

The effect of teaching style and motivation on student football passing learning outcomes

Sahabul Adri AR^{1*}, Samsudin², Hidayat Humaid³

^{1,2,3}Universitas Negeri Jakarta: sahabul.adri.ar@mhs.unj.ac.id (S.A.R.) samsudin@unj.ac.id (S.) hhumaid@unj.ac.id (H.H.).

Abstract: This study aims to determine the effect of teaching style and learning motivation in football courses for students. This research is an experimental study using ANOVA analysis of variance with a quantitative approach. The results showed that there were significant changes from the pre-test and post-test results of several styles in learning by involving 220 respondents with an increase; training style 14.4, reciprocal style 9.87 and inclusion style 9.72 and learning motivation. Motivation is an important mediator in the relationship between variables.

Keywords: Football learning, Learning motivation, Teaching style.

1. Introduction

Improving human resources for the better, of course, cannot be separated from education (Sangsawang, 2020). Education is expected to form students who are able to develop attitudes (Bragg et al., 2021), skills (W. Zhang et al., 2022), and intelligence to become skilled (Coman et al., 2020), noble and intelligent (Aelterman et al., 2019). Education is a strategic effort to be able to raise the dignity of the nation through the availability of quality human resources (Kuhail et al., 2023). Qualified human resources will be born from a generation with religious character (Cheon et al., 2020), self-confidence (Yadegaridehkordi et al., 2019), and a high work ethic (Jabarullah & Iqbal Hussain, 2019). Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength (Tanis, 2020), self-control (C. L. Huang et al., 2020), personality (Jeffery & Bauer, 2020), intelligence (Amerstorfer & Freiin von Münster-Kistner, 2021), noble character (Shorey et al., 2021), and skills needed by themselves (Shirazi & Heidari, 2019), society (Vermote et al., 2020), nation (Goedhart et al., 2019) and state (Dekker, 2019). Teaching is the art of communicating skills (Dörnyei & Muir, 2019), knowledge (Gill et al., 2020) and values guided by educational values (Lin et al., 2019), conditions (Moè & Katz, 2020), environment (Invernizzi et al., 2019), individual student needs (Eager & Brunton, 2023) and teacher beliefs (Leo et al., 2022). A teacher's teaching style is a strategy of transferring information given to students (Hartt et al., 2020).

Physical Education, is an educational discipline that focuses on students' physical development (Yannier et al., 2021) (Ryan & Poole, 2019) and fitness (Garbóczy et al., 2021), as well as the acquisition of motor skills and knowledge of physical activity (Rogers et al., 2021). Physical education is an important component of the education curriculum that aims to develop psychomotor, cognitive and affective aspects (Saxon et al., 2021). Physical education aims to encourage lifelong habits of regular physical activity (Bozki et al., 2021), which are essential for maintaining health and well-being (Chen et al., 2019). In an effort to achieve this goal, educators have implemented a variety of teaching approaches (T. C. Huang et al., 2019) and styles to improve learning effectiveness (Ceha et al., 2021).

One teaching style that has received special attention is the reciprocal teaching style (Son et al., 2020). Reciprocal teaching style is a learning approach that emphasises the importance of providing feedback between students as an integral component of the teaching and learning process (McMahon et al., 2019). This method is characterised by the practice of four strategies, including summarising,

questioning, clarifying and predicting (Mahmood et al., 2019). Reciprocal teaching style often involves students to some extent taking on the role of teacher, guiding discussion and questioning among peers (Moè & Katz, 2020). Reciprocal teaching style is an evolution of an improved practice approach, which emphasises the enlargement of social bonds between students (Singh et al., 2022), as well as making judicious use of feedback provided by peers (Okechukwu et al., 2022). Reciprocal teaching style is an approach where students work in pairs or small groups, giving each other feedback and helping each other in the learning process (Reeve et al., 2022). Reciprocal teaching style emphasises social interaction, collaboration and communication between students (Kundu & Garg, 2022). It is expected to increase students' engagement and their understanding of physical education learning materials (Castillo et al., 2020), as well as to improve motor skills, increase active participation, and promote deeper learning through reciprocal teaching style (Gómez-Galán, 2020).

Inclusive learning style and practice learning style are two learning styles that are rarely used in higher education (Gupta et al., 2021). These learning styles are very suitable for students who demand optimal creative, physical and mental development (Shi, 2023). Inclusion learning style, is a learning style used by lecturers (Arsovic & Stefanovic, 2020), by presenting learning material in detail (Müller & Wulf, 2020) and offering different levels of difficulty in sequence (Roothoof, 2022), which aims to make students creative and get ease in learning a movement skill (Prat et al., 2019), students are given the freedom to choose (Fin et al., 2019) and determine the level of difficulty in starting movement learning (Jungblut et al., 2020) and are given the freedom (Kruk et al., 2022) and flexibility to determine how many repetitions of motion must be done in learning (Guo et al., 2021).

While the exercise learning style is a learning style that can be used to improve students' abilities and skills towards forms of motion (Stephenson et al., 2020). By giving tasks to do as many exercises as possible by repeating them, so that there is an increase in learning a movement technique (Wang et al., 2020).

Motivation is the overall driving force, both from within and from outside by creating a series of efforts to provide certain conditions that ensure continuity and give direction to activities so that the goals desired by the subject can be achieved (Dos Santos, 2019). Motivation to learn can arise from essential factors in the form of desire and desire to succeed, as well as encouragement of learning needs and desire for ideals (Collie et al., 2019). External factors include rewards, a facilitating learning environment and interesting learning activities (Cheon et al., 2019). Motivation is considered important in learning and learning efforts because it encourages behaviour, influences and changes student behavior (Margunayasa et al., 2019)(Y. Zhang et al., 2019). Motivation is the energy in humans that encourages them to do something with a specific purpose. Learning motivation is anything that can motivate students or individuals to learn (Madsen et al., 2021).

2. Methods

2.1. Instrumentation

The method used in this research is experimental method with 3 x 2 design. The treatment is done randomly to the experimental units. The matrix of the 3 x 2 factorial design design is:

Table 1.
Experiment design.

Learning style (A) Motivation (B)	Exercise (A₁)	Reciprocal (A₂)	Inclusion (A₃)
Higher (B ₁)	A ₁ B ₁	A ₂ B ₁	A ₃ B ₁
Lower (B ₂)	A ₁ B ₂	A ₂ B ₂	A ₃ B ₂

2.2. Participants

This study involved several groups of participants as follows: training, reciprocal and illusion who were students of football courses.

The main population in this study consisted of 220 respondents drawn from 5 sports campuses in Aceh and Medan. Determination of population size using Cochran formula for unknown population with 95% confidence level and 5% margin of error.

2.3. Data Analysis

Table 1 shows that students who were given passing learning using a reciprocal teaching style experienced an increase in learning outcomes of 14.44 from an average of 46.55 increased to 60.95. Students who were given passing learning using the practice teaching style experienced an increase in learning outcomes of 9.87 from an average of 43.25 increased to 53.12. Students who were given passing learning using the inclusion teaching style experienced an increase in learning outcomes of 9.72 from an average of 40.50 increased to 50.22.

Table 2.
Pre-test and post-test data on passing learning outcomes.

Learning style	Average value of passing learning outcomes		
	Pre-tes	Pos-tes	Perubahan
Exercise	46.55	60.95	14.4
Reciprocal	43.25	53.12	9.87
Inclusion	40.50	50.22	9.72

The data normality test was conducted to determine whether or not the data obtained in the research process was normal. Normality testing was carried out on each group of treatment data with a value of $\alpha = 0.05$ which was carried out using the Liliefors test assisted by the SPSS programme with the following hypothesis:

Table 3.
Motivation normality test table.

	Group	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Motivation	Exercise	0.099	40	0.200*	0.963	40	0.218
	Reciprokal	0.105	40	0.200*	0.958	40	0.144
	Inclusion	0.122	40	0.139	0.971	40	0.376

Note: *. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The data homogeneity test was carried out on all data to determine whether or not the data obtained from the research results were homogeneous. The testing process was carried out through the Barlett test assisted by SPSS 25 with the following hypothesis:

Table 4.
Table motivation homogeneity test.

		Levene statistic	df1	df2	Sig.
Motivation	Based on mean	3.886	2	117	0.053
	Based on median	3.291	2	117	0.091
	Based on median and with adjusted df	3.291	2	101.481	0.091
	Based on trimmed mean	3.868	2	117	0.064

3. Results

In conclusion, this study highlights the positive impact of inclusive teaching styles on passing skills among university students in soccer. Utilizing an experimental one-group pre-test post-test design, the research demonstrated significant improvements in passing abilities following the implementation of inclusive teaching methods. These findings underscore the broader implications of inclusivity in sports education, emphasizing its role in creating a supportive learning environment where students from

diverse backgrounds can thrive and develop confidence in their soccer skills. Moreover, the study emphasizes the need for curriculum development and teaching methods that cater to individual differences, including social, cultural, and skill-related diversity. By promoting inclusive practices, universities can enhance student motivation, engagement, and skill development in sports education. This approach not only prepares students to excel as competent athletes but also fosters their ability to collaborate effectively in diverse global sporting communities. However, it's important to acknowledge the study's limitations, such as the lack of a control group for comparison, the relatively small sample size, and the reliance on a standardized scale to measure passing skills. Addressing these limitations in future research could provide a more comprehensive understanding of how inclusive teaching strategies impact various facets of sports education beyond technical skills. Overall, the study contributes valuable insights into the benefits of inclusive teaching in sports education, advocating for its broader implementation to promote inclusive excellence and equity among students in athletic development and beyond.

4. Discussion

Based on the results of the research, discussion and limitations in this study, there are several things that can be suggested, including the following:

1. The application of the practice teaching style is proven to be able to make a positive contribution to the learning outcomes of passing the inner leg, so it should be used by PE lecturers in general.
2. Motivation as one aspect that contributes to the learning outcomes of passing the inner leg obtained by students, so it should be possible before implementing learning by using a particular teaching style, lecturers need to pay attention to the motivation of each student.
3. This research is only limited to high and low motivation, so other researchers can conduct studies or research in a broader context to be able to know and understand the learning outcomes of inner leg passing obtained by students.

5. Recommendations

Further research should be conducted in other cities or countries to see if the findings of this study can be applied more broadly. Use longitudinal methods to see how perceptions of teaching style and motivation. Examine how changes in technology and the latest teaching trends affect physical education learning.

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References

- [1] Aelterman, N., Vansteenkiste, M., Haerens, L., Soenens, B., Fontaine, J. R. J., & Reeve, J. (2019). Toward an integrative and fine-grained insight in motivating and demotivating teaching styles: The merits of a circumplex approach. *Journal of Educational Psychology*, 111(3), 497–521. <https://doi.org/10.1037/edu0000293>
- [2] Amerstorfer, C. M., & Freiin von Münster-Kistner, C. (2021). Student Perceptions of Academic Engagement and Student-Teacher Relationships in Problem-Based Learning. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.713057>
- [3] Arsovic, B., & Stefanovic, N. (2020). E-learning based on the adaptive learning model: case study in Serbia. *Sadhana - Academy Proceedings in Engineering Sciences*, 45(1). <https://doi.org/10.1007/s12046-020-01499-8>
- [4] Bozki, E., Stark, P., Gao, H., Hasenbein, L., Hahn, J. U., Kasneci, E., & Gollner, R. (2021). Exploiting object-of-interest information to understand attention in VR classrooms. In *Proceedings - 2021 IEEE Conference on Virtual Reality and 3D User Interfaces, VR 2021* (pp. 597–605). <https://doi.org/10.1109/VR50410.2021.00085>
- [5] Bragg, L. A., Walsh, C., & Heyeres, M. (2021). Successful design and delivery of online professional development for teachers: A systematic review of the literature. *Computers and Education*, 166. <https://doi.org/10.1016/j.compedu.2021.104158>
- [6] Castillo, I., Molina-García, J., Estevan, I., Queral, A., & Álvarez, O. (2020). Transformational teaching in physical education and students' leisure-time physical activity: The mediating role of learning climate, passion and self-determined motivation. *International Journal of Environmental Research and Public Health*, 17(13), 1–16.

- <https://doi.org/10.3390/ijerph17134844>
- [7] Ceha, J., Lee, K. J., Nilsen, E., Goh, J., & Law, E. (2021). Can a humorous conversational agent enhance learning experience and outcomes? In *Conference on Human Factors in Computing Systems - Proceedings*. <https://doi.org/10.1145/3411764.3445068>
- [8] Chen, Y. T., Liou, S., & Chen, L. F. (2019). The Relationships among Gender, Cognitive Styles, Learning Strategies, and Learning Performance in the Flipped Classroom. *International Journal of Human-Computer Interaction*, 35(4–5), 395–403. <https://doi.org/10.1080/10447318.2018.1543082>
- [9] Cheon, S. H., Reeve, J., & Ntoumanis, N. (2019). An intervention to help teachers establish a prosocial peer climate in physical education. *Learning and Instruction*, 64. <https://doi.org/10.1016/j.learninstruc.2019.101223>
- [10] Cheon, S. H., Reeve, J., & Vansteenkiste, M. (2020). When teachers learn how to provide classroom structure in an autonomy-supportive way: Benefits to teachers and their students. *Teaching and Teacher Education*, 90. <https://doi.org/10.1016/j.tate.2019.103004>
- [11] Collie, R. J., Granziera, H., & Martin, A. J. (2019). Teachers' motivational approach: Links with students' basic psychological need frustration, maladaptive engagement, and academic outcomes. *Teaching and Teacher Education*, 86. <https://doi.org/10.1016/j.tate.2019.07.002>
- [12] Coman, C., Țiru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability (Switzerland)*, 12(24), 1–22. <https://doi.org/10.3390/su122410367>
- [13] Dekker, S. (2019). Foundations of Safety Science: A Century of Understanding Accidents and Disasters. In *Foundations of Safety Science: A Century of Understanding Accidents and Disasters*. <https://doi.org/10.4324/9781351059794>
- [14] Dörnyei, Z., & Muir, C. (2019). Creating a Motivating Classroom Environment. In *Springer International Handbooks of Education: Vol. Part F1628* (pp. 719–736). https://doi.org/10.1007/978-3-030-02899-2_36
- [15] Dos Santos, L. M. (2019). Recruitment and retention of international school teachers in remote archipelagic countries: The Fiji experience. *Education Sciences*, 9(2). <https://doi.org/10.3390/educsci9020132>
- [16] Eager, B., & Brunton, R. (2023). Prompting Higher Education Towards AI-Augmented Teaching and Learning Practice. *Journal of University Teaching and Learning Practice*, 20(5). <https://doi.org/10.53761/1.20.5.02>
- [17] Fin, G., Moreno-Murcia, J. A., León, J., Baretta, E., & Nodari, R. J. (2019). Interpersonal autonomy support style and its consequences in physical education classes. *PLoS ONE*, 14(5). <https://doi.org/10.1371/journal.pone.0216609>
- [18] Garbóczy, S., Szemán-Nagy, A., Ahmad, M. S., Harsányi, S., Ocsenás, D., Rekenyi, V., Al-Tammemi, A. B., & Koložsvári, L. R. (2021). Health anxiety, perceived stress, and coping styles in the shadow of the COVID-19. *BMC Psychology*, 9(1). <https://doi.org/10.1186/s40359-021-00560-3>
- [19] Gill, D., Whitehead, C., & Wondimagegn, D. (2020). Challenges to medical education at a time of physical distancing. In *The Lancet* (Vol. 396, Issue 10244, pp. 77–79). [https://doi.org/10.1016/S0140-6736\(20\)31368-4](https://doi.org/10.1016/S0140-6736(20)31368-4)
- [20] Goedhart, N. S., Blignaut-van Westrhenen, N., Moser, C., & Zweekhorst, M. B. M. (2019). The flipped classroom: supporting a diverse group of students in their learning. *Learning Environments Research*, 22(2), 297–310. <https://doi.org/10.1007/s10984-019-09281-2>
- [21] Gómez-Galán, J. (2020). Media education in the ICT Era: Theoretical structure for innovative teaching styles. *Information (Switzerland)*, 11(5). <https://doi.org/10.3390/INFO11050276>
- [22] Guo, J., Bai, L., Yu, Z., Zhao, Z., & Wan, B. (2021). An AI-application-oriented in-class teaching evaluation model by using statistical modeling and ensemble learning. *Sensors (Switzerland)*, 21(1), 1–28. <https://doi.org/10.3390/s21010241>
- [23] Gupta, Y., Khan, F. M., & Agarwal, S. (2021). Exploring Factors Influencing Mobile Learning in Higher Education - A Systematic Review. *International Journal of Interactive Mobile Technologies*, 15(12), 140–157. <https://doi.org/10.3991/ijim.v15i12.22503>
- [24] Hartt, M., Hosseini, H., & Mostafapour, M. (2020). Game On: Exploring the Effectiveness of Game-based Learning. *Planning Practice and Research*, 35(5), 589–604. <https://doi.org/10.1080/02697459.2020.1778859>
- [25] Huang, C. L., Luo, Y. F., Yang, S. C., Lu, C. M., & Chen, A. S. (2020). Influence of Students' Learning Style, Sense of Presence, and Cognitive Load on Learning Outcomes in an Immersive Virtual Reality Learning Environment. *Journal of Educational Computing Research*, 58(3), 596–615. <https://doi.org/10.1177/0735633119867422>
- [26] Huang, T. C., Chen, M. Y., & Hsu, W. P. (2019). Do learning styles matter? Motivating learners in an augmented geopark. *Educational Technology and Society*, 22(1), 70–81. <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85063800693&origin=inward>
- [27] Invernizzi, P. L., Crotti, M., Bosio, A., Cavaggioni, L., Alberti, G., & Scurati, R. (2019). Multi-teaching styles approach and active reflection: Effectiveness in improving fitness level, motor competence, enjoyment, amount of physical activity, and effects on the perception of physical education lessons in primary school children. *Sustainability (Switzerland)*, 11(2). <https://doi.org/10.3390/su11020405>
- [28] Jabarullah, N. H., & Iqbal Hussain, H. (2019). The effectiveness of problem-based learning in technical and vocational education in Malaysia. *Education and Training*, 61(5), 552–567. <https://doi.org/10.1108/ET-06-2018-0129>
- [29] Jeffery, K. A., & Bauer, C. F. (2020). Students' responses to emergency remote online teaching reveal critical factors for all teaching. *Journal of Chemical Education*, 97(9), 2472–2485. <https://doi.org/10.1021/acs.jchemed.0c00736>
- [30] Jungblut, J., Vukasovic, M., & Steinhardt, I. (2020). Higher education policy dynamics in turbulent times—access to higher education for refugees in Europe. *Studies in Higher Education*, 45(2), 327–338. <https://doi.org/10.1080/03075079.2018.1525697>

- [31] Kruk, M., Pawlak, M., Elahi Shirvan, M., & Shahnama, M. (2022). The emergence of boredom in an online language class: An ecological perspective. *System*, 107. <https://doi.org/10.1016/j.system.2022.102803>
- [32] Kuhail, M. A., Alturki, N., Alramlawi, S., & Alhejori, K. (2023). Interacting with educational chatbots: A systematic review. *Education and Information Technologies*, 28(1), 973–1018. <https://doi.org/10.1007/s10639-022-11177-3>
- [33] Kundu, T., & Garg, H. (2022). A hybrid ITLHHO algorithm for numerical and engineering optimization problems. *International Journal of Intelligent Systems*, 37(7), 3900–3980. <https://doi.org/10.1002/int.22707>
- [34] Leo, F. M., Mouratidis, A., Pulido, J. J., López-Gajardo, M. A., & Sánchez-Oliva, D. (2022). Perceived teachers' behavior and students' engagement in physical education: the mediating role of basic psychological needs and self-determined motivation. *Physical Education and Sport Pedagogy*, 27(1), 59–76. <https://doi.org/10.1080/17408989.2020.1850667>
- [35] Lin, Q., Zhu, Y., Zhang, S., Shi, P., Guo, Q., & Niu, Z. (2019). Lexical based automated teaching evaluation via students' short reviews. *Computer Applications in Engineering Education*, 27(1), 194–205. <https://doi.org/10.1002/cae.22068>
- [36] Madsen, J., Júlio, S. U., Gucik, P. J., Steinberg, R., & Parra, L. C. (2021). Synchronized eye movements predict test scores in online video education. *Proceedings of the National Academy of Sciences of the United States of America*, 118(5). <https://doi.org/10.1073/pnas.2016980118>
- [37] Mahmood, S., Palaniappan, S., Hasan, R., Sarker, K. U., Abass, A., & Rajegowda, P. M. (2019). Raspberry PI and role of IoT in Education. In *2019 4th MEC International Conference on Big Data and Smart City, ICBDS C 2019*. <https://doi.org/10.1109/ICBDSC.2019.8645598>
- [38] Margunayasa, I. G., Dantes, N., Marhaeni, A. A. I. N., & Suastra, I. W. (2019). The effect of guided inquiry learning and cognitive style on science learning achievement. *International Journal of Instruction*, 12(1), 737–750. <https://doi.org/10.29333/iji.2019.12147a>
- [39] McMahon, K., Yeh, C. S. H., & Etchells, P. J. (2019). The Impact of a Modified Initial Teacher Education on Challenging Trainees' Understanding of Neuromyths. *Mind, Brain, and Education*, 13(4), 288–297. <https://doi.org/10.1111/mbe.12219>
- [40] Moè, A., & Katz, I. (2020). Self-compassionate teachers are more autonomy supportive and structuring whereas self-derogating teachers are more controlling and chaotic: The mediating role of need satisfaction and burnout. *Teaching and Teacher Education*, 96. <https://doi.org/10.1016/j.tate.2020.103173>
- [41] Müller, F. A., & Wulf, T. (2020). Technology-supported management education: a systematic review of antecedents of learning effectiveness. In *International Journal of Educational Technology in Higher Education* (Vol. 17, Issue 1). <https://doi.org/10.1186/s41239-020-00226-x>
- [42] Okechukwu, F. O., Ogba, K. T. U., Nwufu, J. I., Ogba, M. O., Onyekachi, B. N., Nwanosike, C. I., & Onyishi, A. B. (2022). Academic stress and suicidal ideation: moderating roles of coping style and resilience. *BMC Psychiatry*, 22(1). <https://doi.org/10.1186/s12888-022-04063-2>
- [43] Prat, Q., Camerino, O., Castañer, M., Andueza, J., & Puigarnau, S. (2019). The personal and social responsibility model to enhance innovation in physical education. *Apunts. Educacion Fisica y Deportes*, 136, 83–99. [https://doi.org/10.5672/APUNTS.2014-0983.ES.\(2019/2\).136.06](https://doi.org/10.5672/APUNTS.2014-0983.ES.(2019/2).136.06)
- [44] Reeve, J., Ryan, R. M., Cheon, S. H., Matos, L., & Kaplan, H. (2022). Supporting Students' Motivation: Strategies for Success. In *Supporting Students' Motivation: Strategies for Success*. <https://doi.org/10.4324/9781003091738>
- [45] Rogers, S. J., Yoder, P., Estes, A., Warren, Z., McEachin, J., Munson, J., Rocha, M., Greenson, J., Wallace, L., Gardner, E., Dawson, G., Sugar, C. A., Hellemann, G., & Whelan, F. (2021). A Multisite Randomized Controlled Trial Comparing the Effects of Intervention Intensity and Intervention Style on Outcomes for Young Children With Autism. *Journal of the American Academy of Child and Adolescent Psychiatry*, 60(6), 710–722. <https://doi.org/10.1016/j.jaac.2020.06.013>
- [46] Roothoof, H. (2022). Spanish lecturers' beliefs about English medium instruction: STEM versus Humanities. *International Journal of Bilingual Education and Bilingualism*, 25(2), 627–640. <https://doi.org/10.1080/13670050.2019.1707768>
- [47] Ryan, E., & Poole, C. (2019). Impact of Virtual Learning Environment on Students' Satisfaction, Engagement, Recall, and Retention. *Journal of Medical Imaging and Radiation Sciences*, 50(3), 408–415. <https://doi.org/10.1016/j.jmir.2019.04.005>
- [48] Sangsawang, T. (2020). An instructional design for online learning in vocational education according to a self-regulated learning framework for problem solving during the covid-19 crisis. *Indonesian Journal of Science and Technology*, 5(2), 283–198. <https://doi.org/10.17509/ijost.v5i2.24702>
- [49] Saxon, S. V., Etten, M. J., & Perkins, E. A. (2021). PHYSICAL CHANGE AND AGING: A Guide for the Helping Professions: Seventh Edition. In *Physical Change and Aging: A Guide for the Helping Professions: Seventh Edition*. <https://doi.org/10.1891/9780826150561>
- [50] Shi, Y. (2023). The use of mobile internet platforms and applications in vocal training: synergy of technological and pedagogical solutions. *Interactive Learning Environments*, 31(6), 3780–3791. <https://doi.org/10.1080/10494820.2021.1943456>
- [51] Shirazi, F., & Heidari, S. (2019). The relationship between critical thinking skills and learning styles and academic achievement of nursing students. *Journal of Nursing Research*, 27(4). <https://doi.org/10.1097/jnr.0000000000000307>
- [52] Shorey, S., Chan, V., Rajendran, P., & Ang, E. (2021). Learning styles, preferences and needs of generation Z healthcare students: Scoping review. In *Nurse Education in Practice* (Vol. 57). <https://doi.org/10.1016/j.nepr.2021.103247>

- [53] Singh, N., Gunjan, V. K., & Nasralla, M. M. (2022). A Parametrized Comparative Analysis of Performance Between Proposed Adaptive and Personalized Tutoring System “Seis Tutor” With Existing Online Tutoring System. *IEEE Access*, 10, 39376–39386. <https://doi.org/10.1109/ACCESS.2022.3166261>
- [54] Son, A. L., Darhim, & Fatimah, S. (2020). Students’ mathematical problem-solving ability based on teaching models intervention and cognitive style. *Journal on Mathematics Education*, 11(2), 209–222. <https://doi.org/10.22342/jme.11.2.10744.209-222>
- [55] Stephenson, C. R., Bonnes, S. L., Sawatsky, A. P., Richards, L. W., Schleck, C. D., Mandrekar, J. N., Beckman, T. J., & Wittich, C. M. (2020). The relationship between learner engagement and teaching effectiveness: a novel assessment of student engagement in continuing medical education. *BMC Medical Education*, 20(1). <https://doi.org/10.1186/s12909-020-02331-x>
- [56] Tanis, C. J. (2020). The seven principles of online learning: Feedback from faculty and alumni on its importance for teaching and learning. *Research in Learning Technology*, 28. <https://doi.org/10.25304/rlt.v28.2319>
- [57] Vermote, B., Aelterman, N., Beyers, W., Aper, L., Buysschaert, F., & Vansteenkiste, M. (2020). The role of teachers’ motivation and mindsets in predicting a (de)motivating teaching style in higher education: a circumplex approach. *Motivation and Emotion*, 44(2), 270–294. <https://doi.org/10.1007/s11031-020-09827-5>
- [58] Wang, R., Lowe, R., Newton, S., & Kocaturk, T. (2020). Task complexity and learning styles in situated virtual learning environments for construction higher education. *Automation in Construction*, 113. <https://doi.org/10.1016/j.autcon.2020.103148>
- [59] Yadegaridehkordi, E., Noor, N. F. B. M., Ayub, M. N. Bin, Affal, H. B., & Hussin, N. B. (2019). Affective computing in education: A systematic review and future research. *Computers and Education*, 142. <https://doi.org/10.1016/j.compedu.2019.103649>
- [60] Yannier, N., Hudson, S. E., Koedinger, K. R., Hirsh-Pasek, K., Golinkoff, R. M., Munakata, Y., Doebel, S., Schwartz, D. L., Deslauriers, L., McCarty, L., Callaghan, K., Theobald, E. J., Freeman, S., Cooper, K. M., & Brownell, S. E. (2021). Active learning: “Hands-on” meets “minds-on.” *Science*, 374(6563), 26–30. <https://doi.org/10.1126/science.abj9957>
- [61] Zhang, W., Shankar, A., & Antonidoss, A. (2022). Modern Art Education and Teaching Based on Artificial Intelligence. *Journal of Interconnection Networks*, 22. <https://doi.org/10.1142/S021926592141005X>
- [62] Zhang, Y., Zhang, S., & Hua, W. (2019). The Impact of Psychological Capital and Occupational Stress on Teacher Burnout: Mediating Role of Coping Styles. *Asia-Pacific Education Researcher*, 28(4), 339–349. <https://doi.org/10.1007/s40299-019-00446-4>