

# Model of problem-based learning towards improving 21st century collaborative skills: Studies in physical education

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## Model of problem-based learning towards improving 21st century collaborative skills: studies in physical education

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### ABSTRACT

Collaboration skills are very important for every student to be able to increase knowledge, interact socially, and increase self-confidence and motivation. Low student collaboration skills will have an impact on learning outcomes and the ability to socialize well. The purpose of this study was to improve students' collaboration skills in physical education subjects, especially in the material of designing systematic rhythmic movement activity exercises using the problem-based learning model. This type of research is called classroom action research. The research subjects were students of class XI MIPA 3 SMA Negeri 3 Banjarbaru, totaling 35 students. The research instrument used a collaboration observation sheet. Data analysis used descriptive, quantitative, and qualitative methods. The results showed the value of collaboration skills in cycle I there were 17 students with high interpretation with a percentage of 48%, 8 students with moderate interpretation with a percentage of 23%, and 10 students with low interpretation with a percentage of 29%. While the value of collaboration skills in cycle II students had a high interpretation of 71% percentage, there were 25 students and 10 students with a moderate interpretation of 29% percentage. The results also show the ANOVA test with a significance value of  $0.000 < 0.05$ , which means that there is a significant difference between the pre-cycle with cycle I and Cycle II. These results provide evidence that the problem-based learning model can improve 21st century collaboration skills in learning physical education rhythmic motion material.

**Keywords:** Learning Model 1; Problem-Based Learning 2; Collaboration Skills 3

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### INTRODUCTION

The education system of a country is intended to educate individuals with the ability to think critically and to develop talents and potential in order for them to be useful to society and the state. Education is carried out with all the strength and effort necessary to create and develop the potential of every human being to have self-control, intelligence, individuality, noble character, and skills required as a community and as citizens in general (Zuriatin et al., 2021). Every human being have physical, creative, and artistic

potential, which must be developed through school in order for them to function in their life path. (Sugiarta et al., 2019). Education is critical in giving opportunity for kids to develop information, skills, and other values through classroom learning (Niyarci, 2022).

Learning is an activity in learning that is carried out in two directions, namely by educators and students and by students with their peers (Mashud et al., 2023). Learning is an educational interaction between teachers and students that allows them to actively learn and give positive experiences for pupils (Bancin & Ambarita, 2020; Masdul, 2018), the process of providing knowledge to students by teachers as needed (Angga et al., 2022), and teacher assistance to students in the process of acquiring knowledge, forming attitudes, skills, character, and student confidence (Fitrah et al., 2022; Ginja & Chen, 2020; Hidayat & Kosasih, 2019; Suryadi et al., 2023). Educators should be able to make changes during the learning process so that the quality of education is continually improving (Afni et al., 2021; Prayogi, 2020).

Based on the characteristics of each skill and the learning content, 21st century learning employs student-centered models and methodologies (Fitrah et al., 2022). The adoption of learning models, one of which is impacted by student attributes, can be beneficial (Safithri et al., 2021). Therefore, before determining the learning model, first observe the problems, needs, and characteristics of the students. Every student in the twenty-first century must be capable of creative thinking, problem solving, communication, and teamwork (Pramono et al., 2021). The most critical issue in school is a lack of learning process, desire in learning, and learning results, particularly cooperative thinking abilities (Nahar et al., 2022).

Collaboration can be defined as a relationship between two or more students who share responsibility, trust, and roles to reach a common understanding of problems and solutions (Alexandra & Barton, 2017; Davis & Bos, 2018). Collaboration is one of the 21st century abilities required for student achievement and job advancement (Tracy & Xu, 2018). Collaboration skills are essential in learning activities because they allow students to share and expand their knowledge in order to attain learning objectives. Students that collaborate will get a lot of knowledge and have a lot of social contact. The application of collaboration to students can implement student-centered learning, the division of tasks, taking responsibility for assigned tasks, and using social skills well (Puspitasari, 2018).

Performed research by Ulhusna et al., (2020) shows that collaboration has implications for student learning and knowledge retention. Furthermore, the benefits of learning with the ultimate goal of collaboration include practicing effective division of labor, increasing the character of responsibility, and bringing together information from diverse sources of knowledge, perspectives of experience, creativity, and quality stimulated by the ideas of members in each group (Dooley & Sexton-Finck, 2017). The problem that still often occurs today is the gap between expectations and reality that students' collaboration skills are still low and indirectly affect learning outcomes (Ulhusna et al., 2020).

Furthermore, the exam results show that pupils are unable to execute the assigned assignment in a complete and proper manner. With the problem of difficulty in describing the thinking process and lack of collaboration with friends (Siagian et al., 2019). Observations and talks with sports teachers indicated that pupils continue to struggle with working together (collaborating) in learning. In terms of group-based learning methods used during learning, it can be seen that students are not actively involved in discussions, are not responsible for tasks, do not respect the ideas and opinions of friends, and when submitting results, results are not maximized. Therefore, the right learning method is needed for successful learning (Mashud et al., 2023; Perdana et al., 2023). Finally, it has an effect on the learning outcomes of students who fall short of the minimal

completeness criterion of 70. Furthermore, learning objectives have not been completely met, and poor cooperation skills have a negative influence on learning outcomes.

Based on the explanation above about the importance of collaboration skills in today's education that is integrated into learning, the efforts that researchers make to overcome these problems are to use problem-based learning models. This study was carried out in a school that had never used a problem-based learning methodology, particularly when it came to designing systematic rhythmic movement activities. Teachers play a significant impact in their students' performance as educators (Ginja & Chen, 2020; Hidayat & Kosasih, 2019; Suryadi et al., 2023). As a result, a teacher is deemed to be successful in educating and applying learning if there is a positive change in student behavior (Bachtiar et al., 2021; Rahayu, 2020). Learning approaches are critical to student progress. (Nasution, 2017), Consequently, the choice of the appropriate approach has a significant impact on the accomplishment of learning goals (Suryadi, 2022). The capacity of teachers to use learning models must be strengthened in order to improve the quality of physical education, sports, and health education (Trimantara, 2021). It makes it easy for teachers to create learning content, create learning multimedia, and create problem-solving activities to increase communication and cooperation skills (Kwangmuang et al., 2021).

## **METHOD**

The classroom action research approach was employed in this study. Using the Kemmis and McTaggart paradigm, specifically Classroom Action research (Purohman, 2018). Classroom action research has four stages: planning, implementation, observation, and reflection (Arikunto, 2017). The population utilized was 35 pupils from class XI MIPA 3 SMA Negeri 3 Banjarbaru in the academic year 2022-2023. Because this is a classroom action research (PTK) study, the complete population (total sampling) of 35 pupils is sampled.

Data collection instruments use non-tests in the form of observations using student collaboration skills sheets. Indicators of cooperation skills instruments link to previous research by Ahwan et al., (2023); Robbins et al., (2019) it was created based on collaborative skills in accordance with the following theory: 1) work together in teams productively; 2) respect the ideas, suggestions, and input of peers; 3) show perspective-taking skills; 4) work according to roles or tasks; and 5) be jointly responsible for the results of the tasks undertaken. The data analysis that researchers used in this study used descriptive quantitative and qualitative methods to analyze assessment data in each cycle, assisted by Microsoft Excel 2019 software and SPSS 26.

## **RESULTS AND DISCUSSION**

This study was carried out at the Banjarbaru Senior High School in the even semester of the 2022-2023 academic year. The results of learning observations in this class action research, which focuses on student collaboration skills, show that students' ability to work together (collaborate) with peers is still low.

The achievement of pre-cycle specified indicators was used to assess data on the results of students' cooperation skills on the material of systematic exercises in rhythmic movement activities utilizing mobile learning media in the form of gadgets. The results indicated that 18% had a high category interpretation, 31% had a medium category interpretation, and 51% were still classed as low. Table 1 displays the results.

The implementation of cycle I actions was carried out in one meeting. First, the researcher instructed students to analyze a video related to the systematic exercises in rhythmic movement activities in the warm-up and core sections. The learning medium used is mobile learning in the form of gadgets. The results obtained were 48% in the high category, 23% in the medium category, and then 29% in the low category. These results



have shown a change, namely 48% with a high interpretation, but these results still have not reached the success indicator of 70%. The results can be seen in the implementation of cycle I actions carried out in one meeting. First, the researcher instructs students to analyze and practice systematic exercises in rhythmic movement activities in the core and cooling sections. The results can be seen in Table 2.

Furthermore, the results of Table 3 on the implementation of cycle II actions show 29% in the medium category and 70% in the high category. These results have provided information about where, in cycle II, it has reached the success indicator.

Table 1. Pre-cycle Results

Collaboration skills	Interpretation	N	Percentage	Indicators of success
Pre-cycle	High	6	18%	70%
	Medium	11	31%	
	Low	18	51%	

Table 2. Cycle I Results

Collaboration skills	Interpretation	N	Percentage	Indicators of success
Cycle I	High	17	48%	70%
	Medium	8	23%	
	Low	10	29%	

Table 3. Cycle II Results

Collaboration skills	Interpretation	N	Percentage	Indicators of success
Cycle II	High	25	71%	70%
	Medium	10	29%	
	Low	0	0%	

Tabel 4. Uji Homogenitas

Results		Levene Statistic	df1	df2	Sig.
Group	Based on Mean	43,455	2	102	0,000
	Based on Median	8,396	2	102	0,000
	Based on Median and with adjusted df	8,396	2	61,316	0,001
	Based on trimmed mean	40,521	2	102	0,000

The significance value of the homogeneity test is  $p=0.000$   $0.05$  based on the findings in table 4, indicating that the data is not homogenous. In addition, the Dunnet test will be performed.

Table 5. One Way Anova Test (dunnet test)

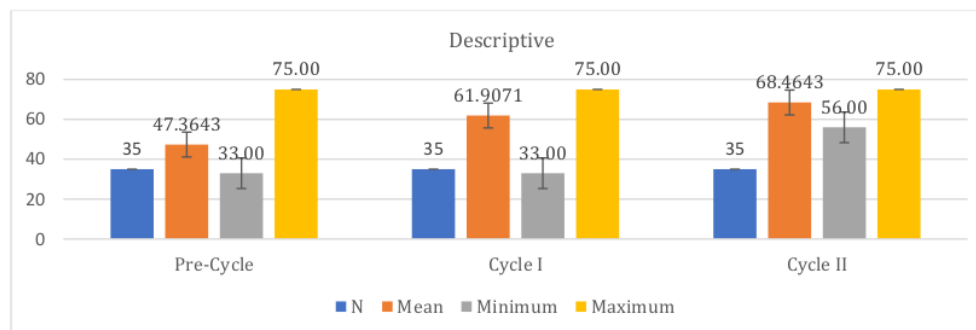
(I) Collaboration skills	(J) Collaboration Skills	Mean Difference (I-J)	Std. Error	Sig.
Pre-Cycle	Cycle I	-14.54286*	3,47886	0,000
	Cycle II	-21.10000*	2,90941	0,000
Cycle I	Pre-Cycle	14.54286*	3,47886	0,000
	Cycle II	-6.55714*	2,22878	0,015
Cycle II	Pre-Cycle	21.10000*	2,90941	0,000
	Cycle I	6.55714*	2,22878	0,015

The results in Table 5 examine if there is a difference in the cycle scores. We look at the ANOVA table, and the (P-value) in the Sig. column is 0.000 0.05. As a result, the conclusion reached is that there is a considerable difference in the average value of the three action cycles.

**Table 6. Descriptive Results of Collaboration Skills**

Results	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Pre-Cycle	35	47,3643	16,52253	2,79282	33,00	75,00
Cycle I	35	61,9071	12,27160	2,07428	33,00	75,00
Cycle II	35	68,4643	4,82379	0,81537	56,00	75,00
<b>Total</b>	<b>105</b>	<b>59,2452</b>	<b>14,98597</b>	<b>1,46248</b>	<b>33,00</b>	<b>75,00</b>

Descriptive results of collaboration skills show that the mean value in cycle I and cycle II has increased. Where the results in cycle II are more dominant, namely 68.4 compared to cycle I of 61.9.



**Figure 1. Descriptive Results of Collaboration Skills**

The purpose of this research is to determine the impact of the problem-based learning model on students' collaborative abilities in physical education classes. The results demonstrated that using a problem-based learning strategy for two cycles worked effectively, as evidenced by an increase. This increase in collaboration skills was seen between cycle I and cycle II. In addition, the ANOVA test results also showed significant differences between pre-cycle, cycle I, and cycle II. This can be seen from students who value the quality of working relationships, facilitated group work, and opportunities to act and think (Harland, 2002). Then, real-life tasks are included, and students are given enough time to solve problems and develop projects (Saldo & Walag, 2020).

The results of this study are in line with various previous studies, among them Nurhayati et al., (2019) demonstrating that the usage of problem-based learning instructional materials may increase students' communication and teamwork abilities. The findings of this study are relevant, but what distinguishes it from others is the testing of problem-based learning teaching materials with direct application of the learning model and integration into the lesson plan. This is also expressed in previous research that highlights the relevance of integrating useful feedback (Mauri et al., 2016), because it may be utilized to enhance student learning and engagement. Tseng et al., (2008) add to this by stating that the problem-based learning technique shifts the classroom toward interactive learning and shifts teaching practices from the traditional classroom to a much more current and engaging atmosphere.

Previous research has also shown that efforts to apply PBL models in delivering learning in higher education have failed (Jamkar et al., 2007; Khaki et al., 2007; Nair et al., 2013). The application of a combined teaching method between problem-based learning and case-based learning in codectorean student discussions showed that both methods were effective in improving conversations related to public health (Ginzburg et al., 2019).

Another research employed problem-based learning and case-based learning strategies to develop students' leadership qualities without requiring curricular practice or learning time (Ginzburg et al., 2018). Furthermore, Hu et al., (2019) integrated flipped classroom with problem-based learning in a dipertiodism course, which resulted in higher performance, but at the expense of a larger effort for students

Research conducted by (Sukmawati, 2021) the problem-based learning strategy was found to increase students' mathematics learning results. The problem-based learning concept has consequences for student performance in learning (Hasanah et al., 2021). Based on the findings of the two studies mentioned above, it is clear that using the problem-based learning paradigm improves student learning outcomes and accomplishment. Furthermore, implementing learning in line with the syntax of the problem-based learning model encourages students to be active participants in their learning. Problem-based learning has been shown to be a teaching method that encourages active learning (Choden & Kijkuakul, 2020), encourages students to think critically, and improves problem-solving skills and knowledge in everyday life (Aydogdu, 2014; Hanifah, 2020). Therefore, students' involvement in teamwork, their ability to express ideas, various ideas, and knowledge, and their willingness to help each other, will increase and indirectly improve students' communication skills (Huang et al., 2010). Problem-based learning gives a realistic picture of the problem and encourages students to take subjective initiative to shift from the paradigm of "what I have learned" to "what I want to learn." (Zhao et al., 2020).

The problem-based learning methodology is feasible and readable, and it may help students develop their communication and teamwork abilities (Nurhayati et al., 2019). In addition, the planned learning activity stage is divided into 3 stages: the introductory, core, and closing stages. This lesson plan is tailored to the issue-based learning model's syntax, which includes 1) alerting students to the problem, 2) arranging students to learn, 3) directing investigations, 4) presenting outcomes, and 5) assessing the problem-solving process (Masruroh & Arif, 2021; Sukmawati, 2021). Students who employ problem-based learning models build individual and group accountability, interpersonal, small group, and group processing abilities, which are among the five essential characteristics of collaborative learning (Laal & Laal, 2012). The present study's findings are also consistent with past studies in which students make crucial decisions based on group consensus, take on important responsibilities, and collaborate to solve tasks or issues (Safarini, 2019). In addition, the problem-based learning model improves learning and learning motivation by applying more student-centered learning principles (Kolmos, 2009). Other studies have found that using social skills appropriately might have a favorable influence on teamwork (Johnson & Johnson, 2009).

Collaboration abilities are fundamental talents that students must acquire, particularly in order to build knowledge in learning (Tan et al., 2015). Collaboration is a mode of social relations that involves working together so that the planned goals can be realized. Leeuwen et al., (2015) students are challenged to share ideas, express their opinions, and engage in conversations when they collaborate or work in groups to achieve projects. Through collaborative completion of task implementation in groups, they are expected to achieve goals (Nathalia, 2019). Students' collaboration abilities will develop an innate awareness and character in the form of cognitive and socio-emotional awareness (Näykki et al., 2021), boost student group work competency (Liu, 2021), and spark the birth of originality and creativity, shaping students' talents in collaborative critical thinking to address challenges encountered in real life (Wilkerson & Trellevik, 2021), as well as academic achievement (Omodan & Tsotetsi, 2018).

The teacher's position as an educator leads to students' active participation and readiness to collaborate during the learning process (Harianto et al., 2023; Lynch et al., 2021). As a result, a teacher is deemed to be successful in educating and applying learning if there is a positive change in student behavior (Bachtiar et al., 2021; Rahayu, 2020). Learning approaches are critical to student progress (Hardinata et al., 2023; Nasution, 2017). As a result, selecting the appropriate approach has a significant impact on the attainment of learning objectives (Suryadi, 2022). The capacity of instructors to use learning models must be strengthened in order to improve the quality of physical education, sports, and health education (Trimantara, 2021). The disadvantage of this problem-based strategy is that it necessitates a significant amount of time for learning exercises (Choden & Kijkuakul, 2020). So that it requires the ability of educators to manage time so that learning activities can run well and smoothly.

## CONCLUSION

Based on the findings of the research, I can infer that the problem-based learning paradigm can help students enhance their teamwork abilities. The findings revealed an increase in the average value of collaborative skills in physical education sessions in cycles I and II, particularly in the content of constructing systematic rhythmic movement activity activities. Recommendations for future study include using control classes with different learning models to assess the efficacy of each model. In addition, make a compilation related to various kinds of good models for improving collaboration skills. The more information that can be obtained, the easier it is for field practitioners to overcome learning obstacles.

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## CONFLICT OF INTEREST

Not conflicts of interest related to the reported research.

## REFERENCES

- Afni, N., Wahid, A., Hastati, S., Jumrah, A. M., & Mursidin, M. (2021). Pengembangan Model Pembelajaran Abad 21 di SD Negeri 126 Borong Kecamatan Herlang Kabupaten Bulukumba. *Madaniya*, 2(2), 137–142. <https://doi.org/10.53696/27214834.66>
- Ahwan, M. T. R., Basuki, S., & Mashud. (2023). Meningkatkan Keterampilan Kolaborasi Siswa melalui Aktivitas Kebugaran Jasmani Menggunakan Model Project Based Learning (PjBL) SMA Negeri 3 Banjarbaru. *Jurnal Pendidikan Kesehatan Rekreasi*, 9 (1), 106–119. <https://doi.org/10.5281/zenodo.7592832>
- Alexandra, D. F., & Barton, S. M. (2017). Collaboration of General and Special Education Teachers: Perspectives and Strategies. *Intervention in School and Clinic*, 2, 1–8. <https://doi.org/10.1177/1053451217693370>
- Angga, A., Abidin, Y., & Iskandar, S. (2022). Penerapan Pendidikan Karakter dengan Model Pembelajaran Berbasis Keterampilan Abad 21. *Jurnal Basicedu*, 6 (1), 1046–1054. <https://doi.org/10.31004/basicedu.v6i1.2084>
- Arikunto, S. (2017). *Prosedur Penelitian Suatu Pendekatan Praktek*. PT Rineka Cipta.
- Aydogdu. (2014). A On Geometry Research Problem Solving Strategies Used By Elementary Mathematics Teacher Candidates. *Journal of Educational and Instructional Studies in The World*, 4(1), ISSN: 2146-7463.
- Bachtiar, B., Putri, A. P., & Maulana, F. (2021). Survei Hasil Belajar Pendidikan Jasmani





- Olahraga dan Kesehatan Melalui E-Learning Siswa Smk Negeri Kota Sukabumi. *Jendela Olahraga*, 6(1), 17–27. <https://doi.org/10.26877/jo.v6i1.6293>
- Bancin, A., & Ambarita, B. (2020). Education Model Based on Life Skill (a MetaSynthesis). *384(Aisteel)*, 319–324. <https://doi.org/10.2991/aisteel-19.2019.69>
- Choden, T., & Kijkuakul, S. (2020). Blending problem based learning with scientific argumentation to enhance students' understanding of basic genetics. *International Journal of Instruction*, 13(1), 445–462. <https://doi.org/10.29333/iji.2020.13129a>
- Davis, K., & Bos, J. (2018). Playing in the Virtual Sandbox: Students' Collaborative Practices in Minecraft. *International Journal of Game-Based Learning*, 8(3), 56–76. <https://doi.org/10.4018/IJGBL.2018070104>
- Dooley, K., & Sexton-Finck, L. (2017). A focus on collaboration: Fostering Australian screen production students' teamwork skills. *Journal of Teaching and Learning for Graduate Employability*, 8(1), 74–105. <https://doi.org/10.3316/informit.157888556477449>
- Fitrah, A., Yantoro, Y., & Hayati, S. (2022). Strategi Guru dalam Pembelajaran Aktif Melalui Pendekatan Saintifik dalam Mewujudkan Pembelajaran Abad 21. *Jurnal Basicedu*, 6 (2), 2943–2952. <https://doi.org/10.31004/basicedu.v6i2.2511>
- Ginja, T. G., & Chen, X. (2020). Teacher educators' perspectives and experiences towards differentiated instruction. *International Journal of Instruction*, 13(4), 781–798. <https://doi.org/10.29333/iji.2020.13448a>
- Ginzburg, S., Schwartz, J., Deutsch, S., Elkowitz, D., Lucito, R., & Hirsch, J. (2019). Using a problem/case-based learning program to increase first and second year medical Students' discussions of health care cost topics. *Med Educ Curric Dev*, 6, 2382120519891178.
- Ginzburg, S., Susan, D., Jaclyn, B., Elkowitz, D., Stern, J., & Robert, L. (2018). Integration of leadership training into a problem/case-based learning program for firststand second-year medical students. *Adv Med Educ Pract.*, 99, 221–226.
- Hanifah, N. (2020). *Penerapan model problem based learning (pbl) untuk meningkatkan kemampuan berpikir kritis siswa di sekolah dasar*. Universitas Pendidikan Indonesia.
- Hardinata, R., Fakhruddin Fakhruddin, Syarif, A., Ahwan, M. T. R., Abidin, M. Z., Alamsyah, A., Abdulrahman, D., Shukla, M., Malek, N. F. A., & Sa'adah, S. P. (2023). The use of audio-visual media: how does it affect rhythmic movement skills? *Tanjungpura Journal of Coaching Research*, 1(2), 38–47. <https://doi.org/10.26418/tajor.v1i2.66586>
- Harianto, E., Gustian, U., Supriatna, E., Shalaby, M. N., & Taiar, R. (2023). Stimulating game performance skills in students: experimental studies using net games. *Tanjungpura Journal of Coaching Research*, 1(2), 63–70. <https://doi.org/10.26418/tajor.v1i2.65009>
- Harland, T. (2002). "Zoology Students' Experiences of Collaborative Enquiry in Problem-based Learning." *Teach. High. Educ.*, 7(1), 3–15.
- Hasanah, U., Sarjono, S., & Hariyadi, A. (2021). Pengaruh Model Problem Based Learning Terhadap Prestasi Belajar IPS SMP Taruna Kedung Adem. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, 7(1), 43. <https://doi.org/10.37905/aksara.7.1.43-52.2021>
- Hidayat, T., & Kosasih, A. (2019). Analisis peraturan menteri pendidikan dan kebudayaan republik indonesia nomor 22 tahun 2016 tentang standar proses pendidikan dasar dan menengah serta implikasinya dalam pembelajaran pai di sekolah. *Muróbbi: Jurnal Ilmu Pendidikan*, 3(1), 45–69. <https://doi.org/10.52431/murobbi.v3i1.172>
- Hu, X., Zhang, H., Song, Y., Wu, C., Yang, Q., Shi, Z., Zhang, X., & Chen, W. (2019). Implementation of flipped classroom combined with problem-based learning: an approach to promote learning about hyperthyroidism in the endocrinology internship. *BMC Med Educ*, 19(1), 290.
- Huang, D., Seth, L., Cheri, H., Debora, L. ., Nora, O., & Gwendelyn, R. (2010). *Preparing Students for The 21st Century: Exploring The Effect of Afterschool Participation on Students' Collaboration Skills, Oral Communication Skills, and Self-Efficacy*. Cress Report (CR) of The National Center for Research on Evaluation, Standards, and Student

- Testing. University of California: Los Angeles, CR 777.
- Jamkar, A., Burdick, W., Morahan, P., Yemul, V., Sarmukadum, & Singh, G. (2007). Proposed model of case based learning for training undergraduate medical student in surgery. *Indian J Surg*, 69(5), 176–183.
- Johnson, D. W., & Johnson, R. T. (2009). “An educational psychology success story: Social interdependence theory and cooperative learning.” *Educ. Res*, 38(5), pp 365-379.
- Khaki, A., Tubbs, R., Zarrintan, S., Khamnei, H., Shoja, M., Sadeghi, H., Ahmadi, M., & M. (2007). The first year medical students’ perception of and satisfaction from problem-based learning compared to traditional teaching in gross anatomy: introducing problem-based anatomy into a traditional curriculum in Iran. *Int J Health Sci*, 1(1), 113.
- Kolmos, A. (2009). “Problem-Based Learning and Project-Based Learning,” in Skovsmose O., Valero P., Christensen O.R. *University Science and Mathematics Education in Transition*, Springer, pp 261-280.
- Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, 7(6), e07309. <https://doi.org/10.1016/j.heliyon.2021.e07309>
- Laal, M., & Laal, M. (2012). “Collaborative learning: What is it?,” *Procedia - Soc. Behav. Sci*, 31, 491–495.
- Leeuwen, A. van, Janssen, J., Erkens, G., & Brekelmans, M. (2015). Teacher regulation of cognitive activities during student collaboration: Effects of learning analytics. *Computers & Education*, 90, 80–94. <https://doi.org/10.1016/j.compedu.2015.09.006>
- Liu, H. Y. (2021). Effect of interdisciplinary teaching on collaborative interactions among nursing student teams in Taiwan: A quasi-experimental study. *Nurse Education Today*, 106, 105083. <https://doi.org/10.1016/j.nedt.2021.105083>
- Lynch, M., Kamovich, U., Longva, K. K., & Steinert, M. (2021). Combining technology and entrepreneurial education through design thinking: Students’ reflections on the learning process. *Technological Forecasting and Social Change*, 164(June 2), 119689. <https://doi.org/10.1016/j.techfore.2019.06.015>
- Masdul, M. R. (2018). Komunikasi Pembelajaran. *Iqra: Jurnal Ilmu Kependidikan Dan Keislaman*, 13 (2), 1–9. <https://doi.org/10.56338/iqra.v13i2.259>
- Mashud, Arifin, S., Kristiyandaru, A., Samodra, Y. T. J., Santika, I. G. P. N. A., & Suryadi, D. (2023). Integration of project based learning models with interactive multimedia: Innovative efforts to improve student breaststroke swimming skills. *Physical Education of Students*, 27(3), 118–125. <https://doi.org/10.15561/20755279.2023.0304>
- Masruroh, L., & Arif, S. (2021). Efektivitas Model Problem Based Learning Melalui Pendekatan Science Education for Sustainability dalam Meningkatkan Kemampuan Kolaborasi. *Jurnal Tadris IPA Indonesia*, 1(2), 179–188. <https://doi.org/10.21154/jtii.v1i2.171>
- Mauri, T., Ginesta, A., & Rochera, M. J. (2016). “The use of feedback systems to improve collaborative text writing: a proposal for the higher education context.” *Innov. Educ. Teach. Int*, 53(16), 411–423.
- Nahar, S., Suhendri, Zailani, & Hardivizon. (2022). Improving Students’ Collaboration Thinking Skill under the Implementation of the Quantum Teaching Model. *International Journal of Instruction*, 15(3), 451–464. <https://doi.org/10.29333/iji.2022.15325a>
- Nair, S., Shah, T., Seth, S., Pandit, N., & Shah, G. (2013). Case based learning: a method for better understanding of biochemistry in medical students. *J Clin Diagn Res Jcdr*, 7(8), 1576–1578.
- Nasution, M. K. (2017). Penggunaan metode pembelajaran dalam peningkatan hasil belajar siswa. *STUDIA DIDAKTIKA: Jurnal Ilmiah Bidang Pendidikan*.
- Nathalia, K. S. (2019). Implementasi Model Discovery Learning Menggunakan Lesson Study untuk Meningkatkan Kemampuan Komunikasi Dan Kolaborasi. *In Prosiding Seminar*

- Nasional Dan Workshop Biologi-IPA Dan Pembelajarannya*, Vol. 4, 629.
- Näykki, P., Isohäätä, J., & Järvelä, S. (2021). “You really brought all your feelings out” – Scaffolding students to identify the socio-emotional and socio-cognitive challenges in collaborative learning. *Learning, Learning, Culture and Social Interaction*, 30(April 2). <https://doi.org/10.1016/j.lcsi.2021.100536>
- Niyarci, N. (2022). Perkembangan Pendidikan Abad 21 Berdasarkan Teori Ki Hajar Dewantara. *Pedagogika: Jurnal Ilmu-Ilmu Kependidikan*, 2(1), 47–55. <https://doi.org/10.57251/ped.v2i1.336>
- Nurhayati, D. I., Yulianti, D., & Mindyarto, B. N. (2019). Bahan Ajar Berbasis Problem Based Learning pada Materi Gerak Lurus untuk Meningkatkan Kemampuan Komunikasi dan Kolaborasi Siswa. *Umes Physics Education Journal*, 8(2), 218. <https://doi.org/10.15294/upej.v8i2.33333>
- Omodan, B. I., & Tsotetsi, C. T. (2018). Student-teacher relationships as a panacea for students’ academic performance in Nigeria secondary schools: An attachment perspective. *Journal of Social Studies Education Research*, 9(4), 82–101. <https://doi.org/10.17499/jsser.19219>
- Perdana, R. P., Supriatna, E., Yanti, N., & Suryadi, D. (2023). Team Game Tournament (TGT)-type cooperative learning model: How does it affect the learning outcomes of football shooting? *Edu Sportivo: Indonesian Journal of Physical Education*, 4(1), 86–96. [https://doi.org/10.25299/es:ijope.2023.vol4\(1\).12130](https://doi.org/10.25299/es:ijope.2023.vol4(1).12130)
- Pramono, A., Pujiyanto, Puspasari, B. D., & Dhanti, N. S. (2021). Character Thematic Education Game “Ak@R” Of Society Themes For Children With Malang-Indonesian Visualize. *International Journal Of Instruction*, 14(2), 179–196. <https://doi.org/10.29333/Iji.2021.14211a>
- Prayogi, R. D. (2020). Kecakapan Abad 21: Kompetensi Digital Pendidik Masa Depan. *Manajemen Pendidikan*, 14 (2). <https://doi.org/10.23917/jmp.v14i2.9486>
- Purohman, P. S. (2018). *Penelitian Tindakan Kelas Kegiatan Penelitian Alternatif untuk Guru*. Prof. Dr. Hamka.
- Puspitasari, N. (2018). Peningkatan Collaboration Skill Siswa sebagai Kecakapan Abad 21 Melalui Pembelajaran Model Cooperative Learning Tipe Team Accelerated Instruction (Tai) Mata Pelajaran Ipa Di Sd Negeri Kotagede 1. *JURNAL PENDIDIKAN GURU SEKOLAH DASAR*, 38(7), 2767–3780.
- Rahayu, Y. P. (2020). Menggunakan Metode Sokratis untuk Meningkatkan Pengetahuan NAPZA Mata Pelajaran PJOK. *SOSIOHUMANIORA: Jurnal Ilmiah Ilmu Sosial Dan Humaniora*, 6(1), 19–25. <https://doi.org/10.30738/sosio.v6i1.6388>
- Robbins, S., Gilbert, K., Chumney, F., & Green, K. (2019). The Effects of Immersive Simulation on Targeted Collaboration Skills among Undergraduates in Special Education. *Teaching & Learning Inquiry*, 7(2). <https://doi.org/10.20343/teachlearninqu>
- Safarini, T. L. S. D. (2019). “Developing students’ collaboration skills through project-based learning in statistics.”. *J. Phys. Conf. Ser.*, 1265(1).
- Safithri, R., Syaiful, S., & Huda, N. (2021). Pengaruh Penerapan Problem Based Learning (PBL) dan Project Based Learning (PjBL) Terhadap Kemampuan Pemecahan Masalah Berdasarkan Self Efficacy Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5(1), 335-346. <https://doi.org/10.31004/cendekia.v5i1.539>
- Saldo, I. J. P., & Walag, A. M. P. (2020). Utilizing Problem-Based and Project-Based Learning in Developing Students’ Communication and Collaboration Skills in Physics. *American Journal of Educational Research*, 8(5), 232–237. <https://doi.org/10.12691/education-8-5-1>
- Siagian, M. V., Saragih, S., & Sinaga, B. (2019). Development of Learning Materials Oriented on Problem-Based Learning Model to Improve Students’ Mathematical Problem Solving Ability and Metacognition Ability. *International Electronic Journal of Mathematics Education*, 14(2), 331–340. <https://doi.org/10.29333/iejme/5717>



- Sugiarta, I. M., Mardana, I. B. P., Adiarta, A., & Artanayasa, W. (2019). Filsafat Pendidikan Ki Hajar Dewantara (Tokoh Timur). *Jurnal Filsafat Indonesia*, 2(3), 124. <https://doi.org/10.23887/jfi.v2i3.22187>
- Sukmawati, R. (2021). Penerapan Model Pembelajaran Problem Based Learning untuk Meningkatkan Hasil Belajar Matematika Kelas II SDN Wonorejo 01. *Glosains: Jurnal Sains Global Indonesia*, 2(2), 49–59. <https://doi.org/10.36418/glosains.v2i2.21>
- Suryadi, D. (2022). Peningkatan Kemampuan Shooting Permainan Sepak Bola Melalui Latihan Kekuatan Otot Tungkai. *Jurnal Pendidikan Kesehatan Rekreasi*, 8(2), 237–246. <https://doi.org/10.5281/zenodo.6684431>
- Suryadi, D., Samodra, Y. T. J., Gustian, U., Yosika, G. F., B, P. S., Dewintha, R., & Saputra, E. (2023). Problem-based learning model: Can it improve learning outcomes for long serve in badminton. *Edu Sportivo: Indonesian Journal of Physical Education*, 4(1), 29–36. [https://doi.org/10.25299/es:ijope.2023.vol4\(1\).10987](https://doi.org/10.25299/es:ijope.2023.vol4(1).10987)
- Tan, C. P., Van der Molen, H. T., & Schmidt, H. G. (2015). To What does the Problem Based Learning Contribute to Students' Professional Identity Development? *Singapore. Elsevier LT*.
- Tracy, G. S., & Xu, Y. (2018). Scaffolded Academic conversations: Access to 21st-Century Collaboration and Communication Skills. *Intervention in School and Clinic*, 1(9). <https://doi.org/10.1177/1053451218762478>
- Trimantara, I. K. B. B. (2021). Implementasi Model Pembelajaran TAI Untuk Meningkatkan Hasil Belajar PJOK pada Siswa Kelas V Sekolah Dasar. *Jurnal Ilmu Keolahragaan Undiksha*, 8(1), 16–23. <https://doi.org/10.23887/jiku.v8i1.29620>
- Tseng, K. H., Chiang, F. K., & Hsu, W. H. (2008). “Interactive processes and learning attitudes in a web-based problem-based learning (PBL) platform.” *Comput. Human Behav*, 24(3), 940–955.
- Ulusna, M., Putri, S. D., & Zakirman, Z. (2020). Permainan Ludo untuk Meningkatkan Keterampilan Kolaborasi Siswa dalam Pembelajaran Matematika. *International Journal of Elementary Education*, 4(2), 130. <https://doi.org/10.23887/ijee.v4i2.23050>
- Wilkerson, B., & Trellevik, L. K. L. (2021). Sustainability-oriented innovation: Improving problem definition through combined design thinking and systems mapping approaches. *Thinking Skills and Creativity*, 42(May), 100932. <https://doi.org/10.1016/j.tsc.2021.100932>
- Zhao, W., He, L., Deng, W., Zhu, J., Su, A., & Zhang, Y. (2020). The effectiveness of the combined problem-based learning (PBL) and case-based learning (CBL) teaching method in the clinical practical teaching of thyroid disease. *BMC Medical Education*, 20(1), 1–10. <https://doi.org/10.1186/s12909-020-02306-y>
- Zuriatin, Nurhasanah, & Nurlaila. (2021). Pandangan Dan Perjuangan Ki Hadjar Dewantara Dalam Memajukan Pendidikan Nasional. *Jurnal Pendidikan Ips*, 11(1), 48–56. <https://doi.org/10.37630/jpi.v11i1.442>

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