Development: Studies in Educational Management and Leadership
January – Juni Vol. 4 No.1 (2025) | P. 37-52
e-ISSN: 2964-0253
DOI: https://doi.org/10.47766/development.v4i1.6622

Educational Management Courses: Leveraging Problem-Based Learning to Improve Students' Motivation to Learn

Hasnadi[1*]
[1] Sekolah Tinggi Agama Islam Teuku Dirundeng Meulaboh.

ABSTRACT
The purpose of this study is to measure the improvement in learner motivation prior to and subsequent to the implementation of the problem-based learning model. This quantitative study used a single-group pretest–posttest design with a sample of 42 students in the Educational Management course. Data collection was conducted in the odd semester of the 2023/2024 academic year using a motivation questionnaire developed based on Keller's theory (1987). The data were analyzed quantitatively. The results show a significant difference in learning motivation before and after the implementation of PBL. The average increase in motivation was 9.51, with an average N-gain score of 0.23, which is classified as low. These findings indicate that PBL can increase student learning motivation in the Education Management course, even though the level of increase is still in the low category. In conclusion, the application of PBL is effective in encouraging increased motivation, but accompanying strategies—such as strengthening feedback, task differentiation, or technological support—are needed to optimize its impact.

OPEN ACCESS

ARTICLE HISTORY
Received: 19-08-2024
Accepted:25-06-2025

KEYWORDS
Educational Management Courses, Problem-Based Learning, Student Learning Motivation.

: https://doi.org/10.47766/development.v4i1.6622
Corresponding Author: Hasnadi | hasnadi@staindirundeng.ac.id

INTRODUCTION

Effective learning focuses on improving abilities and skills in learning, students are more active, think critically and independently in learning (Sari et al., 2022). The lecturer competence factor is the main factor for students in carrying out activities in the lecture process (Dias & Braganza, 2022). Lecture management carried out by lecturers needs to formulate innovative strategies in order to get the students recognised all the information that is delivered. Innovative and creative lecturers will always create ideas in designing new learning systems that are able to enable students to attain their purpose in learning optimally.

The results of the researchers' observations during the educational management lecture process at STAIN Teungku Dirundeng Meulaboh-Indonesia showed that students were less active in attending lectures, students had not been able to complete assignments and had not been able to solve problems given by the lecturer. This can be seen from students who have not been active in discussions, students do not ask questions and do not express their opinions during lecture activities. Students seem less enthusiastic in attending lectures.

Based on the results of interviews with researchers as lecturers with students, it shows that the lack of student motivation in attending lectures is caused by studying in the afternoon. Students are tired of attending other lectures since the morning. Lecturers have tried to do several ways to make their students more active in learning, for example applying various lecture methods, using interesting lecture media. However, the lecturer also acknowledged that what was being done was also not optimal and needed innovations in managing lectures, especially educational backgrounds and coming from different regions.

Problems for students who take education management courses are related to motivation and learning independence. Motivation is an individual insistence internally and externally to take an action to achieve the expected goals. This illustrates that students who want their learning outcomes to increase, their learning motivation also increases. Thus, student learning motivation affects their creativity (Bhakti et al., 2018; Fischer et al., 2019; Zhang, 2022) and motivation affects learning outcomes (Hediansah & Surjono, 2019; Ritonga et al., 2020). Students' motivation and activeness in the lecture process

will be increased and more effective if using methods that are diverse and correspond with the student's circumstances.

One of the strategy to overcome the problem of learning motivation is to implement an enticing lecture model for students (Twyman & Heward, 2018). The lecture model that can increase student motivation in learning is the Problem Based Learning (PBL) model (Fatimahwati et al., 2021). Problem based learning focuses on teaching students to be able to solve the actual problem on regular basis so that students are actively involved in learning to figure out solutions to problems given by the lecturer. PBL affects students' critical thinking skills (Ulger, 2018; Saiful et al., 2020; Fadilla et al., 2021; Sangka, 2022; Irawati & Sulisworo, 2023) and student learning outcomes (Umaira et al., 2019; Kartamiharja et al., 2020), strengthening students' character (Martini et al., 2018), improve students' digital literacy (Rizal et al., 2021) and can lead up students in analyzing, interpreting, and reporting quantitative data (Erwin Jr, 2015).

