

Correlation of learning motivation and emotional intelligence with student higher order thinking skills level on biology material

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Article Information	Abstract
Keyword: Correlation; Learning motivation; Emotional intelligence; High order thinking skills Kata Kunci: Korelasi; Motivasi belajar; Kecerdasan emosional; Keterampilan berpikir tingkat tinggi History: Received : 10/04/2024 Revised : 16/06/2024 Accepted : 27/06/2024 Published : 29/06/2024	The ability to think at a high level is essential for students to master because this ability encourages students' motivation to look at every problem critically. Learning motivation and emotional intelligence are several factors that determine how students have the desire or drive to achieve their goals. This study is ex post facto research to examine the relationship between learning motivation and emotional intelligence with higher-order thinking skills. The population in this study were all students of grade XI IPA at public senior high schools in the Majene district of the 2023/2024 academic year. The research samples 268 students by employing a simple random sampling technique with representatives of one school for each sub-district in Majene Regency. The research instruments were a questionnaire on learning motivation and emotional intelligence and a test of higher-order thinking skills on Biology learning material. The data obtained in this research was analyzed using descriptive and inferential statistics (multiple and simple regression analysis) with the help of the SPSS program. Based on the hypothesis testing, the research results reveal that learning motivation and emotional intelligence have a very strong and significant relationship to higher-order thinking skills. Further research is needed to achieve broader goals, increase learning motivation and increase students' positive character values. <i>Abstrak. Kemampuan berpikir tingkat tinggi sangat penting untuk dikuasai oleh peserta didik, karena kemampuan tersebut mendorong motivasi peserta didik untuk memandang setiap permasalahan dengan kritis. Motivasi belajar dan kecerdasan emosional merupakan beberapa faktor yang menjadi penentu bagaimana peserta didik memiliki keinginan atau dorongan dalam menggapai cita-citanya. Penelitian ini adalah penelitian ex post facto yang bertujuan untuk mengetahui hubungan antara motivasi belajar dan kecerdasan emosional dengan keterampilan berpikir tingkat tinggi. Populasi dalam penelitian ini adalah seluruh peserta didik kelas XI IPA SMA Negeri di Kabupaten Majene tahun ajaran 2023/2024. Sampel dalam penelitian ini diambil sebanyak 268 dengan menggunakan teknik simple random sampling dengan perwakilan satu sekolah untuk masing-masing kecamatan yang ada di Kabupaten Majene. Instrumen penelitian ini adalah angket motivasi belajar dan kecerdasan emosional dan tes keterampilan berpikir tingkat tinggi pada materi biologi. Data yang diperoleh dalam penelitian ini di analisis menggunakan statistik deskriptif, dan inferensial (analisis regresi ganda dan sederhana) dengan bantuan program SPSS. Berdasarkan pengujian hipotesis, hasil penelitian menunjukkan bahwa motivasi belajar dan kecerdasan emosional memiliki hubungan yang sangat kuat dan signifikan terhadap keterampilan berpikir tingkat tinggi. Penelitian lebih lanjut diperlukan untuk mencapai tujuan yang lebih luas meningkatkan motivasi belajar dan meningkatkan nilai karakter positif siswa.</i>

A. Introduction

Education is a program designed in which there is a component objective of the teaching and learning process between students and teachers to improve the quality of Human Resources (HR) to be qualified and able to compete (Ichsan et al., 2019). A learning process in which one thing wants to be achieved ideally (Siburian et al., 2019). Education for a country can create, produce and guide people who can compete with the progress of the times and have skills not only intellectual intelligence but also emotional and spiritual intelligence that are beneficial for themselves, their families, society and the country (Yachsan et al., 2019). According to academics, education is generally the idea that to know educational success, there needs to be measurement. It is not solely determined by the student's grades, as seen on report cards or diplomas, but it can also be known as a standard measure of achievement or success in the cognitive field. Through student learning outcomes (Dakhi, 2020).

Students in the teaching and learning process are never free from the dream of learning success, which can be seen in good learning results. Good learning outcomes are closely related to the motivation that underlies students' desire to develop. The existence of motivation will have an impact on students' learning outcomes, both directly and indirectly because motivation will encourage attitudes and influence and change these attitudes. A person who does not have the motivation to learn will not likely have the desire to carry out learning activities.

Motivation arises from genuine impulses or desired attention. In general, it has several supporting indicators or elements. Without learning motivation, a student will not learn and ultimately will not achieve maximum learning results to achieve a goal (Reski et al., 2022). Learning motivation encourages moving, directing, and maintaining a person's behaviour to act to do something when studying to achieve learning goals (Rafiola et al., 2020).

Students' ability to motivate themselves and manage emotions is a component of emotional intelligence. Students are expected to be able to manage their emotions with excellent and positive emotional management (Utami et al., 2020). Many studies have been conducted on emotional intelligence. Emotional intelligence, the aspect of self-awareness, influences learning achievement (Sk & Halder, 2020). By increasing students' emotional intelligence, they can improve and optimize their mastery of mathematical concepts (Udayar et al., 2020). Students' emotional intelligence will provide an overview of students' critical thinking abilities in solving problems and improving their critical thinking abilities in managing their emotions while participating in the learning process (Reski et al., 2022).

Students with emotional intelligence will find it easier to express emotions to behave and act effectively, be self-motivated, disciplined and have strong self-control (Goleman, 2006). On the other hand, if students have low emotional intelligence, they will behave or act outside of their thinking (Sk & Halder, 2020). Children whose desires are not achieved will usually change their attitude to a negative one from their previous attitude because they do not intelligently manage their emotions (Chang & Tsai, 2022).

The development of higher-order thinking skills relies on lower-order thinking skills. This means that mastering higher-level thinking skills is based on lower-level thinking skills. Students in achieving critical thinking skills (HOTS) require previous knowledge of the content of the subject matter (Adawiyah et al., 2023). Higher-order thinking skills consist of several categories, namely critical thinking, creative thinking, problem-solving and decision-making, logical thinking, reflective thinking and metacognition, scientific process skills, argumentation skills, as well as analysis, evaluation and information literacy skills (Mahanal, 2019; Wijnen et al., 2023).

Biology learning is one of the steps for students to improve their knowledge, skills, attitudes and values, as well as their responsibility to the environment, society, nation and state (Siburian et al., 2019). Biology learning is related to the process of collecting information, such as finding out and understanding nature systematically, so biology learning is not only for mastering cognitive knowledge in the form of facts, concepts, and principles but is a process of discovery so that students are required to be able to think critically and creatively (Lestari et al., 2022).

Based on field observations, several things cause students' poor thinking abilities: low learning motivation to develop, lack of teacher support, media integration, and slightly open materials that can stimulate students' higher-order-level thinking skills. Apart from learning motivation, the different levels of emotional intelligence in each student also support how students can absorb learning material well. Research related to higher thinking skills has been carried out. Research the relationship between learning motivation and emotional intelligence with higher-order thinking skills. It is said to be integrated with State High Schools in Majene Regency so that it becomes something new in the study of biology education.

In research conducted by Sri et al. (2022), it is stated that learning carried out by teachers tends only to divide tasks into each group and put them back together according to the specified time. In this case, the students' high-level thinking abilities will not develop. High-level thinking abilities will be good if students have high learning motivation and emotional

intelligence. This statement follows research conducted by Mursidah et al. (2019), which states that a positive relationship exists between high-level thinking skills and students' emotional intelligence. Research Primahesa et al. (2023) state that students' high-level thinking skills in biology material are included in the sufficient category.

Therefore, the research aims to determine the correlation between motivation and emotional intelligence with high-level thinking skills about biological material and to provide additional information for teachers to increase students' learning motivation, emotional intelligence and high-level thinking skills. Based on the rationality above, it is necessary to investigate the relationship between student emotional intelligence and learning motivation with higher-order thinking skills.

B. Material and method

The approach used in this study is quantitative. The research was conducted at a high school in Majene Regency, West Sulawesi Province. The research sample 268 students by employing a simple random sampling technique with representatives of one school for each sub-district in Majene Regency, which consisted of SMAN 1 Majene, SMAN 2 Majene, SMAN 3 Majene, SMAN 1 Pamboang, SMAN 1 Sendana, and SMAN 1 Malunda.

Data, Instruments and Data Collection Techniques

The instruments in this research were learning motivation questionnaires, and learning motivation can be interpreted as an urge to carry out certain learning activities that come from within oneself and outside the individual to foster enthusiasm for learning (Zulyusri et al., 2022). Emotional intelligence is the ability to regulate and recognize one's own and other people's emotions, being able to create good relationships in one's social environment (Nuha & Pedhu, 2021) and high-level thinking ability is the value that students have obtained after working on questions that have been prepared by researchers based on Bloom's taxonomy at level C4 (Saputri et al., 2020).

The normality test is used to determine whether the research data is normal. *Kolmogorov-Smirnov* a significance level of 5%. The data distribution is normal if the analysis results obtain a value *Sig* > 0.05, whereas *Sig* < 0.05 indicates that the distribution of research data is not normally distributed.

Data analysis technique

The analysis used in this research is correlation test analysis. Data analysis used IBM SPSS 25 software. The correlation test used was the Pearson product-moment correlation test based on the results of normal distribution data.

From the correlation test, determine the relationship's strength or closeness by looking at the coefficient value according to Azwar 2012 (Table 1).

Table 1 Categorization of learning motivation and emotional intelligence

Score Calculation	Category
$\mu + 1,5 \sigma < \text{score}$	Very high
$\mu + 0,5 \sigma < \text{score} \leq \mu + 1,5 \sigma$	High
$\mu - 0,5 \sigma < \text{score} \leq \mu + 1,5 \sigma$	Medium
$\mu - 1,5 \sigma < \text{score} \leq \mu - 0,5 \sigma$	Low
$< \mu - 1,5 \sigma$	Very low

C. Results and discussion

Based on the problem formulation that has been put forward, data was obtained from the analysis of descriptive statistical data related to learning motivation, emotional intelligence, and higher order-level thinking skills of class and higher-order-level thinking skills of class XI students in biology material, which was then analyzed using the SPSS version 25.0 for Windows program. For a more detailed explanation regarding the normality test for each variable, see Table 2.

The significance value (*p*) learning motivation, namely $0.057 > 0.05$; emotional intelligence, namely $0.129 > 0.05$; higher order-level thinking skills, namely $0.052 > 0.05$, so it can be concluded that the data from the analysis on the variables of learning motivation, emotional intelligence, and higher order-level thinking skills normally distributed. The results of data analysis of the relationship between learning motivation and emotional intelligence, together with higher order-level thinking skills in biology material for class XI students at State High Schools in Majene Regency, can be seen in Table 3.

Based on Table 3, the correlation coefficient (*r*) value for students was 0.810, so the relationship between learning motivation, emotional intelligence, and higher-order-level thinking skills is in the very strong category. Students have high-level thinking skills in biology material in class when using learning media to increase their enthusiasm.

This aligns with research conducted by Rasam & Sari (2018), which states that teacher creativity will help deliver learning material to students so that students feel challenged and excited and do not feel bored. The creativity of a good teacher is one of the causes of learning to be enjoyable for students. The results of research by Bahri et al. (2020) stated that the teacher is one of the main elements in the learning process, and nothing can replace the role of the teacher in the classroom as a teacher who transfers knowledge and as a guide who encourages students' potential in learning.

Based on Table 4, the regression coefficient value is obtained $b_1 = 0,311$, $b_2 = 0,883$. Thus, the regression equation is obtained, namely $\hat{Y} = 25,864 +$

0,311 X_1 + 0,883 X_2 . Learning motivation and emotional intelligence are strongly related to students' higher-order thinking skills. This shows the synergy between learning motivation and emotional intelligence with higher-order thinking skills (Batubara & Nugroho, 2021). In this case, learning motivation and emotional intelligence support each other in improving students' high-level thinking skills.

If students' learning process has good motivation and emotional intelligence, then students will also have good higher-order thinking skills (Nasrul et al., 2019). This means that students have passion, encouragement, and enthusiasm for learning and can control their emotions during the learning process. This shows that students have good learning motivation and emotional intelligence.

Table 2 Normality test

Tests of Normality	
	Kolmogorov-Smirnov ^a
	Statistic
Motivation	0,057
Emotional Intelligence	0,129
HOTS	0,052

Table 3 The learning motivation and emotional intelligence relationship with HOTS

Model	R	R Square	Adj. R Square	Sig
Motivation Emotional Intelligence and HOTS	00,810	0,655	0,653	00,000

Table 4 Regression equation of learning motivation and emotional intelligence relationship with HOTS

Model	B	t	Sig
Constant	21.864	5,367	0,000
Motivation	0,311	3.086	0,000
Emotional Intelligence	0,883	0,088	0,000

Table 5 The learning motivation relationship with HOTS

Model	R	R Square	Adj. R Square	Sig
Motivation and HOTS	00,723	00,523	0,522	0.000

Table 6 Regression equation of learning motivation relationship with HOTS

Model	B	t	Sig
Constant	21.890	3,883	.000
Motivation	1,147	.067	.000

Table 7 The emotional intelligence relationship with HOTS

Model	R	R Square	Adj. R Square	Sig
Emotional Intelligence and HOTS	00,790	0,643	0,642	0,000

Table 8 Regression equation the learning motivation relationship with HOTS

Model	B	t	Sig
Constant	18.482	4.349	0,000
Emotional Intelligence	1.106	21.887	0,000

Based on Table 5, it is known that there is a relationship between students' learning motivation and higher-order-level thinking skills in students at State High Schools in Majene Regency. Learning motivation plays a role in students' learning success. If students possess a high motivation for learning, learning will be carried out well, and high-level thinking skills will increase. In line with this by

Zamsir et al. (2021) at SMAN 4 Wangi-Wangi, the results showed that learning motivation significantly affects learning outcomes. Motivation to learn comes from within and outside; motivation to learn from within, such as the desire to be an intelligent child, to be able to make parents proud and a high level of curiosity, while motivation from outside, such as

encouragement from family, parents and teachers (Ramadhanti et al., 2022).

Based on Table 6, students' motivation to learn is not equally strong; students' intrinsic motivation and willingness to learn is stronger and does not depend on factors outside themselves. On the other hand, with students whose learning motivation is extrinsic, their willingness to learn depends on conditions outside themselves. This aligns with research Yunanti (2016), which found a positive relationship between learning motivation and learning outcomes in biology. A relationship between student learning motivation and learning outcomes was also found in research by Alhadi & Saputra, (2017), who found a significant relationship between learning motivation and student learning outcomes in chemistry subjects in the low category.

Based on the correlation coefficient value in Table 7, the relationship between Emotional Intelligence and higher-order thinking skills is in the strong category based on the R-value correlation coefficient guideline. Emotional intelligence has a significant role in achieving success in learning at school and communicating in society (Nurhayati et al., 2021). If someone can control and stabilize the emotions that arise within him, then it can be concluded that he is emotionally intelligent. Emotional intelligence is not based on intellectual intelligence but on character (Sukriadi et al., 2015). Someone successful is someone who can manage their own emotions and can adapt to the people around them. Research conducted by Anisha et al. (2020) states that a person's achievement of success in life is influenced by an emotional intelligence of approximately 80%.

Table 8 shows that students' high-level thinking skills increase along with their learning motivation. This is in line with research conducted by Rasam & Sari (2018), which states that teacher creativity will help deliver learning material to students so that students feel challenged, excited and not bored. The creativity of a good teacher is one of the causes of learning to be enjoyable for students. The same thing was also stated by Firmansyah (2015), who stated that the teacher is one of the main elements in the learning process and no one thing can replace the role of the teacher in the classroom as a teacher who transfers knowledge and as a guide who encourages students' potential in learning.

School facilities and infrastructure are also the cause of students' learning success. Facilities and infrastructure are essential in supporting the continuity of the learning process. The student's learning process will be affected without learning facilities and infrastructure that run less than optimally. This is also in line with research conducted by Alfatihah et al. (2021), which states that more adequate learning facilities and infrastructure can

make students, masters and schools directly connected.

The contribution of learning motivation and emotional intelligence to higher-order-level thinking skills for the research sample at State High Schools in Majene Regency was 65.5%. At the same time, the remainder was influenced by other variables not controlled in the research. The relationship between learning motivation and emotional intelligence with higher-order thinking skills is very strong. Learning motivation is a factor that influences student learning achievement, so the higher the learning motivation, the higher the learning achievement (Nowlan et al. 2023). Emotional intelligence is also essential in the learning process because it influences thinking skills that are essential for improving learning achievement.

Learning motivation and emotional intelligence are strongly related to students' higher-order thinking skills. This shows the synergy between learning motivation and emotional intelligence with higher-order-level thinking skills. In this case, learning motivation and emotional intelligence support each other in improving higher-order-level thinking skills.

Students' learning motivation significantly contributes to students' high-level thinking skills, where the better the students' learning motivation, the better the students' high-level thinking skills will be achieved. On the other hand, if students' learning motivation is not good, the results that students obtain will also be less good, which is also the same as emotional intelligence. Students' emotional intelligence significantly contributes to their high-level thinking skills, where the better their emotional intelligence, the better the high-level thinking skills students achieve. On the other hand, if students' emotional intelligence is not good, the results obtained by students will also be less good.

Learning motivation and emotional intelligence have a strong and significant relationship with students' higher-order thinking skills (Filgona et al. 2020). This shows the synergy between learning motivation and emotional intelligence with higher-order thinking skills (Sk & Halder, 2020). In this case, learning motivation and emotional intelligence support each other in improving students' higher-order-level thinking skills (Chang & Tsai, 2022). So if students' learning process has good motivation and emotional intelligence, then students will also have good higher-order thinking skills. This means that students have passion, encouragement, and enthusiasm for learning and can control their emotions during the learning process. This shows that students have good learning motivation and emotional intelligence. Meanwhile, when students can analyze a problem, evaluate it, and express something accompanied by evidence, they will have good higher-order-level thinking skills.

D. Conclusion

The results show that learning motivation and emotional intelligence can influence relationships or correlations to train HOTS in biology learning. The high-level thinking skills students possess can be one factor that can advance education in the 21st century. Recommendations for future research can be made by analyzing or developing factors or variables that influence relevant research results.

E. References

- Adawiyah, R., Irawan, F., Zubaidah, S., & Arsih, F. (2023, January). The relationship between creative thinking skills and learning motivation in improving student learning outcomes. In *AIP Conference Proceedings*, (Vol. 2569, No. 1, pp. 1-8). AIP Publishing. DOI: <https://doi.org/10.1063/5.0112425>
- Alfatihah, I., Nugroho, A. S., Haessel, E., & Maharani, A. (2021). The influence of work-life balance with work motivation as mediating factor on job satisfaction a prediction toward transition to new normal situation. *The Management Journal of Binaniaga*, 6(1), 79-94. DOI: <https://doi.org/10.33062/mjb.v6i1.431>
- Alhadi, S., & Saputra, W. N. E. (2017, May). The relationship between learning motivation and learning outcome of junior high school students in Yogyakarta. In *1st Yogyakarta International Conference on Educational Management/ Administration and Pedagogy (YICEMAP 2017)*, (pp. 138-141). Atlantis Press. DOI: <https://doi.org/10.2991/yicemap-17.2017.23>
- Anisha, S., Hartanto, I., Ahda, Y., & Darussyamsu, R. (2020). An analysis of high order thinking skills aspects on the assessment instruments in ecosyst topic for the 10th grade senior high school students. *Jurnal Atrium Pendidikan Biologi*, 5(1), 62-67. DOI: <https://doi.org/10.24036/apb.v5i1.6904>
- Bahri, A., Jamaluddin, A. B., Muharni, A., Fikri, M. J. N., & Arifuddin, M. (2021, May). The need of science learning to empower high order thinking skills in 21st century. In *Journal of Physics: Conference Series*, (Vol. 1899, No. 1, p. 012144). IOP Publishing. DOI: <https://doi.org/10.1088/1742-6596/1899/1/012144>
- Batubara, S., & Nugroho, R. R. (2021). Hubungan motivasi belajar dengan kemandirian belajar siswa kelas IX MTsN 28 Jakarta pada masa pandemi. *Guidance: Jurnal Bimbingan dan Konseling*, 18(1), 8-16. Retrieved from <https://uia.e-journal.id/guidance/article/view/1472>
- Chang, Y. C., & Tsai, Y. T. (2022). The effect of university students' emotional intelligence, learning motivation and self-efficacy on their academic achievement—online english courses. *Frontiers in Psychology*, 13(February), 1–11. DOI: <https://doi.org/10.3389/fpsyg.2022.818929>
- Dakhi, A. S. (2020). Peningkatan hasil belajar siswa melalui metode PAKEM. *Jurnal Education and Development Institut Pendidikan Tapanuli Selatan*, 8(2), 468–470. DOI: <https://doi.org/10.36418/japendi.v1i3.33>
- Filgona, J., Sakiyo, J., Gwany, D. M., & Okoronka, A. U. (2020). Motivation in learning. *Asian Journal of Education and Social Studies*, 10(4), 16–37. DOI: <https://doi.org/10.9734/ajess/2020/v10i430273>
- Firmansyah. (2015). Peningkatan hasil belajar siswa dalam pembelajaran matematika menggunakan teori bruner di sekolah dasar. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, 4(7), 1–12. DOI: <https://dx.doi.org/10.26418/jppk.v4i7.10724>
- Goleman, D. (2006). *Emotional intelligence the 10th anniversary edition*. New York: Bantam Dell A Division of Random House, Inc. Retrieved from <https://asantelim.wordpress.com/wp-content/uploads/2018/05/daniel-goleman-emotional-intelligence.pdf>
- Ichsan, I. Z., Sigit, D. V., Miarsyah, M., Ali, A., Arif, W. P., & Prayitno, T. A. (2019). HOTS-AEP: higher order thinking skills from elementary to master students in environmental learning. *European Journal of Education Research*, 8(4), 935–942. DOI: <https://doi.org/10.12973/eu-jer.8.4.935>
- Lestari, W., Widadah, S., & Ayuningtyas, N. (2022). Kemampuan berpikir kritis dalam menyelesaikan soal pisa ditinjau dari tingkat kecerdasan emosional. *Musamus Journal of Mathematics Education*, 4(1), 30–42. DOI: <https://doi.org/10.35724/mjme.v4i1.3861>
- Mahanal, S. (2019). Asesmen keterampilan berpikir tingkat tinggi. *Jurnal penelitian dan pengkajian ilmu pendidikan: E-Saintika*, 3(2), 51-73. DOI: <https://doi.org/10.36312/e-saintika.v3i2.128>
- Mursidah, S., Susilo, H., & Corebima, A. D. (2019). Hubungan antara keterampilan berpikir kritis dan keterampilan berkomunikasi dengan retensi siswa dalam pembelajaran biologi melalui strategi pembelajaran reading practicing questioning summarizing and sharing. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 4(8), 1071-1076. DOI: <https://doi.org/10.17977/jptpp.v4i8.12676>
- Nasrul, A. R., Hobri, H., & Oktavianingtyas, E. (2019). Analisis kemampuan berpikir tingkat tinggi siswa sekolah menengah pertama di jember dalam menyelesaikan soal peluang pada pembelajaran berbasis lesson study learning community berdasarkan kecerdasan emosional. *Kadikma*, 10(1), 1-12. DOI: <https://doi.org/10.19184/kdma.v10i1.11653>
- Nowlan, N., Arya, A., Qorbani, H. S., & Abdinejad, M. (2023). Higher-order thinking skills assessment in 3D virtual learning environments using motifs and expert data. *Computers & Education: X Reality*, 2, 100012. DOI: <https://doi.org/10.1016/j.cexr.2023.100012>

- Nuha, R. A., & Pedhu, Y. (2021). Hubungan antara kecerdasan emosional dan kemampuan berpikir kreatif mahasiswa program studi bimbingan dan konseling. *Jurnal Psiko Edukasi*, 19(2), 128–139. Retrieved from <https://ejournal.atmajaya.ac.id/index.php/psikoedukasi/article/view/3430>
- Nurhayati, L., Maula, L. H., & Nurasiah, I. (2021). Kecerdasan emosional dan kemampuan berpikir kritis pada materi bangun datar di kelas tinggi sekolah dasar. *Mimbar Ilmu*, 26(2), 274–280. DOI: <https://doi.org/10.23887/mi.v26i2.36919>
- Primahesa, A., Sajidan, S., & Ramli, M. (2023). Improving higher order thinking skills in high school biology: a systematic review. *Biosfer: Jurnal Pendidikan Biologi*, 16(1), 206–218. DOI: <https://10.21009/biosferjpb.26724>
- Rafiola, R. H., Setyosari, P., Radjah, C. L., & Ramli, M. (2020). The effect of learning motivation, self-efficacy, and blended learning on students' achievement in the industrial revolution 4.0. *International Journal of Emerging Technologies in Learning*, 15(8), 71–82. DOI: <https://doi.org/10.3991/ijet.v15i08.12525>
- Ramadhanti, A., Kholilah, K., Fitriani, R., Rini, E. F. S., & Pratiwi, M. R. (2022). Hubungan motivasi terhadap hasil belajar fisika kelas X MIPA di SMAN 1 Kota Jambi. *Journal Evaluation in Education*, 3(2), 60–65. DOI: <https://doi.org/10.37251/jee.v3i2.246>
- Rasam, F., & Sari, A. I. (2018). Peran kreativitas guru dalam penggunaan media belajar. *Research and Development Journal of Education*, 5(1), 95–113. DOI: <http://dx.doi.org/10.30998/rdje.v5i1.3391>
- Reski, A., Taiyeb, A. M., & Nurhayati, B. (2022, July). Hubungan motivasi dan kemandirian belajar dengan hasil belajar biologi peserta didik kelas XI SMA Negeri di Kabupaten Bulukumba. In *Prosiding Seminar Nasional Biologi dan Pembelajarannya*, (Vol. 10, pp. 230–239), Universitas Negeri Makassar, Makassar. Retrieved from <https://ojs.unm.ac.id/semnasbio/article/view/40925>
- Saputri, W., Corebima, A. D., Susilo, H., & Suwono, H. (2020). Qasee: A potential learning model to improve the critical thinking skills of pre-service teachers with different academic abilities. *European Journal of Educational Research*, 9(2), 853–864. DOI: <https://doi.org/10.12973/eu-jer.9.2.853>
- Siburian, J., Corebima, A. D., Ibrohimi, I., & Saptasari, M. (2019). The correlation between critical and creative thinking skills on cognitive learning results. *Eurasian Journal of Educational Research*, 2019(81), 99–114. DOI: <https://doi.org/10.14689/ejer.2019.81.6>
- Sk, S., & Halder, S. (2020). Critical thinking disposition of undergraduate students in relation to emotional intelligence: Gender as a moderator. *Heliyon*, 6(11), e05477. DOI: <https://doi.org/10.1016/j.heliyon.2020.e05477>
- Sri, N. P., Alam, R., & Nurhayati, B. (2022, July). Hubungan kecerdasan emosional, kecerdasan adversitas dan kepercayaan diri dengan hasil belajar biologi peserta didik SMA Negeri 5. In *Prosiding Seminar Nasional Biologi dan Pembelajarannya*, (Vol. 10, pp. 177–186), Universitas Negeri Makassar, Makassar. Retrieved from <https://ojs.unm.ac.id/semnasbio/article/view/40914>
- Sukriadi, S., Kartono, K., & Wiyanto, W. (2015). Analisis hasil penilaian diagnostik kemampuan berpikir kritis matematis siswa dalam pembelajaran PMRI berdasarkan tingkat kecerdasan emosional. *Unnes Journal of Mathematics Education Research*, 4(2), 139–145. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujmer/article/view/9841>
- Udayar, S., Fiori, M., & Bausseron, E. (2020). Emotional intelligence and performance in a stressful task: The mediating role of self-efficacy. *Personality and Individual Differences*, 156, 109790. DOI: <https://doi.org/10.1016/j.paid.2019.109790>
- Utami, N. A., Murtianto, Y. H., & Nizaruddin, N. (2020). Profil kemampuan representasi matematis ditinjau dari kemampuan berpikir kritis dan kecerdasan emosional. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, 11(2), 274–285. DOI: <https://doi.org/10.26877/aks.v11i2.6501>
- Wijnen, F., Walma van der Molen, J., & Voogt, J. (2023). Primary teachers' attitudes towards using new technology and stimulating higher-order thinking in students: a profile analysis. *Education and Information Technologies*, 28(6), 6347–6372. DOI: <https://doi.org/10.1007/s10639-022-11413-w>
- Yachsan, S., Aziz, A. A., & Junda, M. (2019). Pengaruh model pembelajaran discovery learning terhadap keterampilan berpikir kritis dan hasil belajar kognitif biologi peserta didik pada materi sistem koordinasi. In *Prosiding Seminar Nasional Biologi VI: Harmonisasi Pembelajaran Biologi pada Era Revolusi 4.0*, (pp. 674–679). Retrieved from <https://ojs.unm.ac.id/semnasbio/article/view/10636>
- Yunanti, E. (2016). Hubungan antara kemampuan metakognitif dan motivasi belajar dengan hasil belajar biologi kelas IX MTS N metro tahun pelajaran 2013/2014. *BIOEDUKASI Jurnal Pendidikan Biologi Universitas Muhammadiyah Metro E*, 7(2), 81–89. DOI: <http://dx.doi.org/10.24127/bioedukasi.v7i2.609>
- Zamsir, Prajono, R., & M., S. S. (2021). Pengaruh motivasi dan persepsi kesadaran terhadap hasil belajar matematika siswa kelas XI SMAN 4 Wangi-Wangi. *Jurnal Jendela Pendidikan*, 01, 134–148. DOI: <https://doi.org/10.57008/jjp.v1i03.22>
- Zulyusri, Elfira, I., Violita, V., & Santosa, T. A. (2022). Meta-analysis study: Correlation study of the influence of motivation on student learning outcomes. *International Journal of Education and literature (IJEL)*, 1(3), 34–45 DOI: <https://doi.org/10.29303/jppipa.v9iSpecialIssue.6422>