Structural Equation Modeling Partial Least Square for Modeling the Relationship of Readiness, Creativity and Motivation to Students' Problem-Solving Ability

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Abstract: This study aims to determine how much influence readiness, creativity, and learning motivation have on problem-solving abilities. This study used a quantitative approach and was conducted in class X SMA Negeri 13 Ambon with 41 students selected by purposive sampling. Tests and questionnaires were used in data collection and analyzed with SMART PLS 4. The results showed that the external model loading factor and Cronbach's Alpha > 0.7 had high validity and reliability. The campaign, creativity, and motivation variables of 54.6% can explain the inner model of the dependent variable. Furthermore, for the hypothesis, there is a positive and significant effect of the readiness and motivation variables, while creativity has no effect and is not substantial. This research has implications for increasing students' cognitive readiness independently through motivation to develop creative ideas and connect the knowledge gained in solving problems.

Abstrak: Penelitian ini bertujuan untuk mengetahui seberapa besar pengaruh kesiapan, kreativitas, dan motivasi belajar terhadap kemampuan memecahkan masalah. Penelitian ini menggunakan pendekatan kuantitatif dan dilakukan pada siswa kelas X SMA Negeri 13 Ambon dengan 41 siswa yang dipilih secara *purposive sampling*. Tes dan kuesioner digunakan dalam pengumpulan data dan dianalisis dengan *SMART PLS 4*. Hasil penelitian menunjukkan bahwa pada *outer model* nilai *loading factor* dan *Cronbach's Alpha* > 0,7 memiliki validitas dan reliabilitas yang tinggi. Variabel kesiapan, kreativitas, dan motivasi sebesar 54,6% dapat menjelaskan *inner model* dari variabel dependen. Selanjutnya untuk hipotesis terdapat pengaruh positif dan signifikan dari variabel kesiapan dan motivasi, sedangkan kreativitas tidak berpengaruh dan tidak signifikan. Penelitian ini berimplikasi untuk meningkatkan kesiapan kognitif siswa secara mandiri melalui motivasi untuk mengembangkan ide kreatif dan menghubungkan pengetahuan yang diperoleh dalam memecahkan masalah.

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A. Introduction

Education is the primary need in improving and developing students' quality of education. Education is a process of fostering connections and learning that is expected students to develop their skills through learning to realize the development of more qualified students (Tania, 2017). Thus, effective learning is needed to create these resources, and the most important thing is to produce quality graduates.

Therefore, it is hoped that stakeholders will pay more attention to various learning facilities and infrastructure in developing practical and exciting learning activities (Kurniawan & Wuryandani, 2017). In developing the effectiveness of this learning, it is essential for the participation of students in teaching and learning activities through interaction in thinking critically in solving problems by assessing, applying, synthesizing, evaluating, and integrating information (Zubaidah, 2010).

The 2013 curriculum is designed to increase students' competence in reflective and critical thinking to answer social problems (Lestari, 2020). The ability to answer geographic problems by developing reasoning skills based on geographic concepts and principles to solve qualitative and quantitative problems is one of the prerequisites in class for learning geography, according to the 2013 Curriculum (Syaharuddin & Mutiani, 2020).

In solving problems, students are expected to be able to overcome them if they have the understanding to choose the proper technique to use in dealing with the problems they face (Agsya et al., 2019). The learning paradigm impacts students' problem-solving abilities. However, the characteristics of the students themselves also play a role, including readiness to learn, talent, curiosity, motivation, creativity, self-confidence, and attitudes which are internal factors that influence students.

One thing that affects a person's ability to overcome difficulties is his readiness to learn (Zakaria & Yusoff, 2009). As stated by Thorndike (1932), one of the laws of learning is the readiness of students to learn, which can affect the level of success achieved. Learner readiness is learner cognitive readiness based on independent learning of pre-class content (Jiang & Jong, 2021). Students' cognitive readiness is believed to predict class performance in higher-order thinking skills activities (Hao, 2016).

Soejanto (1991) emphasized that the learning readiness of students is needed to create a good teaching and learning climate about learning mastery. Students to learning can be determined by how well they prepare themselves, which will have an impact on their overall learning success. Student readiness in the learning process determines the success or failure of a student's lesson (Mulyani, 2013). Students' understanding of the problems presented in each material taught is also strongly influenced by their readiness to learn (Irawan et al., 2016).

