2.2118

Rusydi, A. I., Hikmawati, H., & Kosim, K. (2018). Pengaruh Model Learning Cycle 7E Terhadap Kemampuan Berpikir Kritis Peserta Didik. *Jurnal Pijar Mipa*, *13*(2), 124–131. https://doi.org/10.29303/jpm.v13i2.741

Sari, K., Sujarwanta, A., & Santoso, H. (2019). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Pembelajaran Biologi Berbasis Keterampilan Berpikir Kritis pada Materi Ekosistem MTs Kelas VII. *Jurnal Lentera Pendidikan Pusat Penelitian LPPM UM METRO*, *4*(1), 63–72. https://doi.org/10.24127/jlpp.v4i1.1092

Sari, M. J., & Paidi. (2023). Analysis of Students' Learning Motivation Using Guided Inquiry Learning Model. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6265–6271. https://doi.org/10.29303/jppipa.v9i8.4366

Sugiyono. (2018). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Syafitri, R. A., & Tressyalina. (2020). The Importance of the Student Worksheets of Electronic (E-LKPD) Contextual Teaching and Learning (CTL) in Learning to Write Description Text during Pandemic COVID-19. *Proceedings of the 3rd International Conference on Language, Literature, and Education (ICLLE 2020)*, 284–287. https://doi.org/10.2991/assehr.k.201109.048

Tarihoran, S. Y., & Anas, N. (2023). Development of STEM-Based E-LKPD on Senses System Material to Improve Creative Thinking Ability. *Jurnal Penelitian Pendidikan IPA*, *9*(5), 2693–2700. https://doi.org/10.29303/jppipa.v9i5.3657

Utami, R. P. (2021). Desain dan Uji Coba Lembar Kerja Peserta Didik Berbasis Learning Cycle 5E pada Materi Larutan Penyangga. *Journal of Education and Teaching*, *2*(1), 94. https://doi.org/10.24014/jete.v2i1.8231