

Problem-Based Learning dan Creative Thinking Skills Students Based on Local Wisdom in Maluku

Pamella Mercy Papilaya¹, Prelly Marsell J. Tuapattinaya²

¹ Biology Education Study Program, Faculty of Teacher Training and Education, Universitas Pattimura, Ambon, Indonesia; e-mail: papilayapamellamercy01@gmail.com

² Biology Education Study Program, Faculty of Teacher Training and Education, Universitas Pattimura, Ambon, Indonesia; e-mail: prelly_tuapattinaya@yahoo.co.id

ARTICLE INFO

Keywords:

Creative thinking skills;
Local wisdom;
Problem Based Learning.

Article history:

Received 2021-11-27

Revised 2021-12-23

Accepted 2022-04-10

ABSTRACT

In learning conservation biology with online learning communities, lecturers usually guide their students through a discussion-based learning process. In theory, mixed learning can increase interaction in the learning environment. Effective learning is promoted through flexibility, enabling the use of various student learning styles. This study aimed to 1) describe students' creative thinking skills about local wisdom on small islands in Maluku; 2) know the differences in creative thinking skills of experimental class students (using problem-based learning and conventional classes on small islands in Maluku; and 3) knowing differences in students' creative thinking skills on the topic of different local wisdom in small islands in Maluku. This research used the development of 4D Model teaching materials, field lectures, and online-based discussions. The data were analyzed descriptively, and the level of development of the 4D model combined with the student's PBL was evaluated using the normalized N-Gain <g>, while the quantitative data were analyzed through the ANCOVA test. The research findings reveal that competitive and facilitator styles significantly mediated the relationship between technology user acceptance and mixed learning on students' creative thinking skills. One of the weaknesses found in this study was the geographical differences between the islands. The internet facilities owned by students were not evenly distributed, and the needs of media were various. Blended learning was somewhat challenging to be applied in optimal learning. Scaffolding was given to students to concentrate more on education and independent activities. According to students, problem-based learning, creative thinking, finding information, and writing reports were problem-solving features that contributed the most to student learning.

This is an open access article under the [CC BY-NC-SA](#) license.



Corresponding Author:

Pamella Mercy Papilaya

Biology Education Study Program, Faculty of Teacher Training and Education, Universitas Pattimura, Ambon, Indonesia; e-mail: papilayapamellamercy01@gmail.com

1. INTRODUCTION

21st Century Learning is learning designed for the 21st-century generation to keep up with the latest technological developments. It is primarily in the realm of communication that has entered the joints of students' lives (OECD, 2019). Students are required to master the four learning skills (4C). It is said that the 21st century is a century that demands quality in all human endeavours and results. The 21st century naturally requires quality human resources produced by professionally managed institutions to produce superior results (Azizi, 2019). These all-new demands call for breakthroughs in thinking, drafting concepts, and actions. In other words, a new paradigm is needed in dealing with new challenges. If these new challenges are faced using the old paradigm, all efforts will fail. The new challenge demands a breakthrough thinking process. If desired, the quality output can compete with the work in an open world (Huda, N., Irsan Pawannei, 2020).

Biology learning in the 21st century is marked by information and communication technology in all aspects of life, including in the learning process that empowers students to think at a higher level. It motivates teachers to carry out the learning process following the learning needs of the 21st century, including educating students to become critical thinkers and problem solvers and be creative, innovative, communicative, and collaborative (Živković, 2016). Teachers must be knowledgeable and able to change the paradigm that focuses not only on the content but also on developing creativity and independent learning skills (Ahmed et al., 2021).

Universities are often criticized for failing to produce graduates with adequate skills or expertise in creativity or innovation (Papaleontiou-Louca et al., 2014). The skills and attitudes are needed for graduates to be productive. Higher education institutions must adapt curriculum developments focusing on flexibility, adaptive skills and attitudes that support creativity and innovation (Nambiar et al., 2019). Creative thinking includes many higher-order thinking skills such as observation, discovery, analysis, hypothesis generation, testing, problem-solving, and communication (Türkmen & Sertkahya, 2019).

