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Building Self-Efficacy in Physics Learning Using Scaffolds

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Abstract
One of the students' main obstacles in studying physics is their low self-efficacy. A person's self-efficacy level affects their process of behavior selection, determining the amount of effort against obstacles, determining ways of thinking and emotional reactions, along with predicting future behavior. This study used a qualitative method with a descriptive approach. Teachers can use scaffolding to increase students' self-efficacy in learning. Scaffolding is a series of activities carried out to help children learn. The teacher provides excellent assistance to students during the early stages of learning; then, the assistance is slowly reduced until students can learn independently.
Keywords: self-efficacy, physics learning, scaffolding

Abstrak
Salah satu hambatan yang utama muncul dari dalam diri siswa ketika belajar fisika adalah *self-efficacy* siswa yang rendah. Tingkat *self-efficacy* seseorang memiliki peran dalam menentukan pemilihan perilaku, menentukan besarnya upaya terhadap hambatan, menentukan cara pikir dan reaksi emosional, dan prediksi perilaku yang akan muncul. Metode penelitian yang digunakan adalah metode penelitian kualitatif dengan pendekatan deskriptif. Guru dapat menggunakan *scaffolding* untuk meningkatkan *self-efficacy* siswa pada pembelajaran. *Scaffolding* merupakan serangkaian kegiatan yang dilakukan untuk membantu anak dalam belajar. Guru memberikan bantuan besar kepada siswa selama tahap awal pembelajaran kemudian seiring waktu bantuan perlahan dikurangi hingga siswa mampu melakukannya secara mandiri.
Kata Kunci: *self-efficacy*, pembelajaran fisika, *scaffolding*

1. Introduction

Physics is a branch of natural science that focuses on the scientific learning of natural phenomena. However, physics courses are commonly regarded as complex and uninteresting. This perception occurs as students have to memorize a bunch of formulas without comprehending their meaning [1]. Besides, most students have not achieved sufficient conceptual understanding and problem-solving skills in physics learning [2]. In general, issues in physics learning can be classified into simple and complex problems. Complex problems involve multi-concept issues [3]. Besides, the students have not been habituated to searching for problems related to the learning materials independently [4]. Consequently, students have a significant dependency on their teachers since they perceive teachers as the only source of knowledge, leaving their independence in learning untrained properly [5].

The student is the most vital stakeholder in the learning process because the core of the learning process is assisting students in comprehending the materials. However, in its practice, students face numerous obstacles during their learning. One of those obstacles is students' low self-efficacy [6]. *Self-efficacy* represents someone's belief in their own ability to solve an issue and attain their

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expected goals [7]. The concept of self-efficacy is developed in the social cognitive theory from Bandura. The four main elements influencing someone's self-efficacy are *enactive mastery experience*, *vicarious experience*, v*erbal persuasion*, as well as *physiological and affective states* [8]. Among those factors, enactive mastery experience is the most effective means to construct robust self-efficacy in students [9]. Often, students are unable to present their academic achievement optimally, which shows their authentic ability since they are frequently unsure of their ability to complete the given tasks [10].

In addition, self-efficacy carries substantial effects on students' knowledge attainment and skills development, affecting their learning outcomes, academic achievement, and other skills [11]. Students with high self-efficacy present active participation during physics learning, allocate time to learn the learning material and construct various learning strategies [12]. Students with high self-efficacy also have greater self-confidence in completing assignments, resulting in a greater chance of attaining academic achievement [13]. In contrast, low self-efficacy tends to lead students to lower their efforts in completing the task and give up quickly so that an easy assignment becomes more challenging [14]. According to previous research, low self-efficacy is linked to teacher-centered learning methods [15]. In that learning, students are not trained to be confident in their own abilities, so they always rely on other people. Meanwhile, self-efficacy is essential in motivating students to solve a problem [16]. A study also reported that students with low self-efficacy present a lower learning outcome than students with high self-efficacy in the physics course [6].

In a learning process, each student has a different level of comprehension progression. This progress of comprehension is known as the zone of proximal development [17]. This zone or comprehension progress consists of the actual and potential understanding zone. The actual comprehension progression can be enhanced to a potential comprehension zone using the scaffolding approach [18]. Scaffolding is defined as a series of activities that aid students in the learning process [19]. It functions as a temporary help that can be adjusted to students' cognitive skills development [20]. In the initial learning stage, teachers give examples of the skills they are learning, then they lower the help slowly, following the increasing students' skills [21]. Besides, scaffolding improves students' conceptual understanding in physics courses [22]. Scaffolding also helps students plan an effective learning strategy, monitor their learning progress, and evaluate their understanding [23]. The implementation of scaffolding enhances students' self-efficacy [15]. Therefore, this study aims to increase students' self-efficacy using scaffolding.

2. Research Method

This study used a qualitative method with a descriptive approach. A descriptive study attempts to describe a recent phenomenon, event, and occasion [24]. We garnered data through literature studies and interviews. A literature study is a series of activities carried out to obtain literature data by reading and taking notes, followed by data processing [25]. The features of a literature study include (1) researchers directly face texts, (2) it requires the available literature, (3) literature data are the secondary data, and (4) the use of literature is not restricted by time and space [26]. The samples were selected using the purposive sampling method. This purposive sampling is a sampling technique that does not follow classification and is not carried out randomly since it is conducted based on particular reasons [27]. We only involved the physics teachers in this study because they were correlated with our research scope. For the interview, we conducted a semi-structured interview which started from the issues included in the interview guidelines. Meanwhile, the sequence of interview questions followed the answers from the respondents and the interview process. The interview guideline ensures that researchers gathered similar data from respondents [28]. In this study, our interview focused on identifying issues related to students' self-efficacy. Thus, our interview questions were mostly related to the student's participation in the learning process, their question and answer session, students' confidence in the learning, learning outcomes, along with their attitude when they receive their outcomes.

3. Results and Discussion

Our interview with six physics teachers suggested six primary findings. First, most students with high self-efficacy come from families with a medium to a high level of income. Second, students with high self-efficacy present great intelligence from the beginning of the class. Third, students present higher

participation in the practice activities than in the theoretical discussion. Fourth, students with low mathematics scores tend to have minimum effort in the physics course. Fifth, the students with great scores usually also show active participation and higher learning motivation. Sixth, students' self-efficacy tends to lower after they attain negative comments from their friends.

Our data indicated a number of factors that affect students' efficacy. Among those factors, the most significant influencing factors are enactive mastery experience, vicarious experience, verbal persuasion, as well as physiological and affective states. The first factor affecting self-efficacy is the enactive mastery experience. This factor is the most prominent factor as it substantially determines someone's amount of effort in attaining their goals. Success grows someone's confidence and self-efficacy, while failure attenuates them, especially when the failure occurs before someone builds robust self-efficacy. The growth of self-efficacy necessitates sufficient experience in resolving obstacles through persistent efforts. Contrastingly, someone who easily achieves success will anticipate quick results and easily give up when they encounter failure [8]. *Self-efficacy* is also determined by the inaccuracy of self-judgment. Someone's habit of only memorizing their shabby attitude and appearance results in low self-efficacy. Adversely, someone persistent in improving their achievement even after facing failures enhances their self-efficacy. Thus, a collection of past experiences determines someone's self-efficacy through cognitive representation [29]. Mostly, children from acceptable economic backgrounds attain more significant opportunities to expand their skills as they receive excellent facilities [30]. The attempt carried out in completing a task is also an influencing factor of self-efficacy. When someone performs extensive effort in completing a difficult task, their success will not affect their self-efficacy, while failure will demolish their self-efficacy. Minimum performance combined with low effort has a lower effect on self-efficacy, but success with minimum effort brings high self-efficacy [7].

The second influencing factor of self-efficacy is vicarious experience. Someone's self-judgment does not only rely on enactive mastery experience. Self-efficacy is somehow affected by their self-indulgent experience mediated by the attainment of a role model [8]. A role model can be observed in daily life or through television and other visual media [29]. Someone frequently assesses their own ability by recognizing other people in completing a similar task and vice versa. A role model bears substantial effects on someone's self-efficacy, particularly on people with low self-confidence. However, its effect is minimal, lower than the effects of someone's mastery. In relation to confidence in self-efficacy, many youths position their role model as their primary source of information [7]. A person considers a number of factors in selecting a role model, such as similar behavior, same race, and gender, along with the role model's determination to resolve obstacles, ability to determine the strategies to manage the challenging situation, and competent guidance [29].

The third influencing factor of self-efficacy is verbal persuasion. Verbal persuasion serves as a further means of strengthening someone's confidence in achieving their goals. Self-efficacy can be easily maintained if someone continuously receives positive support and trust in their ability, compared to when they attain skepticism. In resolving a problem, people who achieve positive verbal persuasion on their ability tend to demonstrate more extensive effort than those who constantly doubt their ability and reflect on their deficiencies [8]. Positive verbal persuasion improves self-efficacy, while negative pessimistic verbal influence lowers self-efficacy. In general, it is easier to reduce someone's self-efficacy [7]. Similarly, students who often receive negative comments present lesser efforts in obtaining their goals, primarily female students. Female students tend to have lower self-efficacy than male students [31].

The last influencing factor of self-efficacy is physiological and affective states. A person's fatigue and soreness influence their strength and stamina, affecting their self-efficacy. Someone's self-efficacy is reported to be influenced by their mood [8]. A person's affective situation carries an extensive influence on their self-efficacy, as it is altered by their strong emotion, such as fear, anxiety, and stress. However, non-excessive change of emotion improves self-efficacy [32], [33]. In a severely stressful situation, someone may experience depression while also losing confidence, self-conception, and pride [34]. Consequently, to increase someone's self-efficacy, we have to improve their physical condition, lower their stress, alter their negative emotion and revise their self-perception [8].

During a learning process, students' academic self-efficacy is crucial. Academic self-efficacy refers to someone's confidence in their ability to complete learning activities and academic assignments. There are several aspects of academic self-efficacy. First, efficacy expectation is the

emergence of an attitude resulting from the individual perception of their own ability in relation to the expected outcome. Second, outcome expectation, which represents the self-estimation of the performed behaviors in attaining a particular result. Third, outcome value shows the meaningfulness of someone's attained result. The outcome value highly influences someone's motivation to reclaim their success [33]. Additionally, someone's self-efficacy substantially impacts their selection of behaviours, amount of effort and power struggle in facing obstacles, way of thinking, emotional reaction, and predicted future behaviors [35]. Students' academic self-efficacy can be measured using a scale consisting of 25 items, as listed in Table 1.

Table 1. Academic Self-Efficacy Scale [36]

No	Item
1	Capable of maintaining focus during the learning process
2	Capable of constructing a useful learning strategy in learning a new course
3	Capable of showing non-excessive reaction to a failure
4	Capable of expressing their doubt and uncertainty about the learning materials delivered by the teachers
5	Capable of constructing a good relationship with the schoolmates
6	Capable of preparing a course expected in a training program
7	Capable of correlating various topics in different courses
8	Capable of articulating disagreement on the opinions of the teacher
9	Capable of learning independently, without help from other people
10	Capable of discussing difficulties with the teacher
11	Capable of comprehending the reasons behind their failures
12	Capable of managing difficult situations
13	Capable of asking for teachers' assistance in resolving learning problems
14	Capable of working in a group
15	Capable of trying to achieve the desired purposes
16	Capable of dodging the unpleasant situation
17	Capable of understanding a situation and selecting the best alternative
18	Capable of positioning their dream linear to their selected profession
19	Capable of making a decision and considering the consequences
20	Capable of avoiding other people's influence in making a future decision
21	Capable of showing excellent performance in their disliked course
22	Capable of asking for help when they face difficulties
23	Capable of discussing the learning assessment based on the expected acquired skills
24	Capable of setting up a positive environment with an excellent relationship with schoolmates
25	Capable of avoiding conflict

Each student's self-efficacy level divers. This difference is induced by the three dimensions of self-efficacy, consisting of the dimension of level, strength, and generalization. The level dimension is related to the student's perception of their assignments' difficulty level, affecting their behavior selection, and what they will and will not do. Students shall try to behave as they are capable of and refrain from acting in ways that are above their capacity. The strength dimension is correlated with students' belief or expectation of tenacity in their capability. The unsupportive experience can easily shake the shaky self-efficacy. Differently, robust self-efficacy encourages students to keep trying, even after they encounter challenging situations. Lastly, the generalization dimension is connected to students' confidence in particular skills, specific problems, or activities in different conditions [37]. In the physics course, self-efficacy influences students' interest in learning [38].

In an attempt to enhance students' self-efficacy, teachers should also alter their teacher-centered learning approach to a student-centered approach. A number of learning models have been reported capable of improving students' self-efficacy in physics courses, such as *Problem Based Learning* [6], *Flipped Classroom* [39], *Inquiry* [14], dan *Blended Learning* [16], and *Project Based Learning* [40], [41]. Besides, students' academic self-efficacy can also be increased using *scaffolding* [15], [16]. The scaffolding learning approach is defined as a technique to support students learning at the beginning of the learning stage to help them learn independently [42]. In scaffolding learning, teachers provide great assistance to the students in the initial phase of the learning process, then the students take away that responsibility gradually. The assistance can be in the form of instruction, encouragement,

elaborating the problems into stages of solvency, and providing example that helps students grow independently [10]. The implementation of scaffolding is crucial since it grows students' mathematical problem-solving skills, positive attitudes, and independence in learning [42], [43].

Several studies have examined the effects of scaffolding on students' self-efficacy [9], [44]–[46]. Scaffolding implementation in a learning process increases students' learning achievement, metacognitive skills, and self-efficacy [46]. Meanwhile, students' mathematic self-efficacy can be enhanced through metacognitive scaffolding [44]. In the metacognitive scaffolding approach, teachers propose a series of questions guiding students to rememorize the mathematical concepts that they have mastered or their success in resolving a problem. Scaffolding techniques have also been implemented in physics learning to improve students' self-efficacy [15].

In the concept of scaffolding, students are not taught the learning materials, but they are given complex assignments to expand their skills in resolving complex problems. Besides, as students' skills develop, the teachers should also reduce their assistance and let the students learn independently. If the students have not achieved learning independence, then the teachers provide the assistance until they can learn independently. The scaffolding technique can be applied when the students plan, conduct, and reflect on their assignments [42].

The teachers can adopt some types of scaffolding in helping students' learning process, such as conceptual, oral, visual, and decision-making scaffolding. The teachers can select the scaffolding type based on the characteristics of the learning materials [3]. Scaffolding is often used to help students reach their proximal development zone [17]. However, some challenges have been reported in the implementation of scaffolding, namely 1) students need time to plan and implement scaffolding; (2) teachers should choose the proper scaffolding for a diverse classroom; (3) the teachers should know when to reduce their assistance during the scaffolding, so the students unaware of their assistance; and (4) teachers should really consider students' cognitive and affective skills level in selecting the scaffolding type [47]. During the learning process, the expert (teacher or peer counselor) should adjust the amount of guidance to students' performance. This way, the development of students' thinking skills and intellectual levels are also affected by the challenging level of the assignment provided by the teachers [17].

4. Conclusion and Suggestion

The perceived difficult and monotonous physics course can be altered by improving students' self-efficacy. Accordingly, teachers should transform their teacher-centered approach into a student-centered to enhance students' self-efficacy. In physics learning, students' self-efficacy affects their selection of behavior, determining their amount of effort in facing a challenge, determining their way of thinking, determining emotional reaction, along with predicting future behavior. Teachers can adopt scaffolding to improve students' self-efficacy. Scaffolding is a series of learning activities designed to help students learn by providing great assistance in the initial learning stage and gradually reducing the assistance until the students are capable of learning independently.

References

[1] M. Amiruddin, S. B. Prastowo, and T. Prihandono, "Analisis Pengaruh Strategi Scaffolding Konseptual dalam Model Pembelajaran Terhadap Hasil Belajar Fisika SMA," in *Seminar Nasional Pendidikan Fisika*, 2018, vol. 3, pp. 39–45.

[2] P. D. Amanah, A. Harjono, and I. W. Gunada, "Kemampuan Pemecahan Masalah Dalam Fisika Dengan Pembelajaran Generatif Berbantuan Scaffolding Dan Advance Organizer," *J. Pendidik. Fis. dan Teknol.*, vol. 3, no. 1, pp. 84–91, 2017, doi: 10.29303/jpft.v3i1.334.

[3] K. Haniin, M. Diantoro, and S. K. H, "Pengaruh Pembelajaran TPS Dengan Scaffolding Konseptual Terhadap Kemampuan Menyelesaikan Masalah Sintesis Fisika," *J. Pendidik. Sains*, vol. 3, no. 3, pp. 98–105, 2015.

[4] N. Nurulsari, Abdurrahman, and A. Suyatna, "Development of soft scaffolding strategy to improve student's creative thinking ability in physics," *J. Phys. Conf. Ser.*, vol. 909, no. 1, pp. 1–8, 2017, doi: 10.1088/1742-6596/909/1/012053.

[5] R. N. Tuada, H. Kuswanto, A. T. Saputra, and S. H. Aji, "Physics mobile learning with scaffolding approach in simple harmonic motion to improve student learning independence," *J. Phys. Conf. Ser.*, vol. 1440, pp. 1–8, 2020, doi: 10.1088/1742-6596/1440/1/012043.

[6] B. Yoannita, E. Budi, and C. E. Rustana, "Pengaruh Self Efficacy Terhadap Hasil Belajar Fisika Melalui Penggunaan Model Problem Based Learning," in *Prosiding Seminar Nasional Fisika (E-Journal)*, 2016, vol. 5, pp. 9–14.
[7] A. Mukhid, "Self-Efficacy (Perspektif Teori Kognitif Sosial dan Implikasinya terhadap Pendidikan)," *Tadris*, vol. 4, no. 1, pp. 107–122, 2009, [Online]. Available: http://www.ncbi.nlm.nih.gov/pubmed/15350854.
[8] A. Bandura, *Self-Efficacy: The Exercise of Control*. New York: W.H. Freeman and Company, 1997.
[9] N. Valencia-Vallejo, O. López-Vargas, and L. Sanabria-Rodríguez, "Effect of motivational scaffolding on e-learning environments: Self-efficacy, learning achievement, and cognitive style," *J. Educ. Online*, vol. 15, no. 1, pp. 1–14, 2018, doi: 10.9743/JEO2018.15.1.5.
[10] F. Masnia and Z. Amir, "Pengaruh Penerapan Model Scaffolding terhadap Kemampuan Pemahaman Konsep Matematis Berdasarkan SElf Efficacy Siswa SMP," *JURING (Journal Res. Math. Learn.*, vol. 2, no. 3, pp. 249–256, 2019, doi: 10.24014/juring.v2i3.7675.
[11] Suparno, Sukardiyono, T. K. Ardiyati, and B. E. Dasilva, "The Effectiveness of Android-Based Interactive Physics Mobile Learning Media to Improve Students' Psychomotor and Self-Efficacy," *Adv. Soc. Sci. Educ. Humanit. Res.*, vol. 401, pp. 22–27, 2020, doi: 10.2991/assehr.k.200204.005.
[12] M. Tezer and G. Y. Aşıksoy, "Engineering Students' Self-Efficacy Related To Physics Learning," *J. Balt. Sci. Educ.*, vol. 14, no. 3, pp. 311–326, 2015, doi: 10.33225/jbse/15.14.311.
[13] J. J. Callesen, K. Hjernø, L. O'Neill, S. S. Carstensen, and M. Bloksgaard, "Scaffolding students' preparation for a pharmacology practical improves their self-efficacy and learning," *Dansk Univ. Tidsskr.*, vol. 16, no. 30, pp. 3–20, 2021, doi: 10.7146/dut.v16i30.122602.
[14] Wulantri, I. W. Distrik, A. Suyatna, and U. Rosidin, "The Effectiveness of Creative-Inquiry-Based Student Worksheet in Improving Physics Self-Efficacy and Problem Solving of Senior High School Students," *J. Phys. Conf. Ser.*, vol. 1467, no. 1, pp. 1–6, 2020, doi: 10.1088/1742-6596/1467/1/012036.
[15] R. Diani, H. Khotimah, U. Khasanah, and M. R. Syarlisjiswan, "Scaffolding dalam Pembelajaran Fisika Berbasis Problem Based Instruction (PBL): Efeknya Terhadap Pemahaman Konsep dan Self Efficacy," *Indones. J. Sci. Math. Educ.*, vol. 2, no. 3, pp. 310–319, 2019, doi: 10.24042/ijsme.v2i3.4356.
[16] Y. Suryani, A. R. Ningrum, N. Hidayah, and N. R. Dewi, "The effectiveness of blended learning-based scaffolding strategy assisted by google classroom toward the learning outcomes and students' self-efficacy," *J. Phys. Conf. Ser.*, vol. 1796, no. 1, pp. 1–9, 2021, doi: 10.1088/1742-6596/1796/1/012031.
[17] I. P. Suardipa, "Proses Scaffolding Pada Zone Of Proximal Development (ZPD) Dalam Pembelajaran," *Widyacarya*, vol. 4, no. 1, pp. 79–92, 2020.
[18] Suparno, E. Evelin, Sukardiyono, and T. Utami, "Effectiveness of Interactive Physics Mobile Learning Media with Scaffolding Approach to Improve Students' Tolerance and Students' Self-Regulated Learning," *Adv. Soc. Sci. Educ. Humanit. Res.*, vol. 401, pp. 85–89, 2020, doi: 10.2991/assehr.k.200204.016.
[19] J. Rokhmat, Marzuki, Wahyudi, and S. D. Putrie, "A strategy of scaffolding development to increase students' problem-solving abilities: The case of physics learning with causalitic-thinking approach," *J. Turkish Sci. Educ.*, vol. 16, no. 4, pp. 569–579, 2019, doi: 10.36681/tused.2020.8.
[20] C. Chen, "An adaptive scaffolding e-learning system for middle school students' physics learning," *Australas. J. Educ. Technol.*, vol. 30, no. 3, pp. 342–355, 2014.
[21] R. N. Tuada and Suparno, "Increasing Student's Hots Using Mobile Technology and Scaffolding Approach on Sound Wave Material," *J. Pendidik. Fis. Indones.*, vol. 17, no. 2, pp. 160–174, 2021, doi: 10.15294/jpfi.v17i2.26949.
[22] S. Mahtari, M. Wati, S. Hartini, M. Misbah, and D. Dewantara, "The effectiveness of the student worksheet with PhET simulation used scaffolding question prompt," *J. Phys. Conf. Ser.*, vol. 1422, pp. 1–5, 2020, doi: 10.1088/1742-6596/1422/1/012010.
[23] H. S. Wang, S. Chen, and M. H. Yen, "Effects of metacognitive scaffolding on students' performance and confidence judgments in simulation-based inquiry," *Phys. Rev. Phys. Educ.*

Res., vol. 17, no. 2, pp. 1–13, 2021, doi: 10.1103/PhysRevPhysEducRes.17.020108.
[24] A. Setyono, S. E. Nugroho, and I. Yulianti, "Analisis Kesulitan Siswa dalam Memecahkan Masalah Fisika Berbentuk Grafik," *Unnes Phys. Educ. J.*, vol. 5, no. 3, pp. 32–39, 2016.
[25] D. Pilendia, "Pemanfaatan Adobe Flash Sebagai Dasar Pengembangan Bahan Ajar Fisika : Studi Literatur," *J. Tunas Pendidik.*, vol. 2, no. 2, pp. 1–10, 2020, doi: 10.52060/pgsd.v2i2.255.
[26] F. F. S. Lestari, M. Hamdan, and Susilawati, "Studi Literatur Keefektifan Kelas Virtual dalam Pembelajaran Fisika di Masa Pandemi," *J. Pendidik. dan Ilmu Fis.*, vol. 1, no. 1, pp. 29–32, 2021.
[27] H. Putranta and Supahar, "Development of physics-tier tests (PysTT) to measure students' conceptual understanding and creative thinking skills: A qualitative synthesis," *J. Educ. Gift. Young Sci.*, vol. 7, no. 3, pp. 747–775, 2019, doi: 10.17478/jegys.587203.
[28] I. N. Rachmawati, "Pengumpulan Data Dalam Penelitian Kualitatif: Wawancara," *J. Keperawatan Indones.*, vol. 11, no. 1, pp. 35–40, 2007, doi: 10.7454/jki.v11i1.184.
[29] I. M. Rustika, "Efikasi Diri: Tinjauan Teori Albert Bandura," *Bul. Psikol.*, vol. 20, no. 1–2, pp. 18–25, 2012, doi: 10.22146/bpsi.11945.
[30] Y. Ariyanti and P. A. Bowo, "Pengaruh prakerin, status sosial ekonomi keluarga, dan efikasi diri terhadap kesiapan kerja," *Econ. Educ. Anal. J.*, vol. 7, no. 2, pp. 671–687, 2018.
[31] I. W. Distrik, U. Rosidin, and A. Abdurraman, "The role of hots-oriented creative inquiry model for improving self-efficacy and physics problem-solving ability in gender perspectives," *Int. J. Psychosoc. Rehabil.*, vol. 24, no. 9, pp. 2254–2263, 2020.
[32] M. H. Mahmudi and Suroso, "Efikasi Diri , Dukungan Sosial Dan Penyesuaian Diri Dalam Belajar," *Pers. J. Psikol. Indones.*, vol. 3, no. 2, pp. 183–194, 2014.
[33] I. P. Wijaya and N. T. Pratitis, "Efikasi Diri Akademik, Dukungan Sosial Orangtua dan Penyesuaian Diri Mahasiswa dalam Perkuliahan," *J. Pers.*, vol. 1, no. 1, pp. 40–52, 2012.
[34] A. Y. Prasetyo, A. Fathoni, and D. Malik, "Analisis Pengaruh Konflik Keluarga,Pekerjaan, Hardiness, Self Efficacy Terhadap Stress Kerja Dengan Dukungan Sosial Sebagai Variabel Moderasinya (Studi Pada Guru Demak)," *J. Manage.*, vol. 4, no. 4, pp. 1–25, 2018.
[35] Lianto, "Self-Efficacy : A brief literature review," *J. Manaj. Motiv.*, vol. 15, no. 1, pp. 55–61, 2019.
[36] K. K. H. Darmayanti, E. Anggraini, E. Y. Winata, and F. F. Mardianto, "Confirmatory Factor Analysis of the Academic Self-Efficacy Scale : An Indonesian Version," *JP3I (Jurnal Pengukuran Psikol. dan Pendidik. Indones.*, vol. 10, no. 2, pp. 118–132, 2021.
[37] D. Kusrieni, "Hubungan Efikasi Diri dengan Perilaku Mencontek," *PSIKOPEDAGOGIA*, vol. 3, no. 2, pp. 100–111, 2014.
[38] H. Sulistiawan and Nurussaniah, "Hubungan Efikasi Diri, Kecerdasan Emosional Dengan Minat Belajar Fisika," *J. Pendidik.*, vol. 4, no. 1, pp. 43–48, 2019, doi: 10.26740/jp.41n1.p43-48.
[39] P. A. Yanah, I. D. P. Nyeneng, and W. Suana, "Efektivitas Model Flipped Classroom pada Pembelajaran Fisika Ditinjau dari Self Efficacy dan Penguasaan Konsep Siswa," *JIPFRI (Jurnal Inov. Pendidik. Fis. dan Ris. Ilmiah)*, vol. 2, no. 2, pp. 65–74, 2018, doi: 10.30599/jipfri.v2i2.302.
[40] A. H. Hasbullah, "Efikasi Diri Siswa Dalam Pembelajaran Proyek Berbasis STEM pada Materi Termodinamika," *J. Pendidik.*, vol. 5, no. 3, pp. 421–426, 2020.
[41] T. Ratu, N. Sari, W. A. H. Mukti, and M. Erfan, "Efektivitas Project Based Learning Terhadap Efikasi Diri dan Kemampuan Berpikir Kritis Peserta Didik," *Konstan - J. Fis. Dan Pendidik. Fis.*, vol. 6, no. 1, pp. 1–10, 2021, doi: 10.20414/konstan.v6i1.74.
[42] E. Nurhayati, T. Mulyana, and B. A. P. Martadiputra, "Penerapan Scaffolding Untuk Pencapaian Kemampuan Pemecahan Masalah Matematis," *J. Penelit. Pendidik. dan Pengajaran Mat.*, vol. 2, no. 2, pp. 107–112, 2016, [Online]. Available: jurnal.unsil.ac.id/index.php/jp3m.
[43] B. R. Belland, *Instructional Scaffolding in STEM Education*. Springer International, 2017.
[44] S. Prabawanto, "The enhancement of students' mathematical self-efficacy through teaching with metacognitive scaffolding approach," *J. Phys. Conf. Ser.*, vol. 1013, no. 1, pp. 1–7, 2018, doi: 10.1088/1742-6596/1013/1/012135.

[45] M. G. Jatisunda, V. Suciawati, and D. S. Nahdi, "Discovery Learning with Scaffolding To Promote Mathematical Creative Thinking Ability And Self-Efficacy," *Al-Jabar J. Pendidik. Mat.*, vol. 11, no. 2, pp. 351–370, 2020, doi: 10.24042/ajpm.v11i2.6903.
[46] N. Valencia-Vallejo, O. López-Vargas, and L. Sanabria-Rodríguez, "Effect of a metacognitive scaffolding on self-efficacy, metacognition, and achievement in e-learning environments," *Knowl. Manag. E-Learning*, vol. 11, no. 1, pp. 1–19, 2019, doi: 10.34105/j.kmel.2019.11.001.
[47] Y. Sulistyorini, "Analisis Kesalahan Dan Scaffolding Dalam Penyelesaian Persamaan Diferensial," *KALAMATIKA J. Pendidik. Mat.*, vol. 2, no. 1, pp. 91–104, 2017, doi: 10.22236/kalamatika.vol2no1.2017pp91-104.