PBL is a courses model that focuses on the concept of self-discipline, assisting learners to be enthusiastically involved in conducting investigations, solving problems, completing lecture assignments so that they can improve student motivation and skills. PBL improves students' knowledge acquisition and increases the efficiency of their lectures (Jalani & Sern, 2015), increases the possibility of conceptual change (Loyens et al., 2015), helps students identify relevant lecture needs thereby improving courses outcomes (McLoughlin & Darvill, 2007).

PBL as a learning model is centered on the learning process in order to get students follow the learning experience to get them able to organize, research, and solve problems in life. Student activity and creativity are expected to develop and improve by applying the PBL model. The implementation of the PBL model can elevate the outcomes of learning (Argaw et al., 2016; Nursa'ban et al., 2019). The application of PBL can lead to positive attitude changes such as responsibility, confidence, and cooperation (Asril et al., 2022). The PBL lecture model can increase students' learning motivation (Fukuzawa & Cahn, 2019) and is also able to facilitate their problem solving abilities (Park, 2019; Kök & Duman, 2023).

The focus of the problem given by the lecturer in the education management course is on educational problems that occur in Indonesia,

especially the problem of education in Aceh Province. The problem solving process in PBL is believed to be able to improve understanding of educational concepts and increase students' competence to figure out the solution to problems. The PBL model points out the scientific approach in the progress of lecturing and utilize the scientific method in dealing with an obstacle. The objective of this study was to establish the enhancement in student motivation to learn trough the fulfillment of the PBL model in education management courses.

The oucomes of this study can support positively to theoretical and practical development. Practically, this research is supposed to be useful for learners so as to elevate motivation, learning development, improve thinking skills and learners activity in attending lectures so that the quality of graduates is further improved.

METHODS

This research is a quantitative research. The quantitative research design in this analysis was a one group pretest-posttest design model to measure the differences in student motivation in learning preceding and following the implementation of the PBL model. This research design was chosen with the aim of finding out whether or not there was an increase in student learning motivation by applying the PBL model to educational management courses.

The participants in the research were all pupils of STAIN TeungkuDirundeng Meulaboh who took the odd semester education management course for the 2023/2024 academic year, totaling 42 students. Sampling was carried out by purposive sampling. The technique for determining the sample is by considering students who are taking educational management courses. The research sample is the entire population or total sampling because the total population is less than 100.

Table 1: Demograpical characteristics

Variable	*Frequecy*	*Percentage*
Gender		
Male	19	45,2
Female	23	54,8
Study Programs		
Education Management	12	28,6
Arabic Language Education	11	26,2
Elementary school education	19	45,2

-

Total	42	100

Research variables consist of independent variables and dependent variables. The instrument used in this research was a learning motivation questionnaire. The instrument in this study is a motivation questionnaire which was developed based on Keller (1987) theory. The questionnaire was developed based on motivation indicators, namely Attention, Relevance, Confidence, and Statification (ARCS). The motivation questionnaire was not tested for validity and reliability because it was valid and reliable based on the concept developed by Keller (1987). The researcher only validated the content for the suitability of the sentence editor. Content validation was carried out by 2 lecturers of educational psychology at STAIN Teungku Dirundeng Meulaboh.

The research was conducted in September 2023 at STAIN Teungku Dirundeng Meulaboh, Indonesia. Data collection was carried out before applying the PBL model and after applying the PBL model. Student learning motivation was measured using a motivational questionnaire containing 36 statements consisting of 26 positive statements and 10 negative statements. The motivation questionnaire used a Likert scale containing four answer options, namely "strongly agree", "agree", "disagree" and "strongly disagree". The research sample was given a motivation questionnaire and asked to answer statements and then the results would be recapitulated and categories determined. How to calculate the overall value of each indicator and find the average using the following formula.

$$\text{Average score} = \frac{\sum Respondent's\ score}{\sum Statement}$$

After obtaining the average value, the results are interpreted as follows.