Maluku has an ecosystem with high biodiversity richness (Indonesia Hametin Associates Hanom Bashari Meabh Cryan Jihad Hilda Lionata et al., 2014). Therefore, it is essential to take a biodiversity inventory to detect, monitor, measure and predict fluctuations in the diversity register and the implications of its changes on ecosystem function. Integrating local wisdom in conservation biology learning is one way to bring the concept of local wisdom into the application of problem-based learning models to improve critical thinking skills. (Park, 2019). Maluku has a lot of local wisdom related to biodiversity conservation, bringing nature closer to the indigenous people of Maluku (Renjaan et al., 2013). The local wisdom also relates to attitudes, knowledge, policies, and decision-making regarding resolutions to achieve social harmony and ecosystem balance. It can be achieved through learning that prepares Indonesian people to meet advances in information and communication technology in social life.

Local wisdom-based education teaches students to be attached to the concrete situations they face permanently. Local wisdom as a learning resource is a crucial component in biology learning. It will increase students' awareness of local potential and wisdom. In problem-based learning, students use triggers from the case or problem scenarios to determine their own learning goals. Thus, problem-based learning is not solving problems alone but using appropriate problems where students are the centre of learning (Servant-Miklos, 2019). The strength of the teaching and learning process can be found in the learning process through a direct approach by students, where scientific facts and ideas are taught directly but are still integrated into the scientific process to increase students' knowledge and understanding (Burgess et al., 2018).

Integrating the concept of local wisdom into conservation biology based on problem-based learning provides ecological benefits to students in building awareness of local wisdom, demonstrating a harmonious relationship between humans and their natural environment. The problem-based learning model provides opportunities for students to build knowledge actively and communicate their thoughts through discussion and writing, enabling them to master concepts, improve learning outcomes, and make learning more meaningful and environmental management efforts. (Chu et al., 2017).

Group discussions in the network become a source of motivation for students to innovate. Teamwork projects force outstanding students to compensate those who are less willing to put in the effort. Online group discussions encourage productive collaboration and sharing of ideas among students. Lecturers and students must understand what the discussion group project needs to be completed and the learning objectives' steps. Many of the fundamental characteristics of learning projects in the discussion are successful online (Coman et al., 2020). Collaborative blended learning increases student interest when technology is integrated into on-campus lessons. Learners tend to be interested, focused, and passionate about what they learn while increasing information retention (Giatman et al., 2020). Engagement and interaction with natural resources keep students focused for a more extended period than with books or paper resources. This engagement also helps develop learning through exploration and research (Kundu et al., 2021).

Collaborative blended learning provides autonomy for students in using E-Learning materials to improve their ability to set appropriate learning goals and take responsibility for their learning. This ability development can be translated into all subjects or courses (Ginaya, 2018). Blended learning instils the self-advocacy disposition of students to be independent and responsible, track individual achievements, help develop the ability to find resources or get the help they need, and support themselves so they can achieve their goals (Boelens et al., 2018).

Actualizing scientific progress to student-teacher candidates through process skills will help them improve activity-oriented skills, cognition and psychomotor skills and encourage the development of problem-solving (Khoiriyah & Husamah, 2018). The application of problem-based learning is one of the learning models that can improve creative thinking skills and encourage problem-solving abilities and student learning outcomes (Yew & Goh, 2016). In addition, the development of current learning models such as cooperative learning and scientific constructivist will help students to work together in groups and exchange ideas that cause other students to have the right to give assessments to fellow students because they experience the learning process together (Saputra et al., 2019). Applying the problem-based learning model involves students in the learning process by conducting experiments and gaining more meaningful knowledge (Seibert, 2020). The study results (Nadeak & Naibaho, 2020) prove that applying the Problem-based learning model is practical and engaging in learning concepts so that students can overcome their natural misunderstandings and encourage student activity to improve students' critical thinking. Students must also understand the process of a phenomenon through practical activities to build knowledge based on their own experiences and improve science process skills (Maison et al., 2019).

