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Impact of Problem-Based Learning on Adversity Quotient with Self-Efficacy as a Moderator in Seventh-Grade Science Education

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Abstract: This study aims to (1) determine the effect of Problem-Based Learning (PBL) on Adversity Quotient moderated by Self Efficacy, (2) determine the effect of Problem-Based Learning (PBL) on Adversity Quotient, (3) determine the effect of Self Efficacy on Adversity Quotient. This study is a quantitative study with a qualitative approach one group post-test design. The sampling technique used was cluster sampling, with a sample size of 64 students. Data collection was carried out through a questionnaire that had been tested for validity and reliability. The validity test technique used was outer model analysis, while data analysis was carried out using Structural Equation Modeling (SEM). The results of this study are as follows. First, the implementation of PBL has a significant positive effect on students' AQ. Second, Self Efficacy is proven to moderate the effect of PBL on AQ, with students who have high Self-efficacy showing a more significant increase in AQ. Third, the implementation of PBL in science learning, especially in water pollution material, can improve students skills in facing learning challenges more effectively.

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INTRODUCTION

Education is one of the most important aspects of forming a quality generation. In an era of globalization full of uncertainty and complex challenges, education functions not only as a means of transferring knowledge but also as a medium for developing children's emotional, social, intellectual, and spiritual potential. Good education must be able to prepare the younger generation to face the dynamics of a rapidly developing and changing world (Pristiwanti et al., 2022). In this context, education is not only about mastering academic material but also about developing skills that can be used to face real-life challenges. This includes critical thinking skills, problem-solving, creativity, and adaptability skills that are essential in the modern world.

Effective education aims to help students develop their capacities holistically, both in emotional, social, intellectual, and spiritual aspects. In modern education, critical thinking and problem-solving skills are one of the main priorities because these two abilities are needed to face complex challenges in real life. By developing this potential, students are expected to be able to become independent, creative, and responsible individuals (Pristiwanti et al., 2022). In this modern era, facing complex challenges is one of the essential skills that students must have to compete in an increasingly dynamic and competitive labor market.

According to Pristiwanti et al. (2022), students' ability to become more independent and accountable can be realized through a holistic educational approach. Quality education is not only focused on mastering theoretical knowledge but also on how students can apply that knowledge in everyday life.

Therefore, a learning model that is able to combine theoretical knowledge with practical skills is needed, which is relevant to future needs.

In the field of science education in Indonesia, various challenges still need to be overcome to improve the quality of learning. One of the main challenges is the low interest of students in science subjects and their weak ability to solve problems. This is mainly due to the learning model, which is still conventional, where students tend to be faced with memorizing material rather than developing critical and analytical thinking skills (Witarsa, 2022). Ideal science education should be able to encourage students to think creatively, explore scientific phenomena, and apply the concepts they have learned in everyday life (Harefa & Sarumaha, 2020).

Rahmawati & Atmojo (2021) stated that conventional learning models do not provide enough space for students to explore scientific concepts in depth. In schools in Indonesia, students are often only taught to memorize concepts without being allowed to practice or apply them in real life. This causes students problem-solving skills to be weak because they are not used to being faced with complex problems and are not used to finding solutions independently.

To overcome this problem, the Indonesian government, through the Ministry of Education and Culture (Kemendikbud), has attempted to implement innovative learning models, one of which is Problem-Based Learning (PBL). PBL is a student-centered learning model where students are faced with real problems that must be solved independently or in groups. This model encourages students to think critically, seek relevant information, and work together to solve the problems given (Nurhamidah, 2022). Hafizah & Nurhaliza (2021) added that the implementation of PBL aims to improve students' critical thinking and problem-solving skills so that they are better prepared to face global challenges in the future.

Problem-Based Learning also provides an opportunity for students to be more actively involved in the learning process. Through the process of identifying problems and finding solutions, students not only learn to understand scientific concepts but also learn how to apply that knowledge in real-life situations. For example, when students are faced with environmental problems such as water pollution, they must find solutions based on their scientific knowledge. Thus, PBL helps students to develop their critical and analytical thinking skills (Thorndahl & Stentoft, 2020). Through PBL, students are faced with situations or problems that require in-depth analysis and creative solutions so they can develop a better understanding of the material being studied (Sulasih et al., 2018).

In the application of the PBL model, there are two important psychological factors in determining student success, namely Adversity Quotient (AQ) and Self Efficacy (SE). Stoltz (1997) defines AQ as a person's ability to persist in adversity and bounce back from failure. AQ is essential in the learning process, especially in the PBL model, because students are often faced with complex problems and require perseverance and fighting spirit to solve them. Students with high AQ tend to be more persistent and do not give up easily when facing challenges, so they are more successful in completing complex tasks.

Meanwhile, Self Efficacy (SE) refers to a person's belief in their ability to achieve certain goals (Bandura, 1997). Self-efficacy greatly influences students learning motivation. Students with high SE tend to be more confident, proactive, and motivated to actively participate in the learning process. They are also better able to manage stress and academic pressure. In the context of PBL, SE is very important because students who believe in their abilities will be more courageous in facing challenges and more creative in finding solutions (Stoltz, 1997).

Although Problem-Based Learning (PBL) has great potential to improve the quality of learning, its implementation in Indonesia still faces various challenges. In one junior high school in Sragen, for example, the implementation of PBL is still limited and has not become a routine part of the learning process. One of the main challenges is the low AQ and SE of students. Many students give up easily when faced with complex problems, are less able to overcome failure, and have low motivation to continue trying (Stoltz, 1997).

The implementation of PBL requires students to have mental readiness and high motivation. They must be able to overcome various challenges during the learning process, such as confusion in understanding complex problems or the inability to find the right solution. In addition, teachers also need

to act as facilitators who provide guidance and motivation to students so that they remain persistent in facing challenges (Nurrohma & Adistana, 2021).

To improve the quality of science education at the junior high school level, an evaluation of the learning models used, including PBL, is needed. This study aims to analyze the effect of PBL on students' Adversity Quotient, with Self Efficacy as a moderator variable. This study is expected to provide more comprehensive insights into how PBL can help students develop problem-solving skills, critical thinking, and improve their AQ and SE.

Thus, this study is expected to contribute significantly to improving the quality of science learning in Indonesia, especially in facing global challenges in the future. Therefore, this study can be a source of theoretical information and references related to the application of learning models to improve the learning outcomes of Natural Sciences in students. Especially in the application of Problem-Based Learning (PBL) to Adversity Quotient moderated by Self-Efficacy. In line with this, this study asks the following research questions:

1. How does Problem-based Learning affect the adversary quotient, moderated by Self-efficacy in science learning for grade VII students?
2. How does Problem-Based Learning affect Adversity Quotient in science learning for grade VII students?
3. How does Self Efficacy influence Adversity Quotient in science learning for grade VII students?

METHOD

This research was conducted from January 2024 to July 2024. The research was conducted at one of Sragen's junior high schools. This research is a quantitative research type with a one-group post-test design approach. The population is all 224 students in grade VII spread across seven classes. The sampling technique used is probability sampling with a cluster sampling approach. Data collection is carried out through observation, tests, and questionnaires. The analysis used in this study is Structural Equation Modeling Partial Least Square (SEM-PLS). There are three types of variables: the independent variable used is Problem-based Learning. The dependent variable used is the Adversity Quotient. The moderating variable used is Self-Efficacy. In this journal, the study was conducted to test the effect of Problem-Based Learning (PBL) on Adversity Quotient (AQ), moderated by Self-Efficacy (SE) in science learning in grade VII students at one of the junior high schools in Sragen. There are three hypotheses tested in this study:

1. Hypothesis 1 (H1): There is a relationship between Problem-based Learning and the adversary quotient, moderated by Self-efficacy in science learning in grade VII students.
2. Hypothesis 2 (H2): There is a relationship between Problem-Based Learning and Adversity Quotient in science learning for class VII students.
3. Hypothesis 3 (H3): There is a relationship between Self-efficacy and Adversity Quotient in science learning for class VII students.

In SEM-PLS (Partial Least Squares Structural Equation Modeling) analysis, the model is divided into two main parts: the outer and inner models. When moderating variables are involved, some additional steps and considerations need to be considered.

1. Outer Model (Measurement Model)

   This study tested convergent validity, discriminant validity, and composite reliability to ensure the reliability of the measurement instrument. Convergent validity in this study was tested through a high loading factor, with an average above 0.5, indicating a strong relationship between the indicator and the construct being measured. In addition, the Average Variance Extracted (AVE) test showed that the Adversity Quotient (AQ) variable had an AVE value of 0.677 and Self-Efficacy (SE) of 0.721, strengthening convergent validity. The discriminant validity test also showed positive results, with higher cross-loading values for each construct. These results ensure that the Adversity Quotient (AQ), Problem-Based Learning (PBL), and Self-Efficacy (SE) constructs are measured appropriately. In addition, the composite reliability test using Cronbach's alpha showed that all

variables had high reliability, with AQ having an alpha value of 0.841 and SE of 0.807, indicating that the instrument used was reliable in measuring these variables. Overall, these results strengthen the fact that the instrument used in this study is valid and reliable in measuring the relevant constructs.

2. Inner Model (Structural Model)

The inner Model tests the relationship between constructs in the model, including moderation relationships. At this stage, hypothesis testing is carried out. This process calculates the T-Statistic and P-Value values to evaluate the strength and significance of the relationship between variables. The P-Value obtained is used to determine whether the proposed hypothesis can be accepted or rejected.

RESULT AND DISCUSSION

The results and discussion of data analysis using Smart PLS software version 4.0 are shown in Figure 1.

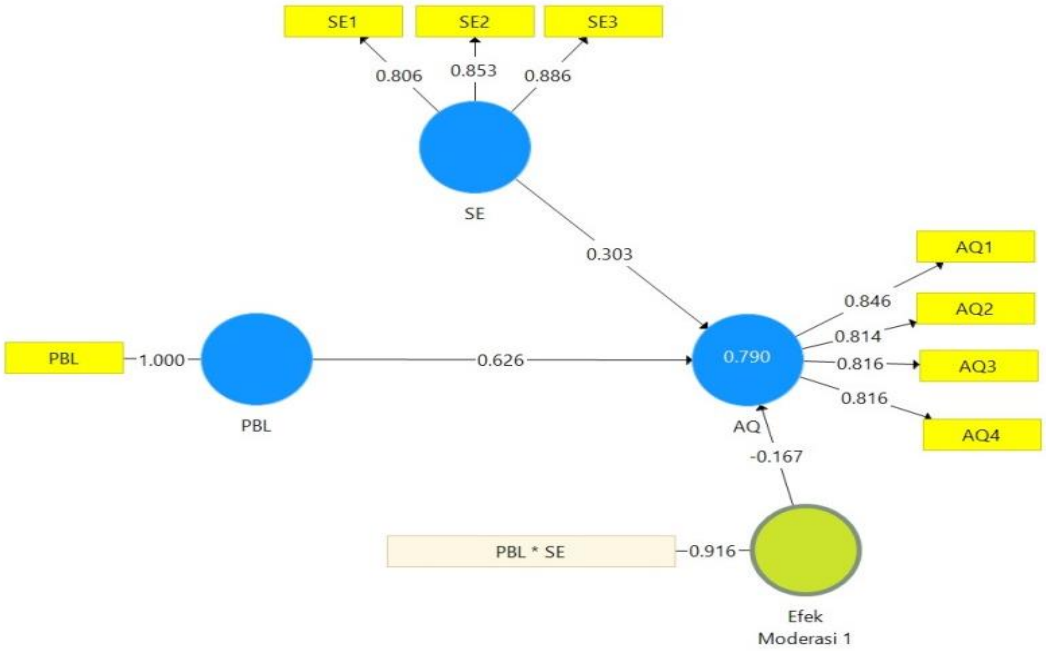

Figure 1. Interconstruction of measurement models

Relationship between Problem-Based Learning and Adversity Quotient Moderated by Self Efficacy

The study results indicate a significant relationship between Problem-Based Learning (PBL) and Adversity Quotient (AQ) moderated by Self Efficacy in grade VII students in science learning at one of Sragen's junior high schools. Hypothesis testing using SmartPLS software version 4.0 produced a T-Statistic value of 2.500 and a P-Value of 0.013, indicating that Self-Efficacy significantly influences the relationship between PBL and AQ. These findings indicate that students with high Self-efficacy are better able to utilize problem-based learning to improve their AQ, especially when facing real challenges, as seen in the context of water pollution learning. The implementation of PBL not only increases student engagement but also strengthens critical thinking and problem-solving skills. Self Efficacy plays an important role as a mediator that strengthens or weakens the relationship between the problem-based learning model and the ability to face adversity quotient (AQ). As a moderating factor, self efficacy affects how students can utilize the benefits of PBL to improve their resilience in dealing with problems. Students with high levels of self-efficacy tend to have confidence in their ability to complete the tasks given in PBL. This belief makes them more persistent in the face of difficulties, more optimistic when looking for solutions, and more able to take the risks needed to solve problems. Thus, self-efficacy strengthens the relationship between PBL and AQ by encouraging students to be more actively involved, think critically,

and show better mental resilience in facing real challenges. Conversely, students with low self-efficacy may feel less confident in their abilities and tend to give up easily when faced with complex problems. Anxiety or fear of failure can reduce the effectiveness of PBL in improving their AQ. This suggests that low self-efficacy can weaken the positive relationship between PBL and AQ because students cannot fully utilize the challenging learning approach. Thus, improving students' self-efficacy is a strategic step to optimize the success of PBL in supporting AQ development. Teachers can help students build self-efficacy by providing challenges that are appropriate to their ability level, providing positive feedback, and creating a supportive learning environment where students feel safe to try, fail, and learn from their experiences.

Students with higher self-efficacy show greater improvements in AQ, reflecting their resilience in the face of academic difficulties and challenges. When students feel confident in their abilities (Self-efficacy), they are more likely to persist in the face of adversity and find creative solutions. Students with high Self Efficacy showed a more significant increase in AQ than those with low Self Efficacy. This suggests that self-confidence affects not only academic performance but also students' ability to adapt and overcome the challenges they face.

From the results of the study, it can be concluded that the success of PBL in improving students' AQ depends not only on the application of active learning methods but also on strengthening students' Self-efficacy. By increasing Self-efficacy, students can be more effective in utilizing problem-based learning models, which in turn will improve their ability to overcome difficulties. This is supported by research conducted Kamalia, Bakar, and Nurbaity (2019) the research results found a correlation between Adversity Quotient (AQ) and Self Efficacy (SE), indicating that both variables are dominant in the moderate category. This positive and significant relationship indicates that students who are able to overcome difficulties well (high Adversity Quotient) tend to have greater confidence in their own abilities (high Self Efficacy). High Adversity Quotient reflects students' ability to face challenges and pressures, which in turn increases their confidence in completing academic tasks. Therefore, efforts to improve students' Adversity Quotient, such as through challenging and supportive learning models, can effectively improve their Self-efficacy. This is reinforced by research Asshiddiq (2023) influences the results of students' Adversity Quotient in relation to students' Self Efficacy, which shows that Adversity Quotient and Self Efficacy are positively correlated, where students who are able to overcome difficulties tend to have greater self-confidence.

The PBL model allows students to learn science more in-depth and relevantly because students are invited to solve real problems related to complex science concepts. Through this model, students understand the material theoretically and develop critical thinking, problem-solving, and collaboration skills—skills that are very much needed in 21st-century education. This study highlights the important role of self-efficacy in moderating the relationship between PBL and students' ability to face challenges (adversity quotient). Teachers can use these findings to create a learning environment that is conducive to strengthening students' self-confidence. For example, teachers can provide assignments that are adjusted to the students' ability level, so that students feel challenged but are still able to complete the task well. In addition, providing positive reinforcement, such as appreciation for student effort or progress, can encourage students to be more confident and not afraid to face difficulties in science learning. The application of the PBL model as a strategy to improve students' self-efficacy, teachers can help students become more resilient, independent, and ready to face challenges both in academics and in everyday life. This makes science learning not only more effective but also more meaningful for students.

Therefore, educators need to consider developing Self-Efficacy as an integral part of PBL learning strategies. Educators can create a supportive learning environment where students feel safe to take risks, collaborate with peers, and learn from their mistakes. In addition, providing positive feedback and reinforcement to students can help increase their confidence in facing academic challenges.

Overall, this study emphasizes that a model in education that combines PBL with increased Self-efficacy can produce students who are not only more academically intelligent but also better prepared to face real-life challenges with high resilience and self-confidence.

Thus, the implementation of the PBL model supported by high Self-efficacy contributes significantly to the development of student resilience, which is the key to facing challenges in the learning process. The implication of this result is the importance of simultaneously considering both factors, namely PBL

and Self-Efficacy, in designing effective learning strategies so that learning does not only focus on cognitive aspects but also on the development of students' non-cognitive skills.

Relationship between Problem-Based Learning and Adversity Quotient

The results of this study indicate that Problem-Based Learning (PBL) has a positive and significant effect on the Adversity Quotient (AQ) of grade VII students in science learning. The statistical analysis results show a T-Statistic value of 4.255 and a P-Value of 0.000, where a P-Value smaller than 0.05 confirms that the effect of PBL on AQ does not occur by chance. Thus, the H2 hypothesis is accepted, indicating that implementing PBL can effectively improve students' AQ. Through this model, students are encouraged to learn by solving real problems, which helps them develop analytical skills, collaboration, and mental toughness when facing challenges.

Problem-Based Learning (PBL) has been proven to be an effective model in improving students' Adversity Quotient (AQ). AQ refers to an individual's ability to face, overcome, and recover from their difficulties or challenges. In the context of learning, PBL allows students to engage in real-world problem solving, which is a key element in developing their AQ. Learning carried out with the PBL model allows students not only to learn theory but also to gain practical experience that is relevant to everyday life. By facing concrete problems, students are trained to analyze situations, find solutions, and collaborate with classmates. This model develops critical thinking skills and creativity and builds the mental resilience needed to overcome obstacles.

The results showed that students involved in PBL significantly improved their AQ. PBL creates a challenging but supportive learning environment where students can learn from mistakes and learn to bounce back from failure. This process is very important, because students with high AQ tend to be more confident and proactive in facing academic and non-academic challenges.

PBL also improves specific aspects of AQ, such as Control, Origin, and Ownership. Students involved in PBL feel more able to control the situation (Control), identify the source of the problem (Origin), and feel responsible for the solutions they produce (Ownership). However, there are still challenges that need to be overcome, especially in terms of Reach and Endurance. Students need to be encouraged to see problems from a broader perspective and maintain motivation and resilience when facing difficulties.

In the context of water pollution, students are faced with various aspects that require in-depth analysis, such as identifying pollution sources and finding mitigation solutions. This learning improves academic skills and students' AQ, preparing them to face real challenges outside of school. This finding is in line with previous studies showing that students who learn through PBL have better problem-solving skills compared to conventional learning methods (Samandy et al., 2021). In addition, research by Aliyana et al. (2021) shows that learning models that are adjusted to students' AQ characteristics can optimize science learning outcomes. Thus, the integration of PBL in the curriculum is expected to provide more optimal results for students in facing future challenges.

Therefore, the implementation of PBL in schools, especially in one of the junior high schools in Sragen, shows that PBL facilitates students to become more independent and responsible in solving problems, especially in water pollution material that requires critical thinking and quick decision making. This learning model places students in real situations that train them to develop better problem-solving skills and resilience in the face of adversity.

Relationship between Self-Efficacy and Adversity Quotient

Based on the results of the analysis using SmartPLS 4.0 software, this study found that Self-Efficacy has a positive and significant influence on Adversity Quotient (AQ) in science learning in grade VII students. The hypothesis test results showed a T-Statistic of 1.988 and a P-Value of 0.047, where a P-Value smaller than 0.05 indicates sufficient evidence to support the hypothesis. Thus, hypothesis H3 is accepted, confirming that increasing Self-Efficacy contributes to increasing students' AQ. This finding suggests that students with higher confidence in their abilities tend to be better able to face challenges in science learning.

Although students showed relatively high confidence in completing the task, lower Strength and Generality scores indicated the need for further reinforcement so that they could apply these skills in various contexts. Students could control the situation and feel responsible for their actions but they still

needed improvement in the Reach and Endurance indicators. This indicates that although Self Efficacy plays an important role, other factors still need to be considered to improve overall AQ.

The implementation of Problem-Based Learning (PBL) in one of Sragen Junior High Schools plays an important role in increasing students' Self Efficacy. Students become more confident in identifying and overcoming challenges through learning experiences that focus on solving real problems, such as water pollution issues. PBL provides a relevant context for students to understand the impacts of pollution and find solutions, which increases their confidence in applying knowledge. This increase in Self Efficacy has implications for higher AQ, making students more persistent and resilient in facing various academic difficulties.

Self-Efficacy, or students belief in their ability to complete a task, has been shown to significantly influence Adversity Quotient (AQ). Research shows that students with high levels of Self-Efficacy tend to have better AQ, meaning they are better able to face, overcome, and learn from challenges faced in the learning process, especially in science learning.

Self Efficacy refers to an individual's belief in their ability to complete a task or face a challenge. In the context of education, Self-Efficacy significantly impacts Adversity Quotient (AQ), which reflects an individual's ability to face, overcome, and learn from adversity. Research shows that students with high levels of Self-Efficacy tend to have better AQ, meaning they can better overcome challenges in learning, including in difficult situations.

The relationship between Self-Efficacy and AQ can be understood through several mechanisms. First, students who believe in their ability to complete tasks tend to be more persistent in the face of difficulties. When faced with challenges, they are more likely to take initiative and find solutions rather than give up. This belief creates a positive cycle in which the experience of overcoming problems further increases their self-confidence, strengthening their AQ. Second, Self-Efficacy serves as a motivational driver. Students who feel capable are more motivated to participate in learning and take on new challenges. They tend to have a more optimistic outlook and are more willing to take risks, which are important components in building AQ. In contrast, students with low Self-Efficacy may feel anxious and uncertain in the face of challenges, making them more vulnerable to failure and loss of motivation.

Self efficacy also affects how students deal with feedback and evaluation. Students with high Self-Efficacy tend to view feedback as an opportunity to learn and grow rather than as a judgment of their abilities. This allows them to face failure with a positive attitude and learn from the experience, which is important for improving their AQ. In line with the findings obtained from the study Ismawati & Andriyani (2022) the higher the level of Self-efficacy of students, the higher the level of AQ they have. This indicates that students' belief in their own abilities to complete tasks and face challenges plays an important role in their ability to survive and overcome difficulties that may be faced in the academic environment.

Although the relationship between Self Efficacy and AQ shows a positive impact, it is important to remember that Self Efficacy cannot stand alone. External factors, such as social support from friends, family, and teachers, can also affect student levels of Self Efficacy. This support can help students develop their self-confidence and improve their ability to face challenges.

Overall, the relationship between Self Efficacy and Adversity Quotient confirms the importance of building students' self-confidence in the context of learning. Encouraging students to develop their Self-efficacy will have a positive impact on their ability to face and overcome difficulties, which will ultimately improve their AQ. Thus, education should pay more attention to the development of Self Efficacy as an integral part of the learning process, to prepare students for various challenges they may face in the future.

CONCLUSION

The conclusion of this study is: (1) There is a relationship between Problem-based Learning (PBL) and the adversary quotient, which is moderated by students' self-efficacy. Students with high levels of SE show better abilities in facing challenges and difficulties in the PBL learning process, which contributes to increasing AQ in solving a problem. (2) Problem-based learning (PBL) is proven effective in increasing students' Adversity Quotient because this model invites students to be actively involved in solving relevant problems, thus encouraging the development of analytical skills and mental resilience. (3) There is a

relationship between Self-Efficacy and Adversity Quotient, where students with high levels of self-confidence have better abilities to overcome difficulties and challenges in learning, which in turn strengthens their AQ in facing difficult situations.

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REFERENCES

Aliyana, Saptono, S., & Budiyono, &. (2021). Analysis of Science Literacy and Adversity Quotient on the Implementation of Problem Based Learning Model Assisted by Performance Assessment Article Info. *Journal of Primary Education*, *10*(2), 221–227. https://journal.unnes.ac.id/sju/index.php/jpe/article/view/34453

Asshidiq, H. (2023). *Pengaruh Self Efficacy Terhadap Adversity Quotient Pada Siswa Spn Di Kecamatan Hinai*. Medan: Universitas Medan Area.

Bandura. (1997). Self-Efficacy : The Exercise of Control. In *The Routledge Handbook of the Psychology of Language Learning and Teaching*. New York: W.H. Freeman and Company. https://doi.org/10.1177/0032885512472964

Hafizah, E., & Nurhaliza, S. (2021). Implementasi Problem Based Learning (Pbl) Terhadap Kemampuan Literasi Sains Siswa. *Quantum: Jurnal Inovasi Pendidikan Sains*, *12*(1), 1. https://doi.org/10.20527/quantum.v12i1.9497

Harefa, D., & Sarumaha, M. (2020). *Teori pengenalan ilmu pengetahuan alam sejak dini*. Banyumas: PM Publisher.

Ismawati, L., & Andriyani, I. N. (2022). Correlation Self-Efficacy and Adversity Quotient of Students at SMK Muhammadiyah 2 Wedi Klaten. *Edunesia : Jurnal Ilmiah Pendidikan*, *3*(1), 78–88. https://doi.org/10.51276/edu.v3i1.212

Kamalia, S., Bakar, A., & Nurbaity. (2019). Korelasi Antara Adversity Quotient Dengan Self-Efficacy Pada Siswa Kelas Xii Sma Negeri Di Kota Banda Aceh. *Jurnal Ilmiah Mahasiswa Bimbingan Dan Konseling*, *4*(4), 53–58.

Nurhamidah, S. (2022). *Problem Based Learning Kiat Jitu Melatih Berpikir Kritis Siswa*. Penerbit P4I.

Nurrohma, R. I., & Adistana, G. A. Y. P. (2021). Penerapan Model Pembelajaran Problem Based Learning Dengan Media E-Learning Melalui Aplikasi Edmodo Pada Mekanika Teknik. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(4), 1199–1209. https://edukatif.org/index.php/edukatif/article/view/544

Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, R. S. (2022). Pengertian Pendidikan. *Jurnal Pendidikan Dan Konseling*, *6*(2), 337–347. https://doi.org/10.33387/bioedu.v6i2.7305

Rahmawati, F., & Atmojo, I. R. W. (2021). Analisis Media Digital Video Pembelajaran Abad 21 Menggunakan Aplikasi Canva Pada Pembelajaran IPA. *Jurnal Basicedu*, *5*(6), 6271–6279. https://doi.org/10.31004/basicedu.v5i6.1717

Samandy, V., Anas, M., & Zamrun, M. (2021). Analisis Kemampuan Pemecahan Masalah Di Tinjau Dari Adversity Quotient (Aq) Melalui Model Pembelajaran Berbasis Masalah. *Jurnal Biofiskim: Pendidikan Dan Pembelajaran IPA*, *3*(2), 174. https://doi.org/10.33772/biofiskim.v3i2.21789

Stoltz, P. G. (1997). *Adversity Quotient : Turning Obstacles Into Opportunities*. John Wiley and Sons.

Sulasih, S., Sarwanto, S., & Suparmi, S. (2018). Physics Learning with Metacognitive Approach through Problem Based Learning (PBL) and Reciprocal Learning (RL) model Viewed from Students' Critical Thinking Skill. *International Journal of Pedagogy and Teacher Education*, *2*, 9. https://doi.org/10.20961/ijpte.v2i0.19896

Thorndahl, K. L., & Stentoft, D. (2020). Thinking critically about critical thinking and prob-lem-based learning in higher education: A scoping review. *Interdisciplinary Journal of Problem-Based Learning*,

14(1), 1–21. https://doi.org/10.14434/ijpbl.v14i1.28773
Witarsa, R. (2022). *Penelitian Pendidikan*. Yogyakarta : Deepublish.