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# The Interaction of Learning Model Implementation and Learning Motivation in Improving Critical Thinking Skills of Elementary School Students

**Fira Nadliratul Afrida[1]✉, Achmad Rifai RC[2] & Yuli Utanto[2]**

[1] Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia
[2] Universitas Negeri Semarang, Indonesia

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## Abstract

This study has purpose to assess the interaction of the learning model (Problem Based Learning and Inquiry Based Learning) and learning motivation to improve the 21st century skills of elementary school students, particularly at the stage of critical thinking. The method applied was quantitative descriptive by interacting learning model, learning motivation to in improving the 21st century skill by using data analysis techniques of validity, reliability, level of difficulty, normality test, homogeneity test and two-way ANOVA. The data collection technique used in this study was in the form of technical tests of essay test and non-test in the form of motivation attitude scale and in-depth interview. Subjects in this study consisted of 64 students. They were divided into two groups, 32 students by using the learning model of PBL model and 32 students by using the learning model of IBL. These results of this study showed that; (1) There is no interaction between the learning model of (PBL and IBL) and learning motivation in improving the 21st century skill of elememtary students in their critical thinking skills. Based on the statistical analysis, obtained sig value higher than 0.05. (2) To improve the critical thinking of studnts, the learning model of PBL is better than the learning model of IBL. (3) The implementation of the learning model of (PBL and IBL) was able to increase students' motivation. (4) The increase of students' motivation with PBL learning model was higher than the IBL learning models.



✉ Correspondence address:
Gajayana No. 50 Malang, Jawa Timur, 65144
E-mail: fira_nadira@gmail.com

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## INTRODUCTION

Education is an important instrument in preparing qualified human resources to enter the era of Asean Economic Community. In the 21st century, Indonesian people will return victorious because of the demographic bonus. Indonesia experienced a heyday cycle of seventh year entering the golden generation of 2045. US-based Partnership for 21st Century Skills (P21), identifying the competencies required in the 21st century is "Communication, collaboration, critical thinking and creativity" (Zubaidah, 2016). Since the advent of global movement calling for a new learning model for the 21st century, has developed the notion that formal education should be changed. These changes are important to bring new forms of learning that is needed in addressing the complex global challenges. Identification of student competencies that should be developed is very important to face the 21st century.

Problems that occur in the education in Indonesia, among others, related to (1) Equity and equality in education, (2) ongoing quality and relevance, and (3) the bureaucracy, governance and accountability. One of the effort to overcome these problems is through learning by teachers inside and outside the classroom. Regardless to the implementation of the curriculum of 2013, still face obstacles that must be handled by educators, one of which is the making of lesson plan (Budianiet, et al. 2017). Lack of understanding of the teachers in designing lesson plans make less learning activities in accordance with scientific approach: to observe, ask, reason, and communicate. Entering 2017, the dynamic development of the curriculum more quickly and significantly, not only in content, but also in the implementation process of learning and assessment system. Revised curriculum learning implementation in 2013 focused on strengthening character education, 21st century skills and high order thinking skills. According to Aeni, et al. (2017), the 21st century skills support learners prepare to think, learn, work, solve problems, communicate, collaborate, and contribute actively. To support those characteristics it is indeed need the learning model and learning process in accordance with the scientific approach.

Learning models relevant to such scientific approach *Problem Based Learning* and Inquiry Based Learning. Fauzi, et al. (2018) stated that Problem Based Learning is one of the innovative learning model that applied to students in solving a problem. This learning model applying cognitive theory and constructively to build knowledge and skills of students. The results of the studies (Park & Choi, 2015; Fatchurrohmah, et al. 2017), explains that PBL can improve learning attitude, disposition of critical thinking, decision-making, and improved its verbal ability of learners.

The model of inquiry learning is a learning model that focuses on the discovery of a concept through Scientific activities undertaken by students during the learning process. scientific activities undertaken aim to give students hands-on experience related to a topic being studied so that students can learn about environmental phenomena based on that experience (Hartini & Ferawati, 2016). Meanwhile, the results of the research conducted by Asriningsih (2015) indicated that the inquiry learning model is able to improve the understanding of the concept and character of students through activities to observe, ask questions, plan for investigation, collect the data, analyze the data, and then draw conclusion.

The main cause of students not getting the skills of the 21st century when the learning is a learning model that teachers use less precise in delivering knowledge. Through appropriate learning models, the students will gain the knowledge and skills of the 21st century, the next hurdle was prohibitive in developing the 21st century skills is the motivation to learn and students who did not study directly in the development of the 21st century skills (Mayasari, T., et al. 2016). Motivation in learning can be defined as something that encourages a person to perform the learning activities. Learning activities would be meaningless if it is not arises in the self-motivation of learners.

Achievement of science based on a survey Trends in Mathematics and Science Study (TIMSS) by The International Achievement (IEA) in 2015 ranks Indonesia's position of 44 from 47 countries with an average value of 397 (IEA, 2016). The main purpose of science education is to assist students in developing high order thinking skills in preparation to face the challenges of everyday life. Saido, et al. (2015) explains that in learning science, students are required to actively construct their own knowledge through discovery. It needs a strong motivation and a supportive environment so that the desire for active learning and creative (Indasari, A. 2016). By having motivation, students will study harder, tenacious, diligent, and have full concentration in the learning process.

The findings of the initial study results show field teachers difficulties in implementing problem-based learning model in order to achieve the 21st century skills (*Communication, collaboration, critical thinking and creativity)*. Teachers are required to complete one theme in four weeks, while there is not sufficient time to complete the learning the 21st century skills-based science learning materials necessary force and motion and discovery process by using model IBL, after understanding, students are able to apply in everyday life. Then the concept of the application is needed problem-solving based learning model that PBL. So the contain is not quite difficult to be understand and focus for improving 21st century especially in critical thinking skill. Several previous studies relevant to the learning model PBL, IBL and 21st century skills (Lusiani, et al. 2016; Rachmadhan, et al. 2017; Efan, K. A., 2017; Hartini, et al. 2016; Zubaidah, 2016). Based on several studies that have been put forward, the research found a gap in the form of limitation in previous studies. There are no studies that found especially in integrating the learning model, learning motivation to improve the 21st century skill; therefore, the researcher conducted a study entitled "The Interaction of Learning Model Implementation and Learning Motivation in Improving critical thinking Skills of Elementary School Students".

## METHODS

This study applied quantitative factorial design research, where the data was analyzed by describing or illustrating the data that has been collected as it does without having purpose to make conclusions or generalizations apply to the public. Furthermore, this study connected the learning model, learning motivation with the increase of the 21st century by using data analysis techniques of validity, reliability, level of difficulty, normality test, homogeneity test and two-way ANOVA. The moderator variable in this study was a student's learning motivation by implementing the learning model of PBL and IBL model of critical thinking skills as presented in figure 1.

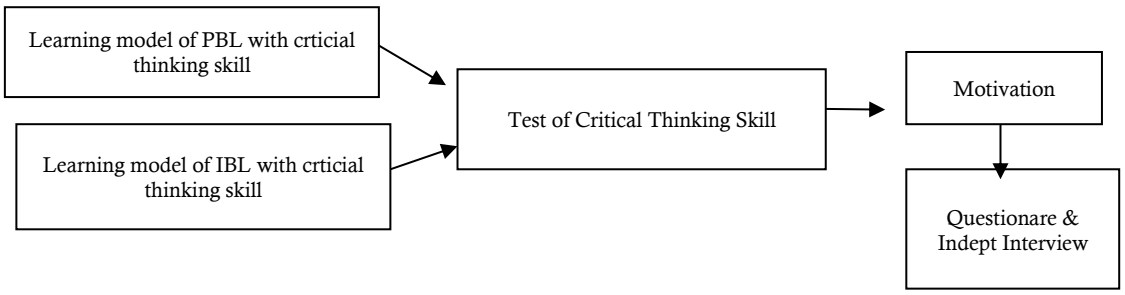


**Figure 1**. Research Design

The population in this study were all fourth grade students of SD N located in Diponegoro area, Tayu, Pati in the Academic Year of 2017/2018. The sampling technique was conducted by the researcher by using a purposive sampling technique and the area were selected based on some consideration, therefore, obtained SD N Tayu Wetan as the samples of the study. This study applied experimental class 1 and experimental class 2 which consist of 32 students for each experimental class. The experimental class 1 was treated by using the learning model of PBL based on the 21st century skills. whereas, the second experimental class was treated by using the learning model of IBL based on the 21st century skills. After given treatment, then the researcher will look at the effects of the two treatments by using descriptive analysis and a hypothesis testing techniques that has been set.

The data collection techniques in this study was by using test and non-test techniques. The tests technique was used to measure the understanding and comprehension of the required material coverage accordance with the learning objectives in the form of essay of *critical thinking* on science learning or science. Arifin (2017) states that in developing measuring instruments critical thinking skills or critical thinking skills which are compiled the specification of instruments, writing instruments, analyze the instruments, trial the instruments, analyze the items of instruments, repair instruments and assembles instrument. Specifications of instrument shows the overall characteristics to be possessed of an instrument. Indicator aspects of critical thinking skills include: (1) Clarification, students be able to mention the information that is known in the problem correctly and clearly; (2) Assesment, students be able to sort information from the problem that needed to solve and the problem with the information that is not needed to solve; (3) Inference, students be able to solve the problem with the knowledge that have known previously; (4) Strategy, students be able to find the other way to solve the problem in the question. The writing of items is a step in defining the indicators into questions whose characteristics correspond with the details on the grille that has been made. Meanwhile, the non-test techniques were used to determine students' motivation by conducting in questionare and in-depth interview. Giving value for the results of the scale has done by converting the ideal average and standard deviation. To determine the measurement result criteria, the average classification and the ideal standard deviation are used by changing the four score as proposed by Eko (2009).

## RESULTS AND DISCUSSION

The results of this study is in the form of quantitative data which was analyze by covering the initial stage and the final stage. The initial stage consists of tests of normality and homogeneity, whereas, the final stage consists of the interaction of two-way ANOVA test. Early stages of the data analysis of this study was to test the homogeneity and normality test data. Based on data analysis by using IBM SPSS Statistics 16 obtained homogeneity and normality test results as can be seen in the following table 1 and table 2.

### Data of Normality and Homogeneity of The Research

Table 1 above provides information that the normal distribution of data with regard to the value the significance of the data. Table 1 shows the sig. on Kolmogrov-smirnov is 0.071, whereas the Shapiro-wilk test obtained sig. 0.321. Both tests obtained a sig. more than 0.05, therefore, the data is included in the normal category.

**Table 1**. Results of Normality Test

| | Kolmogorov-smirnov | | | Shapiro-wilk | | |
|---|---|---|---|---|---|---|
| | Statistics | df | Sig. | Statistics | df | Sig. |
| Standardized residual for value | .106 | 64 | .071 | .978 | 64 | .312 |

a. Significance Lilliefors correction

Based on table 2, obtained sig. 0.56. This sig. is greater than 0.05. Therefore, both data of student learning outcomes based on critical thinking skills are considered as homogeneous data or have the same variant.

**Table 2**. Test of Homogeneity

| F | $df_1$ | $df_2$ | Sig. |
|---|---|---|---|
| 2.125 | 7 | 56 | .056 |

**Interaction of Learning Model with Learning Motivation**

Testing of the interaction learning model and learning motivation in improving critical thinking skills of students based on learning outcomes of IPA by using PBL and IBL models which was integrated with students' critical thinking skills. The data analysis was performed by using two-way ANOVA test as can be seen in the following table 3.

**Table 3**. Interaction of Learning Model and Learning Motivation

| Source | Type III sum of squares | df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Corrected model | 2434.451 | 7 | 347.779 | 2.989 | .010 |
| Intercept | 273.307.567 | 1 | 273,307.567 | 2.349E3 | .000 |
| Model | 65.403 | 1 | 65.403 | .562 | .457 |
| Motivation | 1179.078 | 3 | 393.026 | 3.377 | .024 |
| Model motivation | 839.825 | 3 | 279.942 | 2.406 | .077 |
| Error | 6516.607 | 56 | 116.368 | | |
| Total | 336.635.750 | 64 | | | |
| Corrected total | 8951.059 | 63 | | | |

R squared = .272 (Adjusted R squared = .181)

Based on the above table 3, obtained the interaction learning model and learning motivation with $sig_{value}$ of 0.077. The value is > 0.05 then $H_0$ is accepted, therefore, it is concluded that there is no interaction between the learning model and learning motivation in determining students' critical thinking skills. This happened since the learning outcomes of students by using PBL model was higher than students who used IBL model, the average scores of students' learning motivation by using PBL models was higher than students who used IBL learning model. In the learning process by using both learning models, students tend to be active and ask a lot of questions, since previously students had never been applied to the model of PBL and IBL. In the implementation of learning, PBL model can develop students 'ability to think critically and develop students' ability to adapt to new knowledge, this was indicated by students way in conducting the procedures of PBL where the students was easier to do the PBL such as conducting investigations and present the work. During the implementation of PBL model, learners can share their knowledge in their real life, they can link the knowledge gained by experience that has been done before, so that when teachers stimulate the students, they can construct their own knowledge and develop higher skills.

The learning process in the classroom by using the model PBL begins with providing motivation for students to be actively involved in solving a problem that will be done, then teachers help students learn to define and organize tasks related to the issue. Unlike the IBL learning process, the teacher started the activity by presenting events or phenomena and the students make observations that allow the discovery of the problem. It is very influential on the basic concept of constructing new knowledge in improving students' critical thinking skills. Improvement of 21st century skills, especially in the critical thinking skills of students by using PBL model supported by the characteristics of learners who are very enthusiastic to learn and discover new things so that the teaching and learning process achieve the desired objectives. Whereas, in the IBL model implementation process, indicated less conducive learning situation, students tend to be active, but do not understand the instructions given by the teacher.

The absence of interaction model of learning and motivation to learn in this study is strengthened by the research of Argraw, et al. (2017) who stated that learning model has no significant effect on the motivation to learn. This is because there is a difference in student learning outcomes based model of learning and student motivation influence on student learning outcomes. In table 3 there is also a difference in students' motivation is based on learning outcomes in terms of critical thinking to the level of sig. 0.024. Motivation categorized into four, namely: excellent, good, sufficient and less. From these two experiments obtained an average of motivation with excellent category 78.708, 74.125 good category, with sufficient motivation 68.048 and lack motivation as 68.476. This is due

to the level of student motivation effect on student learning outcomes. In line with the research of Prastiwi (2018) which states that the higher the score of the student science process skills the higher student motivation.

**The Data of The 21st Century Skills of Students (Critical Thinking), by Using The Learning Model of PBL and IBL.**

Data of students' learning outcomes in terms of critical thinking skills based tests students' understanding of materials science teaching force and motion by using elements of critical thinking skills. In the process of classroom learning experiment by using PBL and IBL learning model that integrates seamlessly with Critical Thinking skills skills can be seen in the following table 4.

**Table 4**. Learning Outcomes Viewed from The Student's Critical Thinking Based on Learning Model

| Learning model | Mean | Std. error | 95% Confidence interval | |
|---|---|---|---|---|
| | | | Lower bound | Upper bound |
| Model PBL | 73.458 | 2.165 | 69.121 | 77.795 |
| Model IBL | 71.220 | 2.056 | 67.102 | 75.338 |

Based on table 4 above, the average score of learning outcomes in terms of critical thinking of students by using PBL learning model is 73.458, whereas, the average acquisition of student learning outcomes by using IBL models is 71.220. From these results it is known that student learning outcomes viewed from critical thinking by using the learning model of PBL is higher than IBL. This happened due to the differences in the characteristics of learners who tend to have high motivation during the PBL model implementation. Based on the observation of the students' critical thinking skills, their critical thinking skills differences lies in the time to solve the problems. Learners with the application of PBL learn concepts based on problems, meanwhile, learners with the learning model of IBL answered questions and solve problems based on facts or observations. It is very influential on information processing skills, gather information to solve problems that being analyze. In the end of the learning process by using the model of PBL, students do evaluation process on problems that have been done before. This activity also affects the test results of students' critical thinking skills. Reinforced by the results of the study (Latitude, et al. 2017; Abdullah, et al. 2015; Nugraha, et al. 2017) which states that the PBL model can improve learning outcomes, solving problems and developing thinking skills in solving problems. The result of the calculation of the average student learning outcomes in terms of critical thinking skills in accordance with the aspects of the elements of critical thinking skills is to give a simple explanation, build basic skills, concluded, explaining further and set the strategy and tactics that specifies an action to interact with others (Sunaryo, Y. 2014).

**Data of Student Motivation**

Students' motivation was obtained from the attitude scale. Attitude scale used is the scale enclosed motivation, motivation scale is distributed to all the students to know the development of student motivation. Grating student motivation instrument that includes the student's attention, confidence, willingness to learn and cooperation. (Fauziatul, et al. 2015). In this process, the researcher in collaboration with the classroom teachers to see the development of student motivation after using the learning model of PBL and IBL. Data of student motivation based on learning model can be seen in the following table 5.

Based on the above table 5, obtained an average student motivation of the fourth grade students of SD 01 Sambiroto after using the learning model of PBL is 74.2750, meanwhile, the average of student motivation after using IBL learning model is 68.7344. Motivation of students in the experimental class by using the learning model of PBL is higher than that of student motivation with IBL learning model, the results of the test is in accordance with the acquisition of critical thinking skills of students by using PBL models which is higher than that of students who used IBL learning model. Based on the results of learning motivation attitude scale showed that

the attention of students by using PBL learning model is higher than students who used IBL learning model. Learners have more interest in the subject matter and felt it was important to understand the subject matter. PBL students' willingness to learn is also higher than students in IBL learning model, students felt easier to find information related to the subject matter and were able to connect prior knowledge.

**Table 5**. Student Motivation

| Learning model | Motivation to learn | Mean | Std. deviation | N |
|---|---|---|---|---|
| Model PBL | Very good | 75.2500 | 11.98668 | 10 |
| | Good | 75.2500 | 5.32943 | 10 |
| | Enough | 74.1667 | 11.98958 | 9 |
| | Less | 69.1667 | 9.46485 | 3 |
| | Total | 74.3750 | 9.79631 | 32 |
| Model IBL | Very good | 82.1667 | 6.09645 | 6 |
| | Good | 73.0000 | 8.90926 | 5 |
| | Enough | 61.9286 | 11.95160 | 14 |
| | Less | 67.7857 | 14.59697 | 7 |
| | Total | 68.7344 | 13.27986 | 32 |
| Total | Very good | 77.8438 | 10.51462 | 16 |
| | Good | 74.5000 | 6.49175 | 15 |
| | Enough | 66.7174 | 13.18989 | 23 |
| | Less | 68.2000 | 12.74363 | 10 |
| | Total | 71.5547 | 11.91974 | 64 |

The results of observations conducted by the researcher during the learning process, the students with the application of PBL have higher enthusiasm compared to the students with IBL. Learners with a greater interest towards learning will help them understand the material being taught. During the learning process of students always want to try to find new things to explore knowledge. In terms of communication and collaboration PBL students present the results of the investigation report has been done with confidence and show the ability to work efficiently with diverse groups. Other factors that influence student motivation of the fourth grade students of SD N 01 Sambiroto is the lack of provision of extrinsic motivation that can provide guidance and raise aspirations so that students have a high learning spirit.

The results are consistent with the theory that factors that increase students' achievement motivation is high. Agustya (2017) states that motivation is an important factor in determining student achievement so that motivation is a factor in the successful development and learning process. Motivation is also a driving force that has been realized in the form of behavior. The driving force is contained in a person to perform certain activities to achieve one goal.

## CONCLUSION

Based on data analysis and discussion, it can be concluded that; there is no significant interaction between the learning model of (PBL and IBL) and learning motivation in improving the skills of the 21st century, particularly on the critical thinking skill of elementary school students. Based on the statistical analysis results, obtained Sig greater than 0.05; to improve the students' critical thinking skill, PBL learning model is better than the IBL learning model. The implementation of learning model of (PBL and IBL) was able to increase students' motivation and the increase of students' motivation by using the learning model of PBL is higher than the IBL learning model.

## REFERENCES

Abdullah, D., Mastur, Z., & Sutarto, H. (2015). Keefektifan Model Pembelajaran *Problem Based Learning* Bernuansa Etnomatematika terhadap Kemampuan Pemecahan Masalah Siswa Kelas VIII. *Unnes Journal of Mathematics Education*, 4(3), 285-291. https://journal.unnes.ac.id/sju/index.php/ujme/article/view/9056

Aeni, N., Prihatin, T., & Utanto, Y. (2017). Pengembangan Model Blended Learning Berbasis Masalah pada Mata Pelajaran Sistem Komputer. *Innovative Journal of Curriculum and Educational Technology*, 6(2), 27-38. https://journal.unnes.ac.id/sju/index.php/ujet/article/view/15642

Agustiya, F., Sunarso, A., & Haryani, S. (2017). Influence of CTL Model by Using Monopoly Game Media to The Students' Motivation and Science Learning Outcomes. *Journal of Primary Education*, 6(2), 114-119. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/17559

Arifin, Z. (2017). Mengembangkan Instrumen Pengukur *Critcal Thinking Skills* Siswa pada

Pembelajaran Matematika Abad 21. *Theorems (The Original Research of Mathematics)*, 1(2), 92-100. http://jurnal.unma.ac.id/index.php/th/article/view/383

Asriningsih, K. K. A., Supardi, K. I., & Wardani, S. (2015). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbasis Lingkungan terhadap Kemampuan Pemahaman Konsep dan Karakter pada Siswa Kelas V SD. *Journal of Primary Education*, 4(2), 132-138. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/10973

Ates, H. K. & Yilmaz, P. (2018). Investigation of the Work Motivation Levels of Primary School Teachers. *Journal of Education and Training Studies,* 6(3), 184-196. https://eric.ed.gov/?id=EJ1171044

Budiani, S., Sudarmin, & Syamwil, R. (2017). Evaluasi Implementasi Kurikulum 2013 di Sekolah Pelaksana Mandiri. *Innovative Journal of Curriculum and Educational Technology*, 6(1), 45-57. https://journal.unnes.ac.id/sju/index.php/ujet/article/view/15998

Fauziatul, F., Wiwik, K., & Subandi. (2015). Pengaruh *Problem Solving* Berkelompok terhadap Motivasi Belajar, Kemampuan Berpikir Kritis, dan Hasil Belajar Siswa. *Jurnal Ilmu Pendidikan*, 21(1), 106-114. http://journal.um.ac.id/index.php/jip/article/view/6493

Fatchurrohmah, A., Sarwi, S., & Utsman, U. (2017). Pengaruh *Problem Based Learning* melalui Demonstrasi dan Diskusi terhadap Kemampuan Verbal. *Journal of Primary Education*, 6(2), 140-146. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/17567

Fauzi, M., Hartono, H., & Utomo, U. (2018). The Role o Students' Critical Thinking and Interpersonal Intelligence in Understanding The Concept of Science. *Journal of Primary Education*, 7(1), 25-33. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/21392

Hartini, I., & Ferawati, F. (2016). Effectiveness of Inquiry Learning and Problem-Based Learning on Students' Achievement in Science Cource. *Jurnal Inovasi Pendidikan Dasar*, 2(1), 27-34. http://jipd.uhamka.ac.id/index.php/jipd/article/view/35

IEA. (2015). *Student Achievement Overview (Science) Grade 4*. http://timss2015.org/wp-content/uploads/filebase/full%20pdfs/T15-International-Results-in-Science-Grade-4.pdf

Indasari, A. (2016). Peningkatan Motivasi Belajar Siswa Kelas IV dalam Pembelajaran IPA melalui Penerapan Metode Penemuan Terbimbing. *Jurnal Pendidikan Guru Sekolah Dasar,* 20(5), 1-12. http://journal.student.uny.ac.id/ojs/index.php/pgsd/article/view/2551

Lusiani, L. P. Semara, P & Surya, M. (2016). Penerapan PBL dengan *Brainstorming* untuk Meningkatkan Kemamuan Pemecahan Masalah dan Kompetensi Pengetahuan IPA. *MIMBAR PGSD Undiksha*, 4(1), 1-10. https://ejournal.undiksha.ac.id/index.php/JJPGSD/article/view/7009

Mayasari, T., Asep, K., Dadi, R., & Ida, K. (2016). Apakah Model Pembelajaran *Problem Based Learning* dan *Project Based Learning* Mampu Melatihkan Keterampilan Abad 21. *Jurnal Pendidikan Fisika dan Keilmuan*, 2(1), 48-55. http://e-journal.unipma.ac.id/index.php/JPFK/article/view/24

Nugraha, A., Suyitno, H., & Susilaningsih, E. (2017). Analisis Kemampuan Berpikir Kritis Ditinjau dari Keterampilan Proses Sains dan Motivasi Belajar melalui Model PBL. *Journal of Primary Education*, 6(1), 35-43 https://journal.unnes.ac.id/sju/index.php/jpe/article/view/14511

Park, S & Choi, S. (2015). Effects of Problem-based Learning on the Learning Attitudes, Critical Thinking Disposition and Problem-Solving Skills of Nursing Students: Infant Care. *Advanced Science and Technology Letters*, 103, 192-196. https://pdfs.semanticscholar.org/507b/9146c159de0082c701c8977d700d9be3dba5.pdf

Prastiwi, D., Sri Haryani, S. H., & Lisdiana, L. (2018). The Effectiveness of Guided Inquiry with Mind Mapping to Improve Science Process Skills and Learning Motivation. *Journal of Primary Education*, 7(2), 195-203. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/23535

Rachmadhan, O., Zainal, A., & Hana, S. (2017). Efektivitas Penggunaan Model Pembelajaran Inkuiri terhadap Peningkatan Keterampilan Proses Siswa Kelas IV di Sekolah Alam Cikeas. *Educational Technologia,* 3(1), 1-12. http://ejournal.umm.ac.id/index.php/jp2sd/article/view/2801

Saido, G. M., Siraj, S., Nordin, A. B. B., & Amedy, A. (2015). Higher Order Thinking Skills among Secondary School Students in Science Learning. *Malaysian Online Journal of Educational Sciences*, 3(3), 13-20. https://eric.ed.gov/?id=EJ1085914

Sunaryo, Y. (2014). Model Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Kritis dan Kreatif Matematik Siswa SMA di Kota Tasikmalaya. *Jurnal Pendidikan dan Keguruan,* 1(2), 41-51. http://pasca.ut.ac.id/journal/index.php/JPK/article/view/58

Zubaidah, S. (2016). *Keterampilan Abad Ke 21: Keterampilan yang diajarkan melalui Pembelajaran. Seminar Nasional Pendidikan. STKIP Persada Khatulistiwa Sintang Kalimantan Barat*. https://www.researchgate.net/publication/318013627_keterampilan_abad_ke-21_keterampilan_yang_diajarkan_melalui_pembelajaran