In the era of the 21st century, learning based on local wisdom in small islands in Maluku is starting to be seen as innovative learning with great potential, which explores community activities in an area that is considered sustainable and original. Through learning based on local wisdom in small islands in Maluku, students' creative thinking and problem-solving abilities will increase so that in the future, they will become cultured individuals and become agents in transferring culture to the next generation.

Some examples of scientific concepts or principles contained in local wisdom on small islands in Maluku include 1) Tipar mayang sageru in Allang village, Ambon island; 2) Production of pure coconut oil on the island of Seram; 3) Processing of Inaskua in the district of Teon Nila, Serua, Central Maluku; 4) Making brown sugar in Ihamahu village, Saparua island; and 5) Making Taiminya coconut in the village of Latuhalat, Ambon island. Some of these concepts are only a small part of local wisdom that can be studied as a source of learning. If it is developed, it will be vital for the creative economy in the tourism sector to support the city of Ambon as a music-based creative world city. Learning using

problem-based learning and creative thinking based on local wisdom in small islands in Maluku is still relatively minimal or even non-existent. On average, exploring creative thinking skills is still generally oriented towards general learning. It has not explicitly led to the culture in Maluku. With the implementation of this research, a more in-depth and broad exploration of local wisdom in small islands in Maluku is carried out to improve students' problem-solving and creative thinking skills.

2. METHOD

This research is a survey and development research. Survey research was conducted to identify the content of local wisdom on small islands in Maluku. In addition, a survey of creative thinking skills of students in Maluku was conducted to complete the existing data on creative thinking skills. Furthermore, development research (R & D) with a 4-D development model consists of 4 main stages, namely: Define, Design, Develop and Disseminate, according to Thiagarajan (1974) (Lawhon, 1976). The Four-D model was then applied using the Problem Based Learning Application-oriented to promote Maluku's natural resource processing which was developed and tested on students collaborating with Blended learning. Students also make field observations at natural resource processing sites. Then report the research results through online discussions via Zoom or via WhatsApp. This design aimed to obtain quantitative and qualitative data. Therefore, qualitative and quantitative data complement each other to understand the problem better. Quantitative data was obtained through quasi-experimental research. The Four-D model combined with problem-based learning is an independent variable and a different topic of local wisdom. At the same time, students' creative thinking ability is the dependent variable.

In general, the population in this study were students of the Biology Education study program at Pattimura University, which offered conservation biology courses totalling 135 students from the 2019/2020 class, divided into 5 classes with different topics of local wisdom by purposive sampling. Expert validators for research tools and instruments were three professors of education experts.

Instruments in development research were: a) Product development validation sheets, b) Questionnaires and interview sheets with village heads/community leaders, and field notes. c) Questionnaire responses from students, lecturers/practitioners on the individual, small group, and broad-scale trials. d) Quantitative data measurement instruments that consist of pretest and posttest questions of critical, creative thinking skills. The concept understanding test instrument refers to the rubric developed by (Furtak et al., 2010), which includes four aspects: not conceptual, no logical conceptual, conceptually based on data, conceptually based on evidence, and logical and sequential conceptual based on inductive-rules deductive. The indicators of creative thinking used are fluency, flexibility, originality, and elaboration (Sy, 2006).

The application of problem-based learning with the stages of applying following the procedure adapted from (Tang et al., 2020), namely: (1) Determine the problem in processing Maluku's natural resources, (2). Make the correct problem statement, (3). Identify the information needed to understand the problem, (4). Identify resources to collect information, (5). Generate possible solutions, (6). Analyze solutions, and (7). Present solutions orally and in writing. Critical thinking ability is measured using six indicators developed (Ennis, 2015). The critical thinking ability that is measured consists of six indicators, namely (1) Focus, ; (2) reasons, (3) conclusion, (4) situation, (5) Clarity, and (6) thorough examination. Student explanations were further categorized into four categories, namely True/correct (B), Fairly accurate/partially correct (C), Less true/partially incorrect (K), and False/incorrect (S).

Qualitative data were analyzed descriptively in this study. The level of development of the application of the Four-D Model combined with student problem-based learning was evaluated by normalizing N-Gain $<g>$. At the same time, quantitative data were analyzed through the covariance test (ANCOVA) in SPSS 20. The prerequisite test used Normality and Homogeneity tests showed normal distribution. The results reveal that the data are typically distributed and homogeneous.

3. FINDINGS AND DISCUSSION

The study of local wisdom in Maluku is significant for the richness of flora and fauna known for centuries. However, many have been in the critical and endangered category. Flora and fauna are exploited to improve the community's economy. Maluku's natural resources are ecologically vulnerable to erosion of genetic resources, causing irreversible and irreplaceable resource damage (Heindorf et al., 2021; Leunufna & Evans, 2014). Various threats to biodiversity must become environmental awareness and knowledge of various related parties. One of them is through the inheritance of local knowledge. There is a close relationship between action and environmental awareness from an educational point of view (Anggraeni & Mundilarto, 2020; Dewi et al., 2017)

The research results on students' creative thinking skills were based on student observations and documentation on processing local wisdom in collaboration with Blended learning, on small islands in Maluku, on five topics that can be explained. It is included tipar mayang sageru in Alang village, Central Maluku as shown in Figure 1.

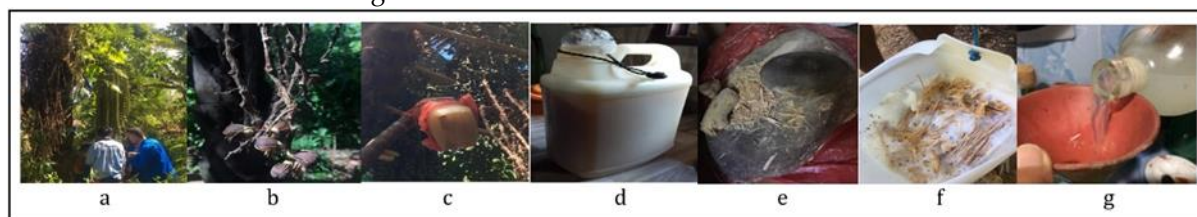


Figure 1 Results of observation and documentation of local wisdom by students. The stage of Tipar Mayang Sageru in Alang Maluku Village, Central Ambon Island

Note

- a. Male flower cob
- b. The mayang tree is spun into rope
- c. The sageru in the mayang tree is tapped
- d. Sageru from the mayang tree that has been accommodated in the gene
- e. Medicinal wood soaked in sageru to make the sageru more delicious
- f. Medicinal wood soaked in mayang sap
- g. Sageru mayang drink is ready to be tasted

In the focus phase of problem formulation, students use teaching materials. These journal articles are appropriate to the website and conduct field observations. The concept building mechanism is not an easy process. Students find it quite difficult to relate the concepts given in scenarios to natural conditions in the field. However, when learning activities use problem-based learning, it helps them. There is openness, criticism, suggestions, assistance, and tolerance among students which helps in group dynamics. Problem-based learning is used to stimulate higher-order thinking in problem-oriented situations, including learning that uses real-world problems as a context (Matilainen et al., 2021).

Based on the analysis of the problem formulation responses by students and the results of the presentation of field research reports. Several differences were found in formulating their research problems. The following shows the results of student work related to the problem formulation process to answer the question "Formulate the problem of the research you are doing." Students' answers were presented in Figures 2, 3 and 4. Problem-based learning was found in the experimental class. Student activities began with a small group brainstorming session to define the problem and determine what they knew about the problems that occurred in the field.

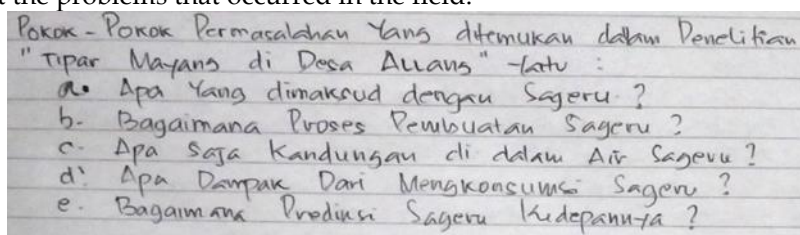


Figure 2 Students' ability to formulate sageru research problems

In Figure 3, it can be seen that students can find and inform their understanding collaboratively in presentations about their findings related to the facts found and feasible solutions in responding to future challenges. From a perspective, students can interact with group members through problem-based learning to develop critical thinking in processing information (Nadeak & Naibaho, 2020). The questions posed are as follows. "Describe what facts are found based on different points of view in your research. The explanation of the student's thoughts is shown in Figure 3.

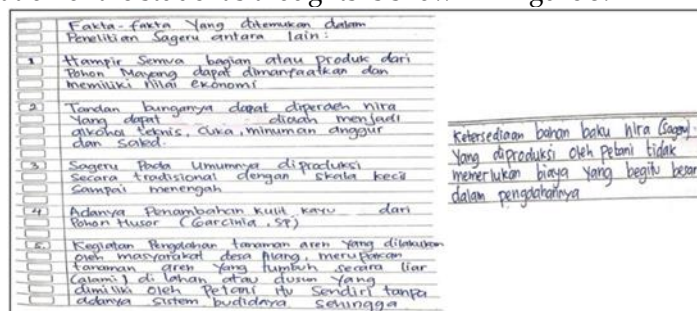


Figure 3 Facts stated by students in sageru research

Groups of students who learn to use problem-based learning provide logical, relevant, and accurate argument responses to their research. The question proved this asked of them, namely, "give a logical response to your argument against the research you are doing." Student responses in Figure 5 are as follows. Sageru has the opportunity to be used as an alternative energy substitute for fuel. Sageru oil can be produced from approximately 70 Mayang trees, producing 13 litres per tree with a sugar concentration of 11%. If converted into ethanol, the volume of bioethanol produced is 24,000 litres of fuel per hectare per year. This number is equal to 82 barrels per day. Students expressed their critical thinking skills. At this stage, students had given critical thoughts about arguments and predictions related to the economic processing of sageru natural resources. The arguments developed by students provide insight to generate new hypothetical ideas and develop different new research ideas (Iordanou & Rapanta, 2021).

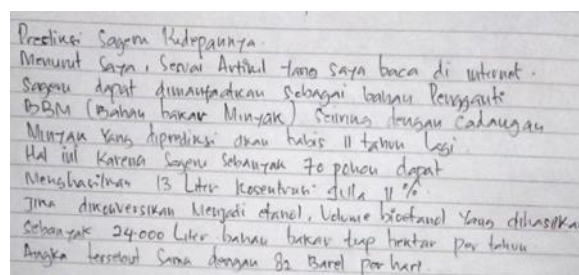


Figure 4 Records of student arguments regarding the development of future Sageru based on research results

The results showed that the value of the presentation of responses to questions in understanding local wisdom of Maluku natural resources was mainly categorized into suitable, sufficient and moderate levels. Also, some students did not even answer at all. After receiving treatment, students could perform better. However, the frequency of student responses using Problem-based learning in collaboration with blended learning had a more profound and higher understanding in the experimental class (Problem based learning) than in the control class (conventional). As shown in Figure 3, students achieved creative thinking skills at an in-depth level or the topic of tipar mayang sageru in Allang village, Central Maluku. The responses to questions in understanding local wisdom of Maluku's natural resources and student hypotheses are depicted in Figure 6.

The results showed that students' creative thinking skills, especially responses to local wisdom problems, showed good critical thinking skills, as shown in Figures 3,4,5 and 6. In working as a team,

students' need for teamwork skills is critical. Social skills required for teamwork and the relevance of control over the number of students in a group, basic social skills, or student academic level are factors that need to be considered (Hyun et al., 2020). To improve students' ability in understanding the problems discussed, their analytical skills need to be developed in formulating questions, then selecting and developing solutions, designing projects to foster the ability to evaluate results and apply feedback (Darling-Hammond et al., 2020)

Based on the N-gain test results, the lowest average pre-test N-gain scores of the experimental and conventional classes were 48 and 46, respectively. The difference in average between them was 2.0. The highest post-test score from the experimental class (Problem based learning) was higher than the conventional one. Likewise, the Problem-based learning group (50.55) was higher than the conventional one (18.64). The results of the calculation of the N-gain test are shown in Table 1.

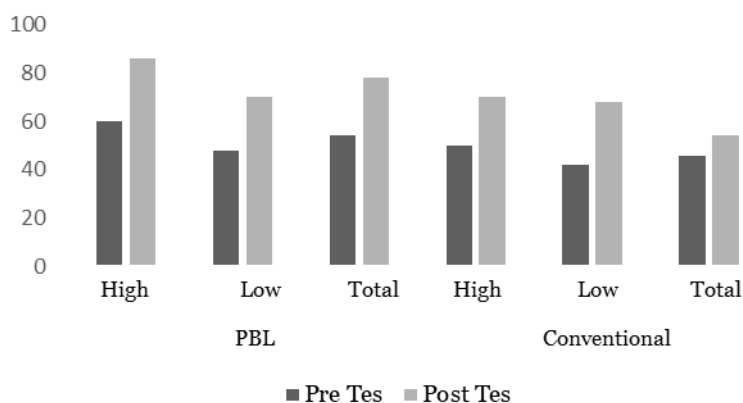


Figure 5 Comparative graph of student responses to the results of observing local wisdom using online problem-based learning

Table 1 The results of the description of the students' pretest, post-test, and N-Gain

Statistic Description	PBL Group		Conventional Group	
	Pre-test	Post-test	Pre-test	Post-test
Highest test score	67	86	61	70
Lowest test score	48	70	46	62
N-gain score		61.43		37.73
Maximum		26.67		6.25
N-gain Score Minimum				
Average		50.55		18.64

Although the students' pre-existing knowledge is still far from what is expected, the problem-based learning process helped them gain knowledge about local wisdom that did not come from their respective areas of origin. From the results of the analysis of the N-Gain value, it was revealed that the overall N-Gain value of the experimental group was higher (31.91) than the control group. Likewise, the results of the LSD test also show that problem-based learning is more effective than conventional learning models. It was also assisted with technology and information systems (learning in the network). In the last century, there has been a significant shift from manufacturing services to services in the learning process that emphasize more information and knowledge on problem-based learning which grows and expands exponentially (Hestiana & Rosana, 2020). Information and communication technology has changed the way of learning, the nature of the work that can be done, and the meaning of social relationships (Hamburg, 2020). Shared decision making, information sharing, collaboration, innovation, and speed of work are fundamental aspects at this time (Jeng et al., 2020)

The results of the ANCOVA test of students' critical thinking skills on five topics of Maluku Local wisdom in collaboration with Blended learning showed that problem-based learning affected students'

critical thinking skills ($p < \text{sig. } 0.05$). Likewise, differences in bio conservation topics affect students' critical thinking skills. The results of the ANCOVA test on students' critical thinking skills towards Maluku Local wisdom collaborating with Blended learning are shown in Table 2.

Table 2 Creative thinking skills about local wisdom using problem based learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1320.217 ^a	5	264.043	12.636	.000
	55.371	1	55.371	2.650	.106
ProblemBasedLearning	672.099	1	672.099	32.165	.000
Topik_LocalWisdom	582.781	4	145.695	6.973	.000
Error	2695.531	129	20.896		
Total	814937.000	135			
Corrected Total	4015.748	134			
a. R Squared = .329 (Adjusted R Squared = .303)					

Meanwhile, the post hoc test results of students' creative thinking abilities are presented in Table 3. Table 3 shows a significant difference between them through the results of the LSD follow-up test.

Table 3 LSD test results

Topik Local wisdom	Mean	Notasi
Tipar mayang <i>sageru</i>	81.3704	a
Making Coconut <i>taiminya</i>	77.5556	b
Making brown sugar	77,1852	b
Pure coconut oil production	76.8148	c
<i>Inaskua</i> fish making	745926	d

The results of the analysis in Table 3. show that different notation Problem-based learning and local wisdom topics in Maluku have different effects in improving students' critical thinking skills.

The ANCOVA and LSD tests show students' critical thinking skills on different topics using problem-based learning. The difference in critical thinking skills between experimental class students and conventional class students occurred because students are required to develop thinking processes and find out the meaning of processing local Maluku natural resources being studied at each stage of learