

**EFEKTIVITAS PENERAPAN *PROBLEM-BASED BLENDED LEARNING*
MODEL DALAM MENGAKOMODASI KEMAMPUAN BERPIKIR
KREATIF DAN *SELF-EFFICACY* SISWA PADA MATERI GELOMBANG
BUNYI DAN CAHAYA**

TESIS

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Pendidikan Fisika Program Studi Pendidikan Fisika



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ABSTRAK

Penelitian ini bertujuan untuk menganalisis efektivitas penerapan *problem-based blended learning model* dalam mengakomodasi kemampuan berpikir kreatif dan *self-efficacy* siswa pada materi gelombang bunyi dan gelombang cahaya. Penelitian ini merupakan penelitian *mixed method* dengan desain *embedded* yang melibatkan sebanyak 40 siswa kelas XI sebagai sampel. Instrumen yang digunakan adalah instrumen tes kemampuan berpikir kreatif dan instrumen non tes *self-efficacy*. Instrumen yang digunakan telah dinyatakan valid dan reliabel oleh ahli maupun berdasarkan hasil uji coba lapangan. Instrumen berpikir kreatif valid dengan nilai *raw variance explained by measures* (82,5%) dan *unexplained variance in contrasts 1-5* (1,2%-2,5%) dengan kategori *excellent*, dan nilai *person reliability* mencapai dan 0,98 dan 0,99 untuk *item reliability*. Sementara instrumen *self-efficacy* valid dengan nilai *raw variance explained by measures* (75,8%) dan *unexplained variance in contrasts 1-5* (1,9%-3,3%) dengan kategori *very good*, dan reliabilitas *person* tercatat sebesar 0.97 dengan kategori *excellent*. Berdasarkan hasil uji *independent t-test*, diketahui bahwa penerapan model *problem-based blended learning* terbukti berpengaruh dalam mengakomodasi kemampuan berpikir kreatif ($\text{sig.} < 0,05$), namun tidak berpengaruh terhadap *self-efficacy* ($\text{sig.} > 0,05$). Hasil uji *effect size* mengungkapkan nilai efektivitas penerapan model *problem-based blended learning* terhadap kemampuan berpikir kreatif mencapai 0,90 dengan kategori tinggi, dan nilai efektivitas terhadap *self efficacy* mencapai 0,53 dengan kategori sedang. Berdasarkan hasil tersebut, maka penerapan *problem-based blended learning* dapat dikatakan lebih efektif dalam mengakomodasi kemampuan berpikir kreatif dibandingkan dengan model *problem-based learning*, dan efektif dalam mengakomodasi *self-efficacy* siswa namun dengan efek yang tidak signifikan.

Kata Kunci: Kemampuan Berpikir Kreatif, *Problem-based Blended Learning*, *Self-efficacy*

**THE EFFECTIVENESS OF PROBLEM-BASED BLENDED LEARNING
MODEL IN ACCOMMODATING STUDENTS' CREATIVE THINKING
SKILLS AND SELF-EFFICACY IN SOUND AND LIGHT WAVES TOPIC**

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ABSTRACT

This study aimed to analyze the effectiveness of applying problem-based blended learning model in accommodating students' creative thinking skills and self-efficacy in sound waves and light waves topic. This research used mixed method with embedded design involving 40 eleventh-grade students as the sample. The instruments used are a creative thinking ability test and a self-efficacy questionnaire as the non-test instrument. The tools used have been declared valid and reliable by experts and based on the results of field trials. Creative thinking instruments are valid with raw variance values explained by measures value reached (82,5%) and unexplained variance in contrasts 1-5 values reached (1,2%-2,5%) in the excellent category, and personal reliability values reached 0,98 and item reliability reached 0,99. While the self-efficacy instrument was declared valid with raw variance explained by measures reaching (75,8%) and unexplained variance in contrasts 1-5 reaching (1,9%-3,3%) in the very good category, and person reliability was recorded at 0,97 with the excellent category. Based on the results of the independent t-test, it is known that the application of problem-based blended learning is proven to be influential in accommodating creative thinking skills (sig. <0,05), but has no effect on self-efficacy (sig. > 0,05). The results of the effect size test reveal that the value of the effectiveness of problem-based blended learning model to students' creative thinking skills reaches 0,90 with high category, and the value of the effectiveness of self-efficacy reaches 0.53 with medium category. Based on these results, the application of problem-based blended learning can be said to be more effective in accommodating creative thinking skills than the problem-based learning model, and effective in accommodating student self-efficacy but with an insignificant effect.

Keywords: Creative Thinking Skills, Self-Efficacy, Problem-based Learning

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DAFTAR PUSTAKA

- Abd-El-Fattah, S. M. (2015). Rasch Rating Scale Analysis of the Arabic Version of the Physical Activity Self-Efficacy Scale for Adolescents: A Social Cognitive Perspective. *Psychology*, *06*(16), 2161–2180. <https://doi.org/10.4236/psych.2015.616213>
- Adamura, F. (2021). Problem-based learning in real number topic for practising critical and creative thinking. *Journal of Physics: Conference Series*, *1742*(1). <https://doi.org/10.1088/1742-6596/1742/1/012038>
- Akyıldız, S. T., & Çelik, V. (2020). Thinking outside the box: Turkish EFL teachers' perceptions of creativity. *Thinking Skills and Creativity*, *36*(January). <https://doi.org/10.1016/j.tsc.2020.100649>
- Aldalalah, O. M. A. (2020). The Effectiveness of Infographic via Interactive Smart Board on enhancing Creative Thinking: A Cognitive Load Perspective. *International Journal of Instruction*, *14*(1), 345–364. <https://doi.org/10.29333/IJI.2021.14120A>
- Alzoubi, A. M., Al Qudah, M. F., Albursan, I. S., Bakhiet, S. F., & Abduljabbar, A. S. (2016). The Effect of Creative Thinking Education in Enhancing Creative Self-Efficacy and Cognitive Motivation. *Journal of Educational and Developmental Psychology*, *6*(1), 117. <https://doi.org/10.5539/jedp.v6n1p117>
- Andriani, A., Dewi, I., & Sagala, P. N. (2019). Development of blended learning media using the mentimeter application to improve mathematics creative thinking skills. *Journal of Physics: Conference Series*, *1188*(1). <https://doi.org/10.1088/1742-6596/1188/1/012112>
- Arikunto, S. (2013). *Prosedur Penelitian sebagai Pendekatan Praktik*. Rineka Cipta.
- Atun, S., & Latupeirisa, V. P. S. (2021). Science KIT Teaching Aid for the Earthquake in Improving Students' Collaboration Skills and Creative Thinking in Junior High School. *European Journal of Educational Research*, *10*(1), 187–197. <https://doi.org/10.12973/EU-JER.10.1.187>
- Aulia Rahman, M., Suparman, & Hairun, Y. (2020). Design of teaching material for problem-based learning to improve creative thinking skills. *Universal Journal of Educational Research*, *8*(2), 559–565.

<https://doi.org/10.13189/ujer.2020.080227>

- Bambang Sumintono, W. W. (2015). *Aplikasi Pemodelan Rasch pada Assesment Pendidikan* (B. Trim (ed.)). Trim Komunikata.
- Bandura, A. (1995). *Self Efficacy in Changing Societies*. Cambridge University Press.
- Basogain, X., Angel, M., Carlos, J., & Javier, M. (2017). Computers in Human Behavior Computational Thinking in pre-university Blended Learning classrooms. *Computers in Human Behavior*, 1–8. <https://doi.org/10.1016/j.chb.2017.04.058>
- Batlolona, J. (2019). Creative thinking skills students in physics on solid material elasticity. *Journal of Turkish Science Education*, 16(1), 48–61. <https://doi.org/10.12973/tused.10265a>
- Batlolona, J. R., Diantoro, M., Wartono, & Latifah, E. (2019). Creative thinking skills students in physics on solid material elasticity. *Journal of Turkish Science Education*, 16(1), 48–61. <https://doi.org/10.12973/tused.10265a>
- Beghetto, R. A. (2007). Does creativity have a place in classroom discussions? Prospective teachers' response preferences. *Thinking Skills and Creativity*, 2(1), 1–9. <https://doi.org/10.1016/j.tsc.2006.09.002>
- Beghetto, R. A. (2019). Large-Scale Assessments, Personalized Learning, and Creativity: Paradoxes and Possibilities. *ECNU Review of Education*, 2(3), 311–327. <https://doi.org/10.1177/2096531119878963>
- Bereczki, E. O., & Kárpáti, A. (2018). Teachers' beliefs about creativity and its nurture: A systematic review of the recent research literature. *Educational Research Review*, 23(October 2017), 25–56. <https://doi.org/10.1016/j.edurev.2017.10.003>
- Berga, K. A., Vadnais, E., Nelson, J., Johnston, S., Buro, K., Hu, R., & Olaiya, B. (2021). Blended learning versus face-to-face learning in an undergraduate nursing health assessment course: A quasi-experimental study. *Nurse Education Today*, 96(August 2020), 104622. <https://doi.org/10.1016/j.nedt.2020.104622>
- Bilgin, I. (2015). The Effects of Project Based Learning on Undergraduate Students' Achievement and Self - Efficacy Beliefs Towards Science Teaching.

- Eurasia Journal of Mathematics, Science & Technology Education*, 11(3), 469–477. <https://doi.org/10.12973/eurasia.2014.1015a>
- Bond, T. G., & Fox, C. M. (2015). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences* (3rd Ed.). Erlbaum.
- Boone, H. N. J., & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension*, 50(2), 1–20. <https://doi.org/10.1111/j.1365-2929.2004.02012.x>
- Boone, W. J., & Noltemeyer, A. (2017). Rasch analysis: A primer for school psychology researchers and practitioners. *Cogent Education*, 4(1). <https://doi.org/10.1080/2331186X.2017.1416898>
- Brown, J. F., & Feder, D. D. (1934). Thorndike's theory of learning as Gestalt psychology. *Psychological Bulletin*, 31(6), 426–437. <https://doi.org/10.1037/h0069893>
- Cai, S., Liu, C., Wang, T., Liu, E., & Liang, J. C. (2021). Effects of learning physics using Augmented Reality on students' self-efficacy and conceptions of learning. *British Journal of Educational Technology*, 52(1), 235–251. <https://doi.org/10.1111/bjet.13020>
- Caldwell, H., Whewell, E., & Heaton, R. (2020). The impact of visual posts on creative thinking and knowledge building in an online community of educators. *Thinking Skills and Creativity*, 36(November 2019), 100647. <https://doi.org/10.1016/j.tsc.2020.100647>
- Cañabate, D., Serra, T., Bubnys, R., & Colomer, J. (2019). Pre-service teachers' reflections on cooperative learning: Instructional approaches and identity construction. *Sustainability (Switzerland)*, 11(21). <https://doi.org/10.3390/su11215970>
- Carman, J. M. (2005). BLENDED LEARNING DESIGN: FIVE KEY INGREDIENTS President Agilant Learning. *Agilant Learning*, 1(11), 1–8.
- CASTRO-FAJARDO, L. E., SANTAMARIA, A., BERNAL-HERNANDEZ, K. L., GOMEZ-HERNANDEZ MG, F. A., & GARRCIA-CEPERO, M. C. (2015). How Do Education Professionals Understand Creativity? A Study of The Implicit Theories On Creativity In A Sample Of Educators. *Journal for the Education of the Young Scientist and Giftedness*, 2(2), 41–41. <https://doi.org/10.17478/jeysg.201429020>

- Çeliköz, N., Erişen, Y., & Şahin, M. (2019). Cognitive Learning Theories With Emphasis On Latent Learning, Gestalt And Information Processing Theories. *Journal of Educational and Instructional Studies in the World*, 9(3), 55.
- Chakravarti, I. M., Laha, R. G., & Roy, J. (1967). Handbook of Methods of Applied Statistics Volume I. In *Wiley*. Wiley.
- Clark, M. D., Hergenrader, T., & Rain, J. (2015). *Creative Writing in the Digital Age (Theory, practice, and pedagogy)*. Bloomsbury Academuc.
- Darmaji, D., Mustiningsih, M., & Arifin, I. (2019). Quality Management Education in the Industrial Revolution Era 4.0 and Society 5.0. *Proceedings of the 5th International Conference on Education and Technology (ICET 2019)*, 382(Icet), 565–570. <https://doi.org/10.2991/icet-19.2019.141>
- Davis, G. A. (1981). Personal Creative Thinking Techniques. *National Association for Gifted Children*, 25(3), 99–101.
- Dawilal, S., Kamyod, C., & Prasad, R. (2021). Effectiveness Comparison of the Traditional Problem-Based Learning and the Proposed Problem-Based Blended Learning in Creative Writing: A Case Study in Thailand. *Wireless Personal Communications*, 118(3), 1853–1867. <https://doi.org/10.1007/s11277-019-06638-x>
- Dewi, F. H., Samsudin, A., & Chandra, D. T. (2021). Developing FD-MT to investigate students' mental model on fluid dynamic concept: a Rasch model analysis. *Journal of Physics: Conference Series*, 2098(1). <https://doi.org/10.1088/1742-6596/2098/1/012020>
- Effects, T. H. E., Blended, O. F., Through, T., & Learning, O. (2020). *The Effects of Blended Learning and Project-based learning on Pre-Service Biology Teachers' creative Thinking through Online Learning* (Vol. 9, Issue 3, pp. 408–420).
- Elizabeth, A., & Sigahitong, M. M. (2018). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kreatif Peserta didik. *Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, 6(2).
- Emmons, C. L., & Zager, D. (2017). Increasing Collaboration Self-Efficacy to Improve Educational Programming for Students With Autism. *Hammill*

Institute on Disabilities.

- Fang, F., & Chen, Y. (2019). A new approach for credit scoring by directly maximizing the Kolmogorov–Smirnov statistic. *Computational Statistics and Data Analysis*, *133*, 180–194. <https://doi.org/10.1016/j.csda.2018.10.004>
- Fernanda, J. W., & Hidayah, N. (2020). Classical Test Theory dan Rasch Model. *SQUARE: Journal of Mathematics and Mathematics Education*, *2*(1), 49–60.
- Fisher, W. J. (2018). *Rating Scale Instrument Criteria*. Rasch Org. <https://www.rasch.org/rmt/rmt211m.htm>
- Fitriani, A., Zubaidah, S., Susilo, H., & Al Muhdhar, M. H. I. (2020). The effects of integrated problem-based learning, predict, observe, explain on problem-solving skills and self-efficacy. *Eurasian Journal of Educational Research*, *2020*(85), 45–64. <https://doi.org/10.14689/ejer.2020.85.3>
- Fitriyana, N., Wiyarsi, A., Ikhsan, J., & Sugiyarto, K. H. (2020). Android-based-game and blended learning in chemistry: Effect on students' self-efficacy and achievement. *Cakrawala Pendidikan*, *39*(3), 507–521. <https://doi.org/10.21831/cp.v39i3.28335>
- Fitriyani, D., Jalmo, T., & Yolida, B. (2019). Penggunaan Problem Based Learning untuk Meningkatkan Keterampilan Kolaborasi Dan Berpikir Tingkat Tinggi. *Jurnal Bioterdidik: Wahana Ekspresi Ilmiah*, *7*(3), 77–87. <http://jurnal.fkip.unila.ac.id/index.php/JBT/article/view/17480>
- Gao, J. (2021). Exploring children's well-being and creativity in Chinese folk music lessons. *Thinking Skills and Creativity*, *41*. <https://doi.org/10.1016/j.tsc.2021.100903>
- Gardiner, P. (2020). Learning to think together: Creativity, interdisciplinary collaboration and epistemic control. *Thinking Skills and Creativity*, *38*(December).
- Gede, D., Putra, A., Astawa, I. W. P., & Ardana, I. M. (2019). Pengaruh model pembelajaran blended learning terhadap pemahaman konsep dan kelancaran prosedur matematis. *Jurnal Riset Pendidikan Matematika*, *6*(1), 75–86.
- Giancoli, D. C. (2014). *Fisika Prinsip Dan Aplikasi Edisi Ketujuh Jilid 1*. Erlangga.
- Gingl, Z. (2019). Comment on “Resistance of a digital voltmeter: Teaching creative thinking through an inquiry-based lab.” In *Physics Education* (Vol. 54, Issue

5). <https://doi.org/10.1088/1361-6552/ab2bdd>

- Güzer, B., & Caner, H. (2014). The Past, Present and Future of Blended Learning: An in Depth Analysis of Literature. *Procedia - Social and Behavioral Sciences*, 116, 4596–4603. <https://doi.org/10.1016/j.sbspro.2014.01.992>
- Habibah, S. U., Fathani, A. H., & Nursit, I. (2021). Kemampuan Berpikir Kreatif Matematis Berdasarkan Resiliensi Matematis Siswa yang Memiliki Kegemaran Bidang Seni Kaligrafi. *Jurnal Komunikasi Pendidikan*, 5(1), 1. <https://doi.org/10.32585/jkp.v5i1.1083>
- Habibi, H., Jumadi, J., & Mundilarto, M. (2020). Phet simulation as means to trigger the creative thinking skills of physics concepts. *International Journal of Emerging Technologies in Learning*, 15(6), 166–172. <https://doi.org/10.3991/IJET.V15I06.11319>
- Habibi, Mundilarto, Jumadi, J., Gummah, S., Ahzan, S., & Prasetya, D. S. B. (2020). Project brief effects on creative thinking skills among low-ability pre-service physics teachers. *International Journal of Evaluation and Research in Education*, 9(2), 415–420. <https://doi.org/10.11591/ijere.v9i2.20531>
- Hairida. (2017). Pengembangan Instrumen untuk Mengukur Self Efficacy Siswa dalam Pembelajaran Kimia. *EDUSAINS*, 9(1).
- Hakim, A., Liliyasi, L., Setiawan, A., & Saptawati, G. A. P. (2017). Interactive Multimedia Thermodynamics To Improve Creative Thinking Skill of Physics Prospective Teachers. *Jurnal Pendidikan Fisika Indonesia*, 13(1), 33–40. <https://doi.org/10.15294/jpfi.v13i1.8447>
- Hidayat, P. W., & Widjajanti, D. B. (2018). Analisis kemampuan berpikir kreatif dan minat belajar siswa dalam mengerjakan soal open ended dengan pendekatan CTL An analysis of creative thinking ability and learning interest of students of junior high school in solving open ended problem with CTL app. 13(1), 63–75.
- Hsia, L.-H., Lin, Y.-N., & Hwang, G.-J. (2021). A creative problem solving-based flipped learning strategy for promoting students' performing creativity, skills and tendencies of creative thinking and collaboration. *British Journal of Educational Technology*, 52(4), 1771–1787. <https://doi.org/10.1111/bjet.13073>

- Ikehara, H. T. (1999). Implications of gestalt theory and practice for the learning organisation. *The Learning Organization*, 6(2), 63–69. <https://doi.org/10.1108/09696479910262587>
- Iskakova, L., Amirova, A., Ospanbekova, M., Zhumabekova, F., Ageyeva, L., & Zhailauova, M. (2021). Developing the future primary school teachers intellectual skills in Kazakhstan. *International Journal of Instruction*, 14(3), 755–770. <https://doi.org/10.29333/iji.2021.14344a>
- Islami, R. A. Z. El, Nahadi, & Permanasari, A. (2015). Hubungan Literasi Sains dan Kepercayaan Diri Siswa pada Konsep Asam Basa. *Jurnal Penelitian Dan Pembelajaran IPA*, 1(1).
- Istiyono, E. (2020). Measuring Creative Thinking Skills of Senior High School Male and Female Students in Physics (CTSP) Using the IRT-based PhysTCreTS. *Journal of Turkish Science Education*, 17(4), 578–590. <https://doi.org/10.36681/tused.2020.46>
- Jailani, J., Sugiman, S., & Apino, E. (2017). Implementing the problem-based learning in order to improve the students' HOTS and characters. *Jurnal Riset Pendidikan Matematika*, 4(2), 247–259.
- Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396–403. <https://doi.org/10.9734/bjast/2015/14975>
- Jumadi, J., Perdana, R., Riwayani, & Rosana, D. (2021). The impact of problem-based learning with argument mapping and online laboratory on scientific argumentation skill. *International Journal of Evaluation and Research in Education*, 10(1), 16–23. <https://doi.org/10.11591/ijere.v10i1.20593>
- Kartika, Y., Wahyuni, R., Sinaga, B., & Rajagukguk, J. (2019). Improving Math Creative Thinking Ability by using Math Adventure Educational Game as an Interactive Media. *Journal of Physics: Conference Series*, 1179(1). <https://doi.org/10.1088/1742-6596/1179/1/012078>
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. *Review of General Psychology*, 13(1), 1–12.
- Kemendikbud. (2018). *Permendikbud No. 21 Tahun 2016 tentang Standar Isi Kurikulum 2013*.

- Kesuma, G. C., Diani, R., Hasanah, N., & Fujiani, D. (2020). Blended Learning Model: Can It Reduce Students' Misconception in Physics? *Journal of Physics: Conference Series*, 1467(1). <https://doi.org/10.1088/1742-6596/1467/1/012044>
- Khoiri, W., Rochmad, & Cahyono, A. N. (2013). Problem Based Learning Berbantuan Multimedia dalam Pembelajaran Matematika untuk Meningkatkan Kemampuan Berpikir Kreatif. *Unnes Journal of Mathematics Education*, 2(1). <https://doi.org/10.15294/ujme.v2i1.3328>
- Khoiriyah, A. J., & Husamah, H. (2018). Problem-based Learning: Creative Thinking Skills, Problem-solving Skills, and Learning Outcome of Seventh Grade Students. *Jurnal Pendidikan Biologi Indonesia*, 4(2), 151–160. <https://doi.org/10.22219/jpbi.v4i2.5804>
- Kurniawan, E. S. (2020). Synectic HOTS oriented: Development of teaching materials for high school physics learning. *Universal Journal of Educational Research*, 8(11), 5547–5554. <https://doi.org/10.13189/ujer.2020.081158>
- Latifah, S., Susilowati, N. E., Khoiriyah, K., Saady, S., Yuberti, Y., & Rahayu, R. (2019). Self-Efficacy: Its Correlation to the Scientific-Literacy of Prospective Physics Teacher. *Journal of Physics: Conference Series*, 1155(1). <https://doi.org/10.1088/1742-6596/1155/1/012015>
- Lee, Jeongju, Song, H. D., & Hong, A. J. (2019). Exploring factors, and indicators for measuring students' sustainable engagement in e-learning. *Sustainability (Switzerland)*, 11(4). <https://doi.org/10.3390/su11040985>
- Lee, Jihyun, & Choi, H. (2017). What affects learner's higher-order thinking in technology-enhanced learning environments? The effects of learner factors. *Computers and Education*, 115, 143–152. <https://doi.org/10.1016/j.compedu.2017.06.015>
- Lian, B., KRistiawan, M., & Fitriya, R. (2018). Giving Creativity Room To Students Through The Friendly School's Program.pdf. *International Journal of Scientific & Technology Research*, 7(7).
- Liu, M., Shi, Y., Pan, Z., Li, C. L., Pan, X., & Lopez, F. (2021). Examining middle school teachers' implementation of a technology-enriched problem-based learning program: Motivational factors, challenges, and strategies. *Journal of*

- Research on Technology in Education*, 53(3), 279–295.
<https://doi.org/10.1080/15391523.2020.1768183>
- Liu, Z., Zhang, J., Xie, X., Rolls, E. T., Sun, J., Zhang, K., Jiao, Z., Chen, Q., Zhang, J., Qiu, J., & Feng, J. (2018). Neural and genetic determinants of creativity. *NeuroImage*, 174, 164–176.
<https://doi.org/10.1016/j.neuroimage.2018.02.067>
- Lucas, B., & Spencer, E. (2017). *Teaching Creative Thinking: Developing Learners Who Generate Ideas and Can Think Critically*. Crown House Publishing Limited.
- Lutfi, A. (2016). Problem Posing Dan Berpikir Kreatif. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika, November*, 88–98.
- Made Rajendra, I., & Made Sudana, I. (2018). The Influence of Interactive Multimedia Technology to Enhance Achievement Students on Practice Skills in Mechanical Technology. *Journal of Physics: Conference Series*, 953(1).
<https://doi.org/10.1088/1742-6596/953/1/012104>
- Malik, A., Setiawan, A., Suhandi, A., & Permanasari, A. (2017). Enhancing pre-service physics teachers' creative thinking skills through HOT lab design. *AIP Conference Proceedings*, 1868(August). <https://doi.org/10.1063/1.4995177>
- Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. *Lectura: Jurnal Pendidikan*, 12(1), 187–193.
- Masitoh, L. F., & Fitriyani, H. (2018). Improving students' mathematics self-efficacy through problem based learning. *Malikussaleh Journal of Mathematics Learning (MJML)*, 1(1), 26.
<https://doi.org/10.29103/mjml.v1i1.679>
- Maskur, R., Sumarno, Rahmawati, Y., Pradana, K., Syazali, M., Septian, A., & Palupi, E. K. (2020). The effectiveness of problem based learning and aptitude treatment interaction in improving mathematical creative thinking skills on curriculum 2013. *European Journal of Educational Research*, 9(1), 375–383.
<https://doi.org/10.12973/eu-jer.9.1.375>
- Molloy, E., Boud, D., & Henderson, M. (2020). Developing a learning-centred

- framework for feedback literacy. *Assessment and Evaluation in Higher Education*, 45(4), 527–540. <https://doi.org/10.1080/02602938.2019.1667955>
- Mukhibin, A., & Ichsan, N. (2019). The Effectiveness of Think Pair Share Learning Model with a Problem Based Learning Approach Based on Students' Self-efficacy. *Hipotenusa: Journal of Mathematical Society*, 1(1), 9–14. <https://doi.org/10.18326/hipotenusa.v1i1.9-14>
- Mulyanto, B. S., Sadono, T., & Koeswanti, H. D. (2020). Evaluation of Critical Thinking Ability with Discovery Learning Using Blended Learning Approach in Primary School. *Journal of Educational Research and Evaluation*, 9(2), 78–84. <https://doi.org/10.15294/jere.v9i2.46135>
- Nasir, M., & Iqbal, S. (2019). Academic Self Efficacy as a Predictor of Academic Achievement of Students in Pre Service Teacher Training Programs. *Bulletin of Education and Research*, 41(1), 33–42.
- Nasution, N. E. A., Harahap, F., & Manurung, B. (2017). The Effect of Blended Learning on Student's Critical Thinking Skills in Plant Tissue Culture Course. *International Journal of Science and Research. International Journal of Science and Research (IJSR)*, 6(11), 1469 – 1473. <https://doi.org/https://doi.org/10.21275/ART20171836>
- Nesbit, J., Beifer, K., & Leacock, T. (2009). *Learning Object Review Instrument (LORI)*. TeleLearning NCE, CANARIE Inc, eduSourceCanada.
- Nurdini, N., Suhandi, A., Ramalis, T., & Samsudin, A. (2020). Developing Multitier Instrument of Fluids Concepts (MIFO) to Measure Student's Conception: A Rasch Analysis Approach. *Journal of Advanced Research in Dynamical and Control Systems*, 12(6), 3069–3083. <https://doi.org/10.5373/JARDCS/V12I6/S20201273>
- Nuswowati, M., & Taufiq, M. (2015). Developing creative thinking skills and creative attitude through problem based green vision chemistry environment learning. *Jurnal Pendidikan IPA Indonesia*, 4(2), 170–176. <https://doi.org/10.15294/jpii.v4i2.4187>
- OECD. (2021). PISA 2021 Creative Thinking Framework (Third Draft). *Oecd*, 53(9), 1689–1699.
- Ozkan, G., & Umdü Topsakal, U. (2021). Exploring the effectiveness of STEAM

- design processes on middle school students' creativity. *International Journal of Technology and Design Education*, 31(1), 95–116. <https://doi.org/10.1007/s10798-019-09547-z>
- Palobo, M., & Meirista, E. (2018). Pengembangan Perangkat Pembelajaran Berbasis Problem Solving Berorientasi pada Peningkatan Kemampuan Berpikir Kreatif dan Minat Belajar Matematika. *Musamus Journal of Mathematics Education*, 1(1), 1–16.
- Park, E. J., & Kim, M. J. (2021). Visual communication for students' creative thinking in the design studio: Translating filmic spaces into spatial design. *Buildings*, 11(3), 1–19. <https://doi.org/10.3390/buildings11030091>
- Parno, Supriana, E., Yulianti, L., Widarti, A. N., Ali, M., & Azizah, U. (2019). The influence of STEM-based 7E learning cycle on students critical and creative thinking skills in physics. *International Journal of Recent Technology and Engineering*, 8(2 Special Issue 9), 761–769. <https://doi.org/10.35940/ijrte.B1158.0982S919>
- Peura, P., Aro, T., Räikkönen, E., Viholainen, H., Koponen, T., Usher, E. L., & Aro, M. (2021). Trajectories of change in reading self-efficacy: A longitudinal analysis of self-efficacy and its sources. *Contemporary Educational Psychology*, 64(January). <https://doi.org/10.1016/j.cedpsych.2021.101947>
- Prifti, R. (2022). Self-efficacy and student satisfaction in the context of blended learning courses. *Open Learning*, 37(2), 111–125. <https://doi.org/10.1080/02680513.2020.1755642>
- Puspita, W. R. (2016). Upaya Meningkatkan Self-Efficacy Melalui Model Learning Cycle 5E Pada Pokok Bahasan Perbandingan. *Seminar Nasional Matematika Dan Pendidikan Matematika UNY*, 557–564.
- Redifer, J. L., Bae, C. L., & Zhao, Q. (2021). Self-efficacy and performance feedback: Impacts on cognitive load during creative thinking. *Learning and Instruction*, 71(February). <https://doi.org/10.1016/j.learninstruc.2020.101395>
- Ritter, S. M., Mostert, N., Treffinger, D. J., Young, G. C., Selby, E. C., Shepardson, C., Sener, N., & Tas, E. (2002). Assessing Creativity: A Guide for Educators. In *Journal of Education and Learning* (Issue December). The National Research Center on the Gifted and Talented.

<http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED505548%0Ahttp://dx.doi.org/10.1007/s41465-016-0002-3>

- Roqobih, F. D., Yuliani, & Rahayu, Y. S. (2019). Improving Student's Creative Thinking Skill through Blended Learning using Schoology. *Journal of Physics: Conference Series*, 1417(1). <https://doi.org/10.1088/1742-6596/1417/1/012094>
- Saepuloh, D., Sabur, A., Lestari, S., & Mukhlisoh, S. U. (2021). Improving Students' Critical Thinking and Self-Efficacy by Learning Higher Order Thinking Skills Through Problem Based Learning Models. *JPI (Jurnal Pendidikan Indonesia)*, 10(3), 495. <https://doi.org/10.23887/jpi-undiksha.v10i3.31029>
- Samura, A. O., Darhim, Juandi, D., Said, A. M., & Malaka, M. (2021). Improving the Creative Thinking Ability of Junior High School Students Through GeoGebra Assisted Learning Community in Mathematics. *International Journal of Interactive Mobile Technologies*, 15(22), 84–98. <https://doi.org/10.3991/IJIM.V15I22.24797>
- Saregar, A., Latifah, S., Hudha, M. N., Susanti, F., & Susilowati, N. E. (2020). Stem-inquiry brainstorming: Critical and creative thinking skills in static fluid material. *Periodico Tche Quimica*, 17(36), 491–505.
- Sari, F. P. (2020). Development of physics comic based on local wisdom: Hopscotch (engklek) game android-assisted to improve mathematical representation ability and creative thinking of high school students. *Revista Mexicana de Fisica E*, 17(2), 255–262. <https://doi.org/10.31349/REVMEXFISE.17.255>
- Sari, Z. O., & Septiasari, E. A. (2016). Pentingnya Kreativitas dan Komunikasi pada Pendidikan Jasmani dan Dunia Olahraga. *Jurnal Olahraga Prestasi*, 12(1), 97–110.
- Satriawan, M., Liliyasi, S., & Setiawan, W. (2019). Wave energy concept mastery relate on creative thinking skills of the pre-service physics teachers in environmental physics lectures. *Journal of Physics: Conference Series*, 1157(3). <https://doi.org/10.1088/1742-6596/1157/3/032044>
- Schnittka, C., & Bell, R. (2011). Engineering design and conceptual change in

- science: Addressing thermal energy and heat transfer in eighth grade. *International Journal of Science Education*, 33(13), 1861–1887. <https://doi.org/10.1080/09500693.2010.529177>
- Shabrina, & Kuswanto, H. (2018). Android-assisted mobile physics learning through Indonesian batik culture: Improving students' creative thinking and problem solving. *International Journal of Instruction*, 11(4), 287–302. <https://doi.org/10.12973/iji.2018.11419a>
- Siburian, J., Corebima, A. D., Ibrohim, & Saptasari, M. (2019). The correlation between critical and creative thinking skills on cognitive learning results. *Eurasian Journal of Educational Research*, 2019(81), 99–114. <https://doi.org/10.14689/ejer.2019.81.6>
- Simamora, R. E., Saragih, S., & Hasratuddin, H. (2018). Improving Students' Mathematical Problem Solving Ability and Self-Efficacy through Guided Discovery Learning in Local Culture Context. *International Electronic Journal of Mathematics Education*, 14(1), 61–72.
- Simanjuntak, M. P., Hutahaean, J., Marpaung, N., & Ramadhani, D. (2021). Effectiveness of problem-based learning combined with computer simulation on students' problem-solving and creative thinking skills. *International Journal of Instruction*, 14(3), 519–534. <https://doi.org/10.29333/iji.2021.14330a>
- Stolz, R. C., Blackmon, A. T., Engerman, K., Tonge, L., & A. McKayle, C. (2022). Poised for creativity: Benefits of exposing undergraduate students to creative problem-solving to moderate change in creative self-efficacy and academic achievement. *Journal of Creativity*, 32(2). <https://doi.org/https://doi.org/10.1016/j.yjoc.2022.100024>
- Sugiyono. (2017). *Metode Penelitian Pendidikan*. Alfabeta.
- Suherman, D. P., Purwianingsih, W., & Diana, S. (2018). Analisis Hubungan Self-efficacy dan Metakognitif terhadap Hasil Belajar Siswa SMA Berdasarkan Gender pada Konsep Genetika. *Assimilation: Indonesian Journal of Biology Education*, 1(1).
- Sumintono, B., & Widhiarso, W. (2015). *Aplikasi Pemodelan Rasch pada Assessment Pendidikan*. Trim Komunikata Publishing Home.

- Sumintono, B., Widhiarso, W., & Mada, U. G. (2014). *Aplikasi Model Rasch untuk Penelitian Ilmu-Ilmu Sosial*. Trim Komunikata Publishing Home.
- Sun, M., Wang, M., & Wegerif, R. (2020). Effects of divergent thinking training on students' scientific creativity: The impact of individual creative potential and domain knowledge. *Thinking Skills and Creativity*, 37(September 2019), 1–10. <https://doi.org/10.1016/j.tsc.2020.100682>
- Sun, W., Xu, C., & Dong, Y. (2019). Investigating the Relationships among College Students' Online Self-Regulated Learning, Grit and 5C Competences. *Journal of Education, Innovation, and Communication*, 1(2), 75–86. <https://doi.org/10.34097/jecom-volume-1-issue-2-december-2019-6>
- Sunaryo, Y. (2017). Pengukuran Self Efficacy Siswa dalam Pembelajaran Matematika di MTs N 2 Ciamis. *Jurnal Teori Dan Riset Matematika*, 1(2), 40–44.
- Supardi. (2013). *Aplikasi Statitika dalam Penelitian (Konsep Statitika yang Lebih Komprehensi)*. Change Publication.
- Suparman, S., Juandi, D., & Tamur, M. (2021). Does Problem-Based Learning Enhance Students ' Higher Order Thinking Skills in Mathematics Learning ? A Systematic Review and Meta-Analysis. *The 2021 4th International Conference on Big Data and Education*, 44–51.
- Supratman, Zubaidah, S., Corebima, A. D., & Ibrohim. (2021). The effect size of different learning on critical and creative thinking skills of biology students. *International Journal of Instruction*, 14(3), 187–206. <https://doi.org/10.29333/iji.2021.14311a>
- Suryandari, K. C., Sajidan, S., Rahardjo, S. B., Prasetyo, Z. K., & Fatimah, S. (2018a). Project-based Science Learning and Pre-service teachers' science literacy and creative thinkig. *Cakrawala Pendidikan*, XXXVII(3), 345–355.
- Suryandari, K. C., Sajidan, S., Rahardjo, S. B., Prasetyo, Z. K., & Fatimah, S. (2018b). Project-based Science Learning and Pre-Service Teachers' Science Literacy Skill and Creative Thinking. *Cakrawala Pendidikan*, XXXVII(3), 345–355.
- Susilowati, N. E., Muslim, M., Efendi, R., & Samsudin, A. (2022a). Pisa 2021 Creative Thinking Instrument for Students: Physics Teachers' Perceptions.

Indonesian Journal of Science and Mathematics Education, 5(2), 194–209.
<https://doi.org/10.24042/ijjsme.v5i2.12439>

- Susilowati, N. E., Muslim, M., Efendi, R., & Samsudin, A. (2022b). What is the Most Impressive Treatment to Foster Students' Creative Thinking Skills? A Meta-Analysis and Bibliometric Review. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, 7(2), 201–219. <https://doi.org/10.24042/tadris.v7i2.12690>
- Suswati, L., Yuliati, L., & Mufti, N. (2015). Pengaruh Integrative Learning Terhadap Kemampuan Berpikir Kritis dan Penguasaan Konsep Fisika Siswa Lis. *Jurnal Pendidikan Sains*, 3(2), 49–57.
- Suyidno, N., M., Y., L., P., K., B., & Jatmiko, B. (2017). Effectiveness of creative responsibility based teaching model on basic learning physics to increase student's scientific creativity and responsibility. *Journal Baltic Science Education*, 17(1), 136–151.
- Sya'Roni, A. R., Inawati, P. A., Guswanto, E., Susanto, & Hobri. (2020). Students' creative thinking skill in the flipped classroom-blended learning of mathematics based on lesson study for learning community. *Journal of Physics: Conference Series*, 1563(1). <https://doi.org/10.1088/1742-6596/1563/1/012046>
- Syaparuddin, S., Meldianus, M., & Elihami, E. (2020). Strategi pembelajaran aktif dalam meningkatkan motivasi belajar PKN peserta didik. *Mahaguru: Jurnal Pendidikan Guru Sekolah Dasar*, 1(1), 30–41. <https://doi.org/10.33487/mgr.v1i1.326>
- Syarafina, D. N., Jailani, & Winarni, R. (2018). The application of problem based learning to improve students' self-efficacy. *AIP Conference Proceedings*, 2014(September). <https://doi.org/10.1063/1.5054428>
- Tabieh, A. A. S., Al-Hileh, M. M., Abu Afifa, H. M. J., & Abuzagha, H. Y. (2020). The effect of using digital storytelling on developing active listening and creative thinking skills. *European Journal of Educational Research*, 10(1), 13–21. <https://doi.org/10.12973/EU-JER.10.1.13>
- Tamur, M., Juandi, D., & Kusumah, Y. S. (2020). The effectiveness of the application of mathematical software in indonesia; a meta-analysis study. *International Journal of Instruction*, 13(4), 867–884.

<https://doi.org/10.29333/iji.2020.13453a>

- Tang, T., Vezzani, V., & Eriksson, V. (2020). Developing critical thinking, collective creativity skills and problem solving through playful design jams. *Thinking Skills and Creativity*, 37, 100696. <https://doi.org/10.1016/j.tsc.2020.100696>
- Tanggaard, L. (2011). Stories about creative teaching and productive learning. *European Journal of Teacher Education*, 34(2), 219–232. <https://doi.org/10.1080/02619768.2011.558078>
- Tangkeallo, G. A., Purbojo, R., & Sitorus, K. S. (2014). Hubungan Antara Self-Efficacy dengan Orientasi Masa Depan Mahasiswa Tingkat Akhir. *Jurnal Psikologi*, 10(1).
- Terwee, C. B., Bot, S. D. M., de Boer, M. R., van der Windt, D. A. W. M., Knol, D. L., Dekker, J., Bouter, L. M., & de Vet, H. C. W. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, 60(1), 34–42. <https://doi.org/10.1016/j.jclinepi.2006.03.012>
- Thalheimer, W., & Cook, S. (2002). How to calculate effect sizes from published research. *Work-Learning Research*, 1(August), 1–9.
- Tipler. (2001). *Fisika Untuk Sains dan Teknik Edisi Ketiga* (Jakarta: Penerbit Erlangga (ed.)).
- Ulfa, F. M., Asikin, M., & Dwidayati, N. K. (2019). Membangun Kemampuan Berpikir Kreatif Matematis Siswa dengan Pembelajaran PjBL terintegrasi Pendekatan STEM. *Prosiding Seminar ...*, 4(2), hal.614. <https://proceeding.unnes.ac.id/index.php/snpsca/article/download/348/368>
- Ulinuha, R., Budi Waluya, S., Rochmad, R., NoKm, P., & Kedu, K. (2021). Creative Thinking Ability With Open-Ended Problems Based on Self-Efficacy in Gnomio Blended Learning. *Unnes Journal of Mathematics Education Research*, 10(1), 20–25. <http://journal.unnes.ac.id/sju/index.php/ujmer>
- Utami, I. S. (2018). The Effectiveness of Blended Learning as an Instructional Model in Vocational High School. *Journal of Educational Science and Technology (EST)*, 4(1), 74. <https://doi.org/10.26858/est.v4i1.4977>
- Vlasenko, K., Achkan, V., Chumak, O., Lovianova, I., & Armash, T. (2020).

- Problem-based approach to develop creative thinking in students majoring in mathematics at teacher training universities. *Universal Journal of Educational Research*, 8(7), 2853–2863. <https://doi.org/10.13189/ujer.2020.080712>
- Wahyu, W., Rusmansyah, R., & Sholahuddin, A. (2017). Meningkatkan Kemampuan Berpikir Kreatif dan Self efficacy siswa menggunakan Model Creatuve Problem Solving Pada Materi Sistem Koloid. *Jurnal Vidya Karya*, 32(1), 36–44.
- Wahyudi, W., Waluya, B., Suyitno, H., Sutriyono, S., & Anugraheni, I. (2019). Development of Problem-based Blended Learning (PB2L) model to increase pre-service primary teacher's creative thinking skill. *Journal of Education and Learning (EduLearn)*, 13(3), 324–334. <https://doi.org/10.11591/edulearn.v13i3.9907>
- Wahyudi, W., Waluya, S. B., Suyitno, H., & Isnarto, I. (2020). The impact of 3CM model within blended learning to enhance students' creative thinking ability. *Journal of Technology and Science Education*, 10(1), 32–46. <https://doi.org/10.3926/jotse.588>
- Wannapiroon, N., & Petsangsri, S. (2020). Effects of Steamification Model in Flipped Classroom Learning Environment on Creative Thinking and Creative Innovation. *TEM Journal*, 9(4), 1647–1655. <https://doi.org/10.18421/TEM94-42>
- Wartono, W., Diantoro, M., & Bartlolona, J. R. (2018). Influence of Problem Based Learning Learning Model on Student Creative Thinking on Elasticity Topics A Material. *Jurnal Pendidikan Fisika Indonesia*, 14(1), 32–39. <https://doi.org/10.15294/jpfi.v14i1.10654>
- Wicaksono, I., Wasis, & Madlazim. (2017). The effectiveness of virtual science teaching model (VS-TM) to improve student's scientific creativity and concept mastery on senior high school physics subject. *Journal of Baltic Science Education*, 16(4), 549–561.
- Widiastuti, R., Kartono, K., Mariani, S., Al, S. M. K., & Gunungpati, A. (2021). Geometry Thinking Ability and Self Efficacy in Problem Based Learning Geogebra Assisted with Self Assessment. *Unnes Journal of Mathematics Education Research*, 12(1), 17–29.

- Williams, N. (2003). ABC of Learning and Teaching in Medicine. *British Medical Journal*, 326, 328–330. <https://doi.org/10.1093/occmed/kqr093>
- Windholz, G., & Lamal, P. A. (1985). Köhler's Insight Revisited. *Teaching of Psychology*, 12(3), 165–167. https://doi.org/10.1207/s15328023top1203_14
- Yang, Y., Long, Y., Sun, D., Van Aalst, J., & Cheng, S. (2020). Fostering students' creativity via educational robotics: An investigation of teachers' pedagogical practices based on teacher interviews. *British Journal of Educational Technology*, 51(5), 1826–1842. <https://doi.org/10.1111/bjet.12985>
- Yang, Y. T. C., Chen, Y. C., & Hung, H. T. (2022). Digital storytelling as an interdisciplinary project to improve students' English speaking and creative thinking. *Computer Assisted Language Learning*, 35(4), 840–862. <https://doi.org/10.1080/09588221.2020.1750431>
- Yaniawati, P., Kariadinata, R., Sari, N. M., Pramiarsih, E. E., & Mariani, M. (2020). Integration of e-learning for mathematics on resource-based learning: Increasing mathematical creative thinking and self-confidence. *International Journal of Emerging Technologies in Learning*, 15(6), 60–78. <https://doi.org/10.3991/ijet.v15i06.11915>
- Yazar Soyadı, M. Ö. (2016). The Effectiveness of SCAMPER Technique on Creative Thinking Skills. *Journal for the Education of Gifted Young Scientists*, 4(1), 31–31. <https://doi.org/10.17478/jegys.2016116348>
- You, H. S., Kim, K., Black, K., & Min, K. W. (2018). Assessing science motivation for college students: Validation of the science motivation questionnaire II using the rasch-andrich rating scale model. *Eurasia Journal of Mathematics, Science and Technology Education*, 14(4), 1161–1173. <https://doi.org/10.29333/ejmste/81821>
- Young, M. H., & Balli, S. J. (2014). Gifted and Talented Education (GATE). *Gifted Child Today*, 37(4), 236–246. <https://doi.org/10.1177/1076217514544030>
- Yuen, M., Gysbers, N. C., Hui, E. K. P., Leung, T. K. M., Lau, P. S. Y., Chan, R. M. C., Shea, P. M. K., & Ke, S. S. Y. (2004). *Academic Development Self-Efficacy Inventory*. Life Skills Development Project, Faculty of Education, University of Hongkong.
- Yustina, Y., Halim, L., & Mahadi, I. (2020). The Effect of “Fish Diversity” Book

in Kampar District on the Learning Motivation and Obstacles of Kampar High School Students through Online Learning during the COVID-19 Period. *Journal of Innovation in Educational and Cultural Research*, 1(1), 7–14. <https://doi.org/10.46843/jiecr.v1i1.2>

Zainuddin, Z., & Keumala, C. M. (2018). Blended Learning Method Within Indonesian Higher Education Institutions. *Jurnal Pendidikan Humaniora*, 6(2), 69–77.

Zhang, H., Sun, C., Liu, X., Gong, S., Yu, Q., & Hou, Z. (2020). Boys benefit more from teacher support: Effects of perceived teacher support on primary students' creative thinking. *Thinking Skills and Creativity*, 37(September).

Zhou, Q. (2021). Development of creative thinking skills through aesthetic creativity in middle school educational music course. *Thinking Skills and Creativity*, 40.