Table 2: Range of student learning motivation scores

Average score	Category
4,50 – 5,00	Veery good
3,50 – 4,49	Good
2,50 – 3,49	Acceptable
1,50 – 2,49	Poor
1,00 – 1,49	Very poor

The results of the student motivation questionnaire were carried out with a t test to determine whether there were differences in students' learning

motivation before and after implementing the PBL model in educational management courses. The increase in students' learning motivation was analyzed using N-gain. The formula for calculating N-gain is as below.

$$N\text{-}gain = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}}$$

Information:
S_{post} = final test score
S_{pre} = initial test score
S_{maks} = maximum score

Table 3: N-gain interpretation

N-gain	Category
N-gain >0,7	High
0,3 ≤ N-gain ≤ 0,7	Medium
N-gain < 0,3	Low

RESULT AND DISCUSSIONS

RESULT

Student learning motivation prior to and subsequent to the implementation of the PBL model was measured to see a rise in student motivation in learning. After the student's motivation questionnaire was filled in via the google form, then the normality test was conducted, the paired sample T Test was conducted, looking for the average motivation before and after implementing PBL, and calculating the N-gain to measure the level of increase in student learning motivation. The results of research respondents' answers before and after applying the PBL model were tested for normality. The results of the normality test can be seen in table 2.

Table 4: Normality test results before and after applying PBL

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Motivation before implementing PBL	,109	42	,200*	,978	42	,594
Motivation after implementing PBL	,088	42	,200*	,963	42	,191

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Output table 4 shows the motivation of students before and after attending lectures by applying PBL. Data with normal distribution or not will be seen from Shapiro-Wilk because the number of samples is less than 50

people. Shapiro-wilk motivation before implementing PBL is sig = 0,594 = 59,4% 5%. Shapiro-wilk motivation after implementing PBL is sig = 0.191 = 19.1% 5%. This shows that the data on student learning motivation before and after implementing PBL is normally distributed. After testing the normality of the data, then proceed with the paired sample t test. The paired sample t test showed that the paired sample had a significant change or not based on its significance value. The results of the paired sample t test can be seen in table 5.

Table 5: Test results of paired samples test

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	f	Sig. (2-tailed)
PPair 1	Motivation before implementing PBL - Motivation after implementing PBL	-10,690	4,217	,651	-12,004	-9,376	-16,431	41	,000

Table 5 depicts that the significance value (2-tailed) is 0.000. This means $p < 0.05$. Motivation before and motivation after attending lectures by applying PBL experienced significant changes (differences). This shows that there is a serious impact on the difference in method exercised to students who take education management lectures. Thus, it can be stated that the problem based learning implementation is proven to elevate student motivation to learn in education management courses. The results of the t-test of student motivation preceding and following the implementation of the PBL model in education management courses are shown in table 6.

Table 6: The results of the t-test of students' motivation before and after the implementation of PBL

Class	Tcount	T_{table}	Intepretation	Conclusion
• Education management	16,431	2,023	• $T_{count} > T_{table}$	There is a significant difference

Table 6 depicts that the value of T_{count} and T_{table} of student motivation to learn before and after the PBL model is applied is $T_{count} > T_{table}$. Thus, it can be concluded that there is a compelling distinction in pupil learning motivation between before and after the PBL model was applied.

The increase in student learning motivation prior to and subsequent to the application of the PBL model in education management courses is presented in table 7.

Table 7 Category N-gain student motivation by applying the implementation of PBL

Class	Average motivation		Gain	N-Gain	Interpretatation
	Before	After			
Education management	80,95	91,64	9,51	0,23	Low

Table 7 shows that the learning motivation of students who take education management courses for the 2022/2023 academic year has increased. The average student learning motivation before PBL was applied was 80.95 and the average student learning motivation after PBL was applied was 91.64. The N-gain score is 0.23 which indicates that the increase in students' learning motivation by fulfilling the PBL model to the education management course is in the low category.

The motivation improvement of student to learn by implementing the PBL model is presented by the number and percentage garnered from the responses to student motivation questionnaires. The N-gain of student learning motivation by fulfilling the PBL model is 6 pupils with low motivation and 36 students with low motivation. The number and percentage of N-gain student motivation by applying the PBL model in education management courses are depicted in figure 1.

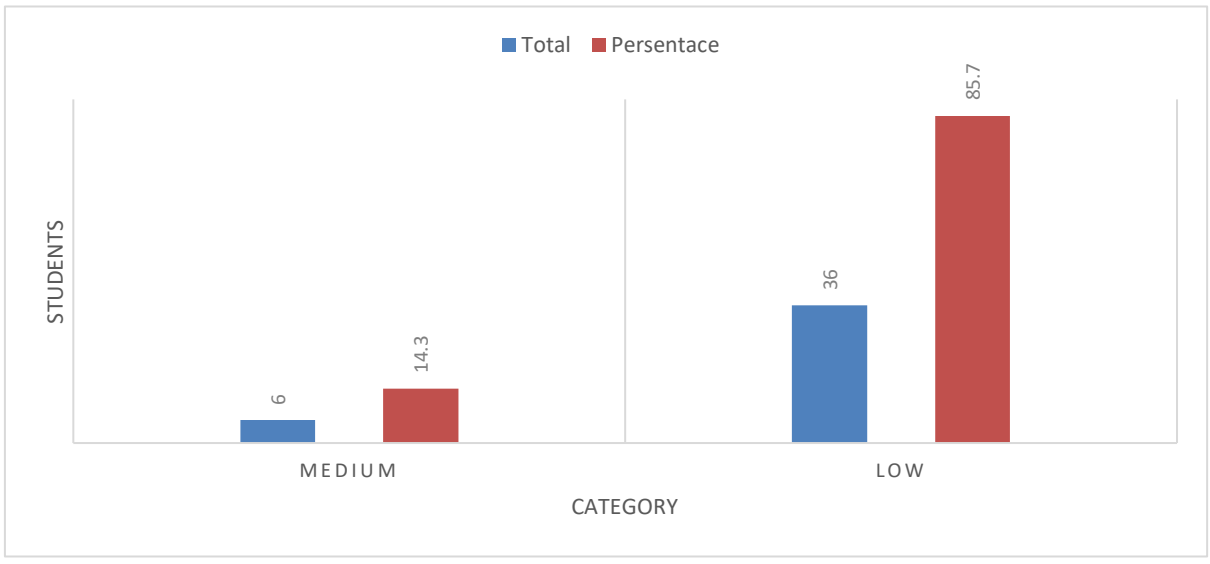

Figure 1 N-Gain of student learning motivation by applying the PBL

Student learning motivation increased subssequent to the PBL model accomplishment to the education management course. The percentage of students' learning motivation after the PBL model was applied was 14.3% which indicates that the category was medium. After the PBL model was implemented, the percentage of student desire to learn was 85.7% which was in the low category. The average increase in student motivation by applying the PBL model in education management courses is low.

Discussion

The discussion section aims to: (1) answer the problem formulation and research or study questions; (2) shows how the findings were obtained or found; (3) interpret the findings; (4) linking research findings or studies with established knowledge structures; and (5) bring up new theories or modifications to existing theories, by comparing the results of previous studies that have been published in reputable journals.

Students' motivation to learn by fulfilling the problem-based learning model in education management courses is increasing. Student learning motivation is higher than the motivation before implementing PBL. The rise in student learning motivation is generated by the treatment, namely the application of a more interesting and student-centered PBL learning model so that learning is more student-centered.

At the planning stage, the lecturer designs the lecture plan. Learning planning is carried out as the first step for lecturers to prepare and determine the appropriate actions that will be taken during the learning process so that the learning process can take place effectively. Learning planning should be designed according to the needs and characteristics of students. Lecturers need to carry out an initial assessment to determine the needs and characteristics of

students in learning. Lecturers must map the learning styles preferred by students, such as audio, visual and audio-visual learning styles.

Lecturers design learning and provide contextual problems according to the material being taught, given to students through student worksheets. Student worksheets are designed to be interesting and relate to real events in everyday life. Student worksheets need to be designed taking into account the results of the initial assessment to adapt to student needs. Learning and assessment are one cycle. Assessments provide information about learning that needs to be designed and assessments are used to check the effectiveness of ongoing learning. Therefore, the priority assessment is a formative assessment that is oriented towards developing student competencies. Lecturers and students need to design assessments that are carried out at the beginning of learning, during learning, and at the end of learning. The suitability of the concepts studied to the environment will have an impact on long-term knowledge.

Learning planning includes learning objectives, learning steps, and learning assessments which are prepared in the form of documents that are flexible, simple, and contextual. Problems about education management are given to students through student worksheets that are made more interesting and relevant to the actual events on regular basis. The suitability of the concepts studied with the environment will have an impact on long-term knowledge. The results of Yew & Goh (2016) concluded that problem based learning affects student learning outcomes, students are superior and more consistent in understanding knowledge for the long term.

At the implementation stage, the lecturer carries out learning according to the plan that has been designed. Lecturers can use learning planning as a guide in implementing learning. Lecturers need to convey the initial steps at the start of learning by conveying learning objectives, learning indicators, and conditioning students to be ready to take part in learning. In core activities, lecturers must pay attention to learning steps in accordance with the steps of the problem-based learning model. At this stage, lecturers need to pay attention to time so that the learning process is carried out according to the planned time. In the final stage, lecturers and students need to conclude the material studied and reflect. Then it is necessary to convey follow-up actions and material to be studied at the next meeting.

The lecture material given to students contains issues that come from news, videos and daily events in the student environment. The problems raised are familiar with student life and relate to the interests or benefits for the community and the environment so that every student is interested in participating in learning well (Hasnadi et al., 2024). The PBL model needs to be applied in learning, because it has a significant effect on the problem solving process and can improve creative thinking (Simamora et al., 2017; Ulger, 2018). Therefore, support from schools is needed to equip teachers in implementing PBL (Li & Chen, 2018).

The PBL model accomplishment in education management courses supposes to enhance the stimulus of learning of STAIN Teungku Dirundeng Meulaboh students. The increase in student motivation is because students are supposed to think actively and figure out solutions to the problems given by the lecturer. Student learning motivation is shown in a good attitude in following the lecture process, enthusiasm in doing assignments until the task is completed, working more independently, confident to defend their opinions, often seeking information and solutions from various sources to solve problems given by the lecturer. The outcomes of the analysis (Da Silva et al., 2018) showed that students were more active in asking and answering questions during discussions by applying the PBL model. This confirms that the PBL learning model can elevate student learning motivation (Chiang & Lee, 2016; Jirajarupat et al., 2022).

Student learning motivation can function as an effort to achieve good learning achievement (Bakar et al., 2022). Learning motivation is a person's effort to learn better so as to lead to optimal learning outcomes. It figured copelling distinctions in the outcomes of learning between pupils who possess greater motivation and those who possess lower motivation (Pada et al., 2016; Shiny & Saravanan, 2022).

The PBL model implementation can lead up students to understand the material taught by the lecturer, can create a pleasant learning atmosphere, can increase learning motivation and can connect the material being studied with real things that exist in life. Students gave a positive response to the PBL learning model activities because they felt more understanding, increased motivation and interest in learning.

Lecturers evaluate each lesson that has been carried out. Learning evaluation needs to be done as a way to see what goals have been achieved and what have not been achieved. Learning objectives that have not been achieved need to analyze the causes and find solutions to the problems that occur. Goals that have been achieved need to be maintained and improved so that they are better for subsequent learning. Learning evaluation should be carried out by considering learning principles that encourage students to actively learn, think critically and creatively and take into account the local context.

CONSLUSION

The fulfillment of the PBL model can elevate student motivation in learning in education management courses. There was a serious distinction between students' learning motivation prior to and subsequent to the PBL model was accomplished. Student learning motivation following the implementation PBL is higher than student learning motivation before implementing PBL. The average increase in student motivation is 9.51. The average N-gain score is 0.23 which indicates that the category is low in enhancing student motivation to learn.

According to the outcomes of the analysis, it is recommended to lecturers or other educators to apply the PBL model to correspond with the lecture material and provide more varied and interesting learning resources so as to increase student learning motivation. Further researchers are advised to be able to research the fulfillment of the PBL model on other materials, other variables or compare the PBL model accomplishment with other models.

REFERENCES

Argaw, A. S., Haile, B. B., Ayalew, B. T., & Kuma, S. G. (2016). The effect of problem based learning (PBL) instruction on students' motivation and problem solving skills of physics. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(3), 857–871. https://www.ejmste.com/download/the-effect-of-problem-based-learning-pbl-instruction-on-students-motivation-and-problem-solving-4694.pdf

Asril, E., Jalinus, N., & Fahmi Rizal, A. (2022). The Effectiveness Of The Problem Based Flipped Classroom Learning Model In Programming Algorithm Courses. *Journal of Positive School Psychology*, *6*(8), 6225–6230. http://mail.journalppw.com/index.php/jpsp/article/view/10916

Bakar, N. A., Alsmadi, M. S., Ali, Z., Shuaibu, A., & Solahudin, M. H. (2022). Influence of Students' Motivation on Academic Achievement Among Undergraduate Students in Malaysia. *Journal of Positive School Psychology*, *6*(2), 3443–3450. http://mail.journalppw.com/index.php/jpsp/article/view/2300

Bhakti, Y. B., Astuti, I. A. D., & Agustina, I. (2018). The influence process of science skill and motivation learning with creativity learn. *Journal of Education and Learning*, *12*(1), 30–35. https://doi.org/DOI: 10.11591/edulearn.v12i1.6912

Chiang, C.-L., & Lee, H. (2016). The effect of project-based learning on learning motivation and problem-solving ability of vocational high school students. *International Journal of Information and Education Technology*, *6*(9), 709–712. http://www.ijiet.org/vol6/779-EP00028.pdf

Da Silva, A. B., de Araújo Bispo, A. C. K., Rodriguez, D. G., & Vasquez, F. I. F. (2018). Problem-based learning: A proposal for structuring PBL and its implications for learning among students in an undergraduate management degree program. *Revista de Gestão*. https://www.emerald.com/insight/content/doi/10.1108/REGE-03-2018-030/full/html

Dias, M. V., & Braganza, S. J. (2022). Motivation: A key factor impelling Student Participation in Sports. *Journal of Positive School Psychology*, 10172–10177. https://www.journalppw.com/index.php/jpsp/article/view/6545

Erwin Jr, R. W. (2015). Data Literacy: Real-world Learning through Problem-Solving with Data Sets. *American Secondary Education*, *43*(2), 18. https://www.jstor.org/stable/43694208

Fadilla, N., Nurlaela, L., Rijanto, T., Ariyanto, S. R., Rahmah, L., & Huda, S. (2021). Effect of problem-based learning on critical thinking skills. *Journal of Physics: Conference Series*, *1810*(1), 12060. https://al-kindipublisher.com/index.php/jeltal/article/view/5164

Fatimahwati, F., Yusrizal, Y., Fitri, Z., Rahmatan, H., & Khaldun, I. (2021). Application of problem based learning model with sets vision to increase students' learning motivation on environmental pollution material. *Jurnal Penelitian Pendidikan IPA*, *7*(3), 310–316. https://pdfs.semanticscholar.org/5066/8dbe4438b1348b1d1544963e5a325b141644.pdf

Fischer, C., Malycha, C. P., & Schafmann, E. (2019). The influence of intrinsic motivation and synergistic extrinsic motivators on creativity and innovation. *Frontiers in Psychology*, *10*, 137. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00137/full

Fukuzawa, S., & Cahn, J. (2019). Technology in problem-based learning: helpful

or hindrance? *The International Journal of Information and Learning Technology*, *36*(1), 66–76. https://www.emerald.com/insight/content/doi/10.1108/IJILT-12-2017-0123/full/html

Hasnadi, Sudibyo, H., & Zikriati. (2024). School Based Management: A Strategy to Improve the Quality of Education. *JoIEM (Journal of Islamic Education Management)*, *5*(1), 60–74. https://doi.org/10.30762/joiem.v5i1.3125

Hediansah, D., & Surjono, H. D. (2019). Building Motivation and Improving Learning Outcomes with Android-Based Physics Books: Education 4.0. *Anatolian Journal of Education*, *4*(2), 1–10. https://eric.ed.gov/?id=EJ1244443

Irawati, F. I. M., & Sulisworo, D. (2023). Utilising Smart Aater Monitoring with IoT in Science Learning with Problem-based Learning Model: Impact on Critical Thinking Skills and the Role of Learning Interest. *Journal of Pedagogical Research*, *7*(5), 69–80. https://www.ijopr.com/article/utilising-smart-water-monitoring-with-iot-in-science-learning-with-problem-based-learning-model-13734

Jalani, N. H., & Sern, L. C. (2015). The example-problem-based learning model: applying cognitive load theory. *Procedia-Social and Behavioral Sciences*, *195*, 872–880. https://www.sciencedirect.com/science/article/pii/S1877042815038458

Jirajarupat, P., Wanta, C., Vasinarom, M., & Phetruchee, M. (2022). The Techniques and Process of Teaching Arts and Dance in Higher Education by Project based Learning Method. *Journal of Positive School Psychology*, *6*(3), 9560–9566. https://journalppw.com/index.php/jpsp/article/view/5374

Kartamiharja, M. R., Sopandi, W., & Anggraeni, D. (2020). Implementation of problem-based learning (PBL) approach in chemistry instructional with context of tofu liquid waste treatment. *International Journal of Learning, Teaching and Educational Research*, *19*(5), 47–77. www.ijlter.net/index.php/ijlter/article/view/331

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of Instructional Development*, *10*(3), 2–10. https://link.springer.com/article/10.1007/bf02905780

Kök, F. Z., & Duman, B. (2023). The effect of problem-based learning on problem-solving skills in English language teaching. *Journal of Pedagogical Research*, *7*(1), 154–173. https://www.ijopr.com/article/the-effect-of-problem-based-learning-on-problem-solving-skills-in-english-language-teaching-12944

Li, H., & Chen, Y. (2018). Conceptions on PBL facilitator's role: A perspective of Chinese teacher. *International Journal of Learning, Teaching and Educational Research*, *17*(9), 18–33. ijlter.myres.net/index.php/ijlter/article/view/640

Loyens, S. M. M., Jones, S. H., Mikkers, J., & van Gog, T. (2015). Problem-based learning as a facilitator of conceptual change. *Learning and Instruction*, *38*, 34–42. https://www.sciencedirect.com/science/article/abs/pii/S0959475215000201

Martini, M., Rosdiana, L., Subekti, H., & Setiawan, B. (2018). Strengthening Studentsâ€™ Characters and Ecopreneurship through Science, Environment, Technology, and Society Course. *Jurnal Pendidikan IPA Indonesia*, *7*(2), 162–171. https://journal.unnes.ac.id/nju/index.php/jpii/article/view/14338

McLoughlin, M., & Darvill, A. (2007). Peeling back the layers of learning: A classroom model for problem-based learning. *Nurse Education Today*, *27*(4), 271–277. https://www.sciencedirect.com/science/article/abs/pii/S0260691706000621

Nursa'ban, E., Masykuri, M., & Yamtinah, S. (2019). Improving student learning outcomes in science subjects through the implementation of PBL-based module. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *5*(2), 269–276. https://ejournal.umm.ac.id/index.php/jpbi/article/view/7534

Pada, H., Setyosari, P., Degeng, I. N. S., & Widiati, U. (2016). The influence of interactive learning model vs direct learning model and achievement motivation on learning outcomes english discourse reading comprehension grade VIII Kupang. *International Conference on Education (ICE2) 2018: Education and Innovation in Science in the Digital Era*, 355–360. https://core.ac.uk/download/pdf/267023574.pdf

Park, I.-S. (2019). The Effect of Problem-based Learning Strategies (PBL) on Problem Solving Skill: A Meta-Analysis. *Journal of the Korea Convergence Society*, *10*(10), 197–205. https://koreascience.kr/article/JAKO201931663568185.page

Ritonga, A. A., Abdillah, A., & Ilba, H. (2020). The Influence of Mind Mapping Strategy and Achievement Motivation on Learning Outcomes of Sacrificial Materials in MIS Raudlatul Uluum. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, *3*(4), 3634–3646.

Rizal, R., Rusdiana, D., Setiawan, W., & Siahaan, P. (2021). Development of a Problem-Based Learning Management System-Supported Smartphone (PBLMS3) Application Using the ADDIE Model to Improve Digital Literacy. *International Journal of Learning, Teaching and Educational Research*, *20*(11). ijlter.net/index.php/ijlter/article/view/723

Saiful, A., Utaya, S., Bachri, S., Sumarmi, S., & Susilo, S. (2020). Effect of Problem Based Learning on Critical Thinking Skill and Enviromental Attitude.

Journal for the Education of Gifted Young Scientists, *8*(2), 743–755. https://dergipark.org.tr/en/pub/jegys/issue/53184/650344

Sangka, K. B. (2022). Critical Thinking Skills in Economic ' s Learning using Teaching Material based Problem Based Learning and Predict Observe Explain (TM-PBLPOE). *Journal of Positive School Psychology*, *6*(8), 8525–8532. http://mail.journalppw.com/index.php/jpsp/article/view/11338

Sari, S. M., Suyanti, R. D., Yus, A., Sinaga, B., Bukit, N., & Bunawan, W. (2022). Development Book Of Science Process Skills Through Problem Based Learning Models Improving Creative Thinking Ability. *Journal of Positive School Psychology*, *6*(8), 4662–4667. https://journalppw.com/index.php/jpsp/article/view/10648

Shiny, A., & Saravanan, P. (2022). *Emotional Intelligence And Learning Style Among Adolescent Students*. *6*(6), 2936–2943. Shiny, A., & Saravanan, P. (2022). Emotional Intelligence And Learning Style Among Adolescent Students. 6(6), 2936–2943.

Simamora, R. E., Sidabutar, D. R., & Surya, E. (2017). Improving learning activity and students' problem solving skill through problem based learning (PBL) in junior high school. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, *33*(2), 321–331. https://www.researchgate.net/profile/Rustam-E-Simamora/publication/317416532_Improving_Learning_Activity_and_Students'_Problem_Solving_Skill_through_Problem_Based_Learning_PBL_in_Junior_High_School/links/5939f2d0a6fdcc58aea6da21/Improving-Learning-Activit

Twyman, J. S., & Heward, W. L. (2018). How to improve student learning in every classroom now. *International Journal of Educational Research*, *87*, 78–90. https://www.sciencedirect.com/science/article/abs/pii/S0883035516301082

Ulger, K. (2018). The effect of problem-based learning on the creative thinking and critical thinking disposition of students in visual arts education. *Interdisciplinary Journal of Problem-Based Learning*, *12*(1). https://scholarworks.iu.edu/journals/index.php/ijpbl/article/view/28166

Umaira, R., Haji, A. G., & Rahmatan, H. (2019). Science Environmental Technology and Society-based Module Development on Petroleum Chemistry to Enhance Student Learning Achievement. *Int. J. Innov. Sci. Math*, *7*(2), 88–98. http://www.ijism.org/administrator/components/com_jresearch/files/publications/IJISM_826_FINAL.pdf

Yew, E. H. J., & Goh, K. (2016). Problem-based learning: An overview of its process and impact on learning. *Health Professions Education*, *2*(2), 75–79.

https://www.sciencedirect.com/science/article/pii/S2452301116300062
Zhang, H. (2022). The Effect of Intrinsic and Extrinsic Motivation on Creativity Based on Rewards. *Journal of Digital Convergence, 20*(5), 253–260. https://koreascience.kr/article/JAKO202216053152965.page