On the other hand, motivation is directly related to the development of student attitudes and persistent efforts to achieve a goal (Ryan & Deci, 2000). The successful application of Keller's (1987) concept of motivation includes attention, relevance, confidence, and satisfaction across various instructional settings by highlighting the positive influence of student motivation on learning (Li & Keller, 2018; Ucar & Kumtepe, 2020; Lin

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et al., 2021). Research in recent decades has proven that motivation is powerful in increasing students' willingness to learn (Pintrich, 2003; Lan et al., 2018; Chai et al., 2020; Jong, 2020).

Motivation is an urgent factor influencing learning outcomes (Rakhmat, 2005). The motivation formed within a person can come from within or outside, providing a driving force in achieving a goal (Munandar, 2009). Some things that show a person is motivated to learn include: (1) a strong desire; (2) needs and drives; (3) wishes and dreams for the future; (4) learning appreciation; (5) interest in learning; and (6) a supportive learning environment (Agsya et al., 2019).

Creativity is contained in a person's personality, even though it does not have to be a constituent of intelligence (Nusbaum & Silvia, 2011). Creativity is a much-needed capacity in many learning discourses (Dwyer et al., 2014). Creativity is a col process which is the ability to that learned knowledge to solve problems and create new things (Kleiman, 2008). is often positioned as vital for the future of education, given the complex problems and situations students face (Harris & de Bruin, 2018). Is done through a willingness to try new ideas and possibilities and engaging with potential failures, which is the key to the iterative nature of creativity and learning (Beghetto, 2018; Henriksen et al., 2021).

The aim of encouraging student creativity is to present opportunities for applying knowledge in solving problems. Thus, the ability to solve difficulties is significantly influenced by creativity (Nurfitriyanti, 2016). The creative capacity of teachers to encourage student creativity is predicted to increase learning activities creatively. Students will be able to find solutions to difficulties that were not anticipated before because the development of creativity from students is automatically significantly related to the teacher component as an agent who also has credible credibility (Budiarti, 2015).

B. Method

A quantitative approach with path analysis is used in this study which presents the theory and facts that emphasize the relationship between the observed variables, calculating the path coefficient values, and the results of the structural model (path). If the dependent variable affects both, directly and indirectly, the independent variables in multivariate linear regression, then this analysis shows the resulting causal relationship (Ghozali, 2008).

The ability to solve problems is used as the dependent variable (Y). and this study examines the influence and interrelationships of each independent variable which includes (X1) readiness, (X2) learning creativity, and (X3) motivation. Furthermore, the study population was class X SMA Negeri 13 Ambon students. Class X students selected through purposive sampling were used as a sample of 41 students. Tests and questionnaires are used to obtain data to collect information about research conducted on geography subjects. The flowchart of this research can be seen in Figure 1.

. The questionnaire instrument data were tested for validity and reliability before being used to assess learning readiness, creativity, motivation, and problem-solving skills. Evaluation of a student's readiness to learn is based on the level of physical fitness, mental acuity, emotional stability, and knowledge of students. Fluency, flexibility, elaboration, and

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originality are the four variables used in measuring the creativity in question. Problem-solving, including interpreting solutions, generating solutions, making plans to overcome them, and anticipating the impact of these solutions, are four signs of problem-solving ability.

Statistical analysis using path analysis is used to describe and evaluate the model and the interdependence of the changing variables. Causality among variables in a hypothetical form refers to knowledge of the truth from theoretical and practical frameworks. In carrying out path coefficient analysis, it is done by calculating the average contribution of each diagram from the relationship between variables.

This analysis uses the Path Analysis model and Partial Least Square (PLS) analysis technique based on the Structural Equation Model (SEM) by utilizing the SMART PLS 4 application. It contains outer and inner models and bootstraps to test hypotheses. Testing the Outer Model (Measurement Model) and Inner Model based on their validity and reliability using research tools in this study (Structural Model).

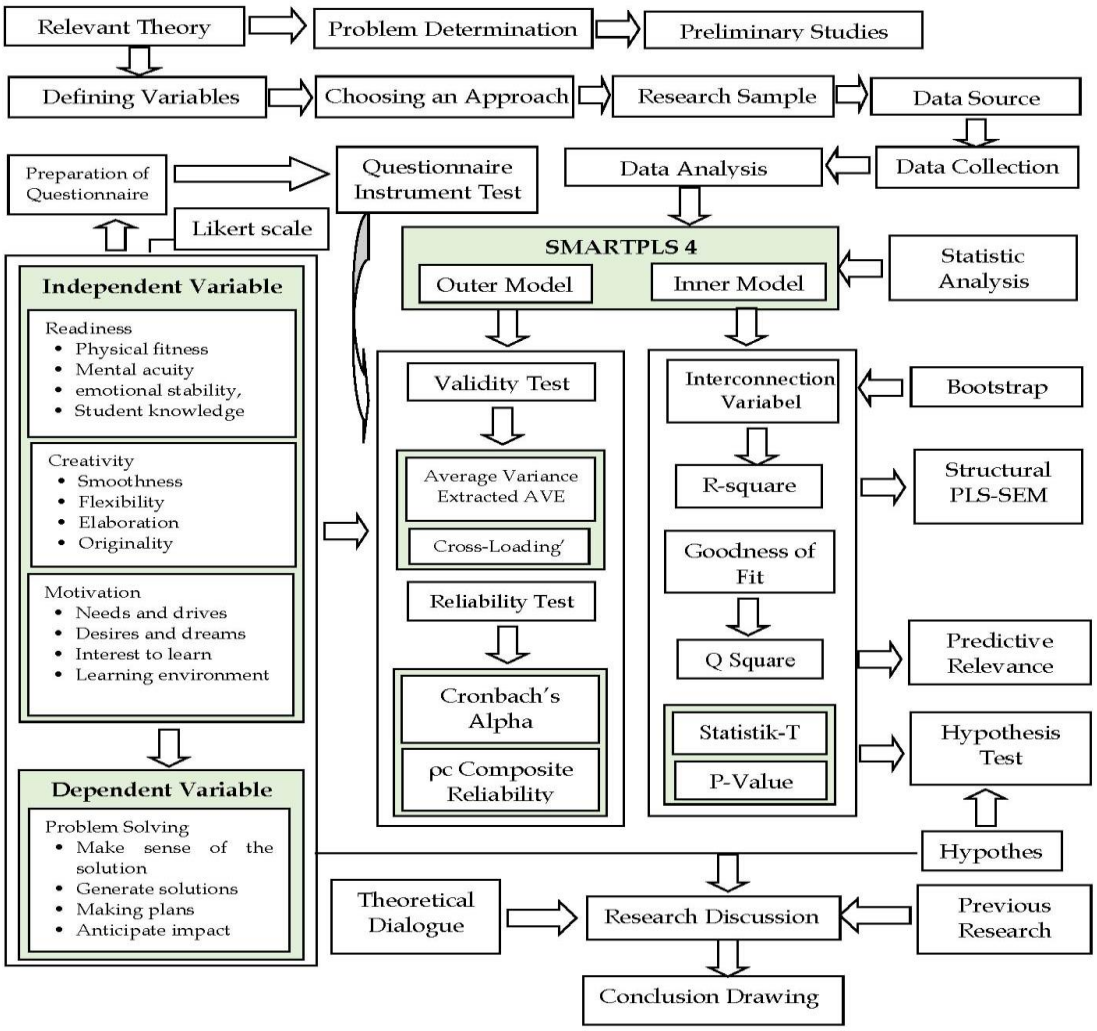

Figure 1. Research Flowchart

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C. Result and Discussion

The discussion in this study uses three measures to evaluate the model, namely testing: outer model, inner model, and hypothesis testing. This measurement is based on background, problem formulation, theoretical studies, conceptual framework, and previous research.

Outer Model Test

The outer Model test determines how the latent variables and their indicators relate. Reflective measurement is the initial PLS SEM measurement on the outer model to measure validity and reliability. Testing the instrument's validity determines how well the research instrument measures a particular construct. The validity test results in the outer model are based on the data processing results for this study, as shown in table 1 and listed below.

Test validity is a requirement to determine the validity of the instrument concerned or measure what is being measured. If the research data collected and the data is accurate for each item studied is the same, then the research findings are valid (Hernikasari et al., 2022). Using convergent validity, the measurement evaluation model (outer) tests the validity (the magnitude of the value loading factor for each variable).

The loading factor in the outer model can be known from the correlation value between the indicators and the constructed value, which is described by the loading factor value. An indicator with a low loading value does not work in the measurement model (loading factor > 0.7). Cross Loading is the term used in the outer model. this value is a further indicator of discriminant validity. The predicted value is obtained from each indicator for a higher loading of the construct studied than the loading value for the other constructs.

Table 1. Outer Loadings

Indicator	Outer loadings
KR_1 <- Creativity	0.880
KR_2 <- Creativity	0.863
KR_3 <- Creativity	0.892
KR_4 <- Creativity	0.718
KS_1 <- Readiness	0.914
KS_2 <- Readiness	0.928
KS_3 <- Readiness	0.929
MB_1 <-- Motivation	0.970
MB_2 <-- Motivation	0.910
MB_3 <-- Motivation	0.956
MB_4 <-- Motivation	0.874
T_1 <- Troubleshooting	0.723
T_2 <- Troubleshooting	0.783
T_3 <- Troubleshooting	0.897

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Indicator	Outer loadings
T $_4$ <- Troubleshooting	0.918

Based on Table 1, all indicator variables with a loading factor r above 0.70 are valid to measure the variables raised in this study, including readiness, creativity, motivation, and problem-solving ability. Therefore, it is optional to drop them to build a robust model.

To obtain a good instrument the reliability test is one of the tests used for collecting data (Hernikasari et al., 2022). Cronbach's alpha can be applied to test reliability. The numbers obtained can show the consistency of all model indicators. The ideal number is 0.8 or 0.9, while 0.7 is.

The value of c (composite reliability) is often used in addition to Cronbach's Alpha. If an indicator with a standard loading factor <0.4, the indicator must be removed from the measurement model (Ghozali, 2008). Table 2 of the research results provide the reliability test results, which are listed below.

Table 2. Composite Reliability

Indicator	Cronbach's Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Extracted Average Variance (AVE)
Solution to problem	0.851	0.882	0.901	0.696
Readiness	0.915	0.952	0.946	0.853
Creativity	0.860	0.879	0.906	0.707
Motivation	0.946	0.968	0.961	0.862

Based on table 2, learning readiness, learning creativity, learning motivation, and problem-solving skills each have a value of Cronbach's alpha,> 0.7, and a value of composite reliability,> 0.4. means that each variable studied is reliable, and further testing can be carried out to prove the hypothesis.

Inner Model Test

Highly motivated students, for instance, engage in more experimental learning techniques. The calculation is based on testing the values in the inner model. Furthermore, the analysis results can be seen in table 3 below.

Table 3. Inner Model

Variable	R-Square	R-Square Adjusted
Solution to problem	0.546	0.507

The R-square value of 0.546 is known from the results of the inner model test from Table 2. The dependent variable can explain the dependent variable (problem-solving ability) (learning readiness (X1), learning creativity (X2), and learning motivation (X3) of 54, 6%, while 45.4% is a variable outside of this study. The better the structural equation, the

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higher the R-square number indicates that the independent variable can explain the dependent variable.

In addition, the Goodness of Fit Index value based on the Stone Geisser Q2 Value criteria refers to the Q Square test. The research model developed is said to have predictive relevance if the Q Square number > 0, while it is said to have less predictive relevance if the Q Square number < 0 (Ghozali, 2008).

Table 4. Inner Model (Q-Square Predictive Relevance)

Variable	Q^2predict	RMSE	MAE
Problem-solving skill	0.427	0.804	0.62

The value of 0.427 for the problem-solving ability variable measured in Q2 according to data processing is calculated using measurements processed using the Smart PLS 4 application, and the resulting square values are:

square = 1- (1-Q2) (1)

Q_2 Troubleshooting:

= 1 - (1 - 0.427)

= 1 – 0.573

= 0.427

Hypothesis test

In studying the Inner Model, the hypothesis is then tested by combining the results of R-Square, Parameter Coefficients, and T-Statistics. The significance of the relationship between the concept, the T-statistic, and the p-value may explain a hypothesis' acceptability. T-Statistics > 1.96 is a rule of thumb applied in this investigation. The beta coefficient is significant and positive, with a significance level of 0.05 (5%).

Table 5. Hypothesis Testing

Hip	Variables	T Statistics (O/STDEV)	P Values
H_1	Readiness -> Troubleshooting	4,981	0.00
H_2	Creativity -> Problem-Solving	1,057	0.145
H_3	Motivation -> Solution-Problem	2,672	0.047

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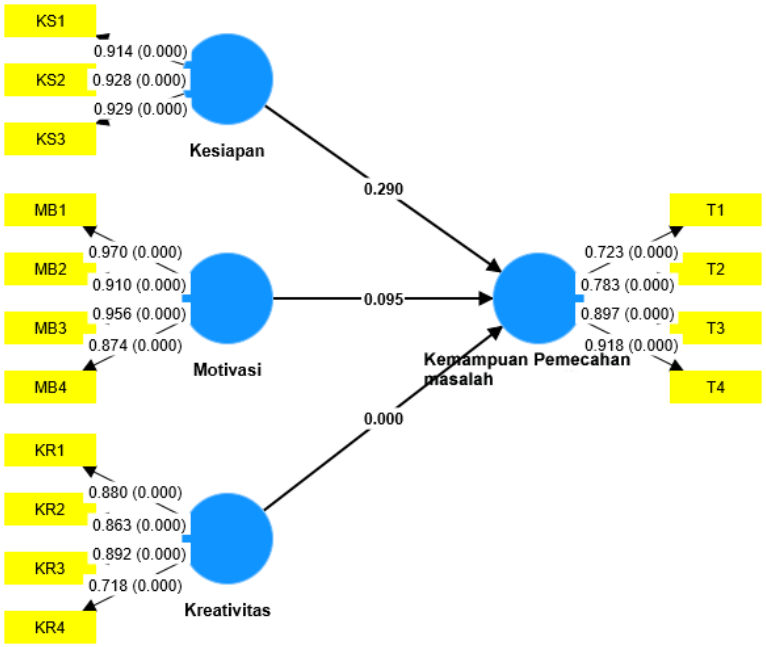

Figure 1. Outer Model

The conclusion from Table 6 is as follows:

1) Hypothesis 1 is accepted, with a t statistic of 4.981 > 1.98 and a p-value of 0.000 <0.005, which means that learning readiness has a positive and statistically significant effect on problem-solving abilities.
2) Hypothesis 2 was rejected, with a p-value of 0.145 > 0.000 and a t-statistic of 1.057 1.98, indicating that creativity had no effect and was not statistically significant on problem-solving ability.
3) Hypothesis 3 is accepted, with a t-statistic of 2.672 > 1.98 and a p-value of 0.000 > 0.005, indicating a positive and significant relationship between learning motivation and problem-solving abilities.

Discussion

Referring to Hypothesis 1, with a t statistic of 4.981 > 1.98 and a p-value of 0.000 <0.005, shows that the ease of learning variable positively and substantially affects students' problem-solving abilities. A student's level of preparation determines whether or not they can learn. Having good learning readiness also means being able to solve problems (Djamarah, 2008).

This finding is in line with Mulyani's research (2013), which shows a relationship between readiness and learning outcomes at a relatively significant level of the correlation coefficient. Student achievement will be better if they are more prepared to learn. According to Thorndike (1932), one of the laws of learning is the readiness of students to learn, which can affect the level of success achieved. Learner readiness is learner cognitive readiness based on independent learning of pre-class content (Jiang & Jong, 2021). Students' cognitive readiness is believed to predict class performance in higher-order thinking skills activities (Hao, 2016).

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Starting from this, Sirait's research findings (2019) show that learning readiness considerably impacts students in terms of conceptual understanding. The estimated value of F (172.526) > F table (3.06), with Sig = 0.000 0.05, is evidence for this. Thus, learning outcomes vary widely. Alwiyah & Imaniyati (2018) show that student learning preparation affects learning outcomes individually and simultaneously regarding this matter. One thing that affects a person's ability to overcome difficulties is his readiness to learn (Zakaria & Yusoff, 2009).

Furthermore, according to hypothesis 2, creativity shows no statistically significant effect on problem-solving skills (t statistic: 1.057 ± 1.98; p-value: 0.145 > 0.000). The research findings of Kadir et al (2022) show that students' creative thinking abilities are classified as moderate to poor and only 59.26%. According to research by Febrianingsih (2022), everyone thinks creatively differently depending on their learning preferences (Fadlilah & Siswono, 2022).

Today's students face an unpredictable future marked by change and complexity. Thinking creatively and adapting to change is crucial for teachers and students in creative problem-solving and innovation (Harris & de Bruin, 2018). Most research defines creativity as a process and a set of capacities to organize ideas, create solutions, and produce artefacts that are relatively new and effective (Nusbaum & Silvia, 2011). Decision-making is critical to most conceptualizations of creativity (Dwyer et al., 2014) and decisions are unavoidable in creative learning given the potential (and inevitable fear) of failure. Creative endeavours also tap into the social realm because of the potential for embarrassment or discomfort with sharing ideas publicly, especially if there is a possibility of adverse outcomes (Beghetto, 2018; Henriksen et al., 2021).

Motivation influences problem-solving abilities, according to hypothesis 3, where the t-statistic is 2.672 > 1.98 and the p-value is 0.000 > 0.005. According to Andhani et al (2017), motivation, creativity, and problem-solving abilities with a coefficient of determination (R^2) of 0.105 or 10.5%. Fourth-grade elementary school students were the subject of research by Datu et al (2022), showing that motivation and academic achievement have a close relationship. Motivation is an essential concept in human behaviour and plays a crucial role in student learning and how educators can help students learn better (Pintrich, 2003). Motivation is closely related to student achievement and is often considered one of the main factors that keep students learning (Lin et al., 2021).

According to Hasanah & Firmansyah's (2022) study regarding problem-solving abilities, motivation is in a low category. According to research by Maulana, learning motivation has a significant direct impact on a person's ability to solve problems. This research also found that learning motivation has an indirect impact. The motivation of each student varies from one student to another. Learning motivation is also directly related to problem-solving abilities (Andhani et al., 2017). Students with different levels of motivation tend to behave differently in learning. Highly motivated students, for instance, engage in more experimental learning techniques (Lan et al., 2018). In addition to the fact that

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motivation is related to learning achievement, the influence of motivation on students' positive emotional experiences during learning is also an important component (Jong, 2020).

D. Conclusion

The following conclusions can be reached based on the research findings and discussion: The indicator variable is reflective in *the outer model*, with a *loading factor* > 0.70, so all of them are considered valid. In addition, the composite reliability score is > 0.4, indicating high reliability, and Cronbach's alpha is also > 0.7.

Testing the inner model with the R-square number is 0.546, meaning that 54.6% of the bond variable of problem-solving ability can be explained by the dependent variable, which includes learning readiness (X1) and learning creativity (X2). And learning motivation (X3). The remaining 45.4% can be explained by factors other than those studied.

Additionally, readiness and learning motivation have a considerable impact on problem-solving abilities, whereas learning creativity has no impact and is not significant. Based on research that reveals hypotheses with significant values between constructs, T-statistics > 1.96, and p-value 0.05 (5%).

References

Agsya, F. M., Maimunah, M., & Roza, Y. (2019). Analisis Kemampuan Pemecahan Masalah Ditinjau Dari Motivasi Belajar Siswa Mts. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, *4*(2), 31–44. https://doi.org/10.23969/symmetry.v4i2.2003

Alwiyah, D., & Imaniyati, N. (2018). Keterampilan Mengajar Guru Dan Kesiapan Belajar Siswa Sebagai Determinan Terhadap Hasil Belajar Siswa. *Jurnal Manajerial*, *17*(1), 95. https://doi.org/10.17509/manajerial.v17i1.9767

Andhani, P. U. L., Handayanto, S. K., & Asim. (2017). Penerapan Model Pembelajaran Berbasis Masalah Berbantuan Media Web Untuk Seminar Nasional Fisika dan Pembelajarannya 2017. *Seminar Nasional Fisika Dan Pembelajarannya 2017*, 65–74. http://conference.um.ac.id/index.php/fis/article/view/146

Beghetto, R. A. (2018). Taking beautiful risks in education. *Educational Leadership*, *76*(4), 18–24. https://eric.ed.gov/?id=EJ1198988

Budiarti, Y. (2015). Pengembangan kemampuan kreativitas dalam pembelajaran IPS. *Jurnal Pendidikan Ekonomi UM Metro*, *3*(1), 61–72. https://doi.org/10.24127/ja.v3i1.143

Chai, C. S., Wang, X., & Xu, C. (2020). An Extended Theory of Planned Behavior for Modelling Chinese Secondary School Students' Intention to Learn Artificial Intelligence. *Mathematics*, *8*(11). https://doi.org/10.3390/math8112089

Datu, A. R., Tumurang, H. J., & Sumilat, J. M. (2022). Pengaruh Motivasi Belajar Terhadap Hasil Belajar Siswa di Tengah Pandemi Covid-19. *Jurnal Basicedu*, *6*(2), 1959–1965. https://doi.org/10.31004/basicedu.v6i2.2285

https://doi.org/10.51276/edu.v4i1.317

Djamarah, S. B. (2008). Psikologi pendidikan. *Jakarta: Rineka Cipta*.

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity*, pp. *12*, 43–52. https://doi.org/https://doi.org/10.1016/j.tsc.2013.12.004

Fadlilah, C., & Siswono, T. Y. E. (2022). Kemampuan Berpikir Kreatif Siswa Asimilasi (Assimilating) Dan Konvergen (Converging) Dalam Memecahkan Masalah Numerasi. *MATHEdunesa*, *11*(2), 548–561. https://doi.org/10.26740/mathedunesa.v11n2.p548-561

Febrianingsih, F. (2022). Kemampuan Berpikir Kreatif Siswa dalam Memecahkan Masalah Matematis. *Mosharafa: Jurnal Pendidikan Matematika*, *11*(1), 119–130. https://doi.org/10.31980/mosharafa.v11i1.1174

Ghozali, I. (2008). *Model persamaan struktural: Konsep dan aplikasi dengan program AMOS 16.0*. Badan Penerbit Universitas Diponegoro.

Hao, Y. (2016). Middle school students' flipped learning readiness in foreign language classrooms: Exploring its relationship with personal characteristics and individual circumstances. *Computers in Human Behavior*, pp. *59*, 295–303. https://doi.org/https://doi.org/10.1016/j.chb.2016.01.031

Harris, A., & de Bruin, L. R. (2018). Secondary school creativity, teacher practice, and STEAM education: An international study. *Journal of Educational Change*, *19*(2), 153–179. https://doi.org/10.1007/s10833-017-9311-2

Hasanah, F. J., & Firmansyah, D. (2022). Analisis Kemampuan Pemecahan Masalah Ditinjau Dari Motivasi Belajar Siswa. *Jurnal Educatio FKIP UNMA*, *8*(1), 247–255. https://doi.org/10.31949/educatio.v8i1.1959

Henriksen, D., Henderson, M., Creely, E., Amélia, A., Cernochova, M., Dash, D., Davis, T., & Mishra, P. (2021). International Journal of Educational Research Open Creativity and risk-taking in teaching and learning settings : Insights from six international narratives. *International Journal of Educational Research Open*, *2–2* (November 2020), 100024. https://doi.org/10.1016/j.ijedro.2020.100024

Hernikasari, I., Ali, H., & Hadita, H. (2022). Model Citra Merek Melalui Kepuasan Pelanggan Bear Brand : Harga Dan Kualitas Produk. *Jurnal Ilmu Manajemen Terapan*, *3*(3), 329–346. https://doi.org/https://doi.org/10.31933/jimt.v3i3.837

Irawan, I. P. E., Suharta, I. G. P., & Suparta, I. N. (2016). Faktor-faktor yang mempengaruhi kemampuan pemecahan masalah matematika: pengetahuan awal, apresiasi matematika, dan kecerdasan logis matematis. *Prosiding Seminar Nasional MIPA*.

Jiang, M. Y., & Jong, M. S. (2021). Learner Preparedness in Flipped Classroom : A Case Study of a Flipped Postgraduate Course. *International Symposium on Educational Technology (ISET)*, *May*. https://doi.org/10.1109/ISET49818.2020.00022

https://doi.org/10.51276/edu.v4i1.317

Jong, M. S. (2020). Promoting Elementary Pupils' Learning Motivation in Environmental Education with Mobile Inquiry-Oriented Ambience-Aware Fieldwork. *International Journal of Environmental Research and Public Health*, *17*(7). https://doi.org/10.3390/ijerph17072504

Kadir, I. A., Machmud, T., Usman, K., & Katili, N. (2022). Analisis Kemampuan Berpikir Kreatif Matematis Siswa Pada Materi Segitiga. *Jambura Journal of Mathematics Education*, *3*(2), 128–138. https://doi.org/10.34312/jmathedu.v3i2.16388

Kleiman, P. (2008). Towards transformation: conceptions of creativity in higher education. *Innovations in Education and Teaching International*, *45*(3), 209–217. https://doi.org/10.1080/14703290802175966

Kurniawan, M. W., & Wuryandani, W. (2017). Pengaruh model pembelajaran berbasis masalah terhadap motivasi belajar dan hasil belajar PPKn. *Jurnal Civics: Media Kajian Kewarganegaraan*, *14*(1), 10–22. https://doi.org/10.21831/civics.v14i1.14558

Lan, Y.J., Botha, A., Shang, J., & Jong, M. S. Y. (2018). Guest Editorial: Technology Enhanced Contextual Game-Based Language Learning. *Journal of Educational Technology & Society*, *21*(3), 86–89. http://www.jstor.org/stable/26458509

Lestari, E. T. (2020). *Cara Praktis Meningkatkan Motivasi Siswa Sekolah Dasar*. Deepublish. https://books.google.co.id/books?hl=id&lr=&id=5mL2Dwaaqba

Li, K., & Keller, J. M. (2018). Use of the ARCS model in education: A literature review. *Computers & Education*, *122*, 54–62. https://doi.org/https://doi.org/10.1016/j.compedu.2018.03.019

Lin, P., Chai, C., Jong, M. S., Dai, Y., Guo, Y., & Qin, J. (2021). Computers and Education : Artificial Intelligence Modeling the structural relationship among primary students ' motivation to learn artificial intelligence. *Computers and Education: Artificial Intelligence*, *2*(October 2020), 100006. https://doi.org/10.1016/j.caeai.2020.100006

Mulyani, D. (2013). Hubungan Kesiapan Belajar Siswa Dengan Prestasi Belajar. *Jurnal Ilmiah Konseling*, *2*(1), 27–31. https://doi.org/https://doi.org/10.24036/0201321729-0-00

Munandar, S. C. U. (2009). Pengembangan kreativitas anak berbakat, Jakarta: PT. *Rineka Cipta Dan Dep. Pendidikan Dan Kebudayaan*.

Nurfitriyanti, M. (2016). Model pembelajaran project based learning terhadap kemampuan pemecahan masalah matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *6*(2). https://doi.org/http://dx.doi.org/10.30998/formatif.v6i2.950

Nusbaum, E. C., & Silvia, P. J. (2011). Are intelligence and creativity so different?: Fluid intelligence, executive processes, and strategy use in divergent thinking. *Intelligence*, *39*(1), 36–45. https://doi.org/https://doi.org/10.1016/j.intell.2010.11.002

Pintrich, P. R. (2003). A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts. *Journal of Educational Psychology*, *95*(4), 667–686.

https://doi.org/10.51276/edu.v4i1.317

https://doi.org/10.1037/0022-0663.95.4.667

Rakhmat, J. (2005). Psikologi Komunikasi edisi revisi. In *Bandung: Remaja Rosdakarya*.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*(1), 54–67. https://doi.org/https://doi.org/10.1006/ceps.1999.1020

Sirait, E. D. (2019). Pengaruh Gaya Dan Kebiasaan Belajar Terhadap. *Jurnal Formatif*, *7*(3), 207–218. https://doi.org/http://dx.doi.org/10.30998/formatif.v7i3.2231

Syaharuddin, S., & Mutiani, M. (2020). *Strategi Pembelajaran IPS: Konsep dan Aplikasi*. Program Studi Pendidikan IPS Fakultas Keguruan dan Ilmu Pendidikan …. http://eprints.ulm.ac.id/8545/2/Mutiani 2020-IPS-100 X %281%29.pdf

Tania, L. (2017). pengembangan bahan ajar e-modul sebagai pendukung pembelajaran kurikulum 2013 pada materi ayat jurnal penyesuaian perusahaan jasa siswa kelas x akuntansi smk negeri 1 surabaya. *Jurnal Pendidikan Akuntansi (JPAK)*, *5*(2). https://ejournal.unesa.ac.id/index.php/jpak/article/view/21294

Ucar, H., & Kumtepe, A. T. (2020). Effects of the ARCS-V-based motivational strategies on online learners' academic performance, motivation, volition, and course interest. *Journal of Computer Assisted Learning*, *36*(3), 335–349. https://doi.org/https://doi.org/10.1111/jcal.12404

Zakaria, E., & Yusoff, N. (2009). Attitudes and problem-solving skills in algebra among Malaysian matriculation college students. *European Journal of Social Sciences*, *8*(2), 232–245. https://www.researchgate.net/profile/Effandi-Zakaria/publication/278848273

Zubaidah, S. (2010). Berpikir Kritis: kemampuan berpikir tingkat tinggi yang dapat dikembangkan melalui pembelajaran sains. *Makalah Seminar Nasional Sains Dengan Tema Optimalisasi Sains Untuk Memberdayakan Manusia. Pascasarjana Unesa*, *16*(1), 1–14. https://www.researchgate.net/profile/Siti-Zubaidah-7/publication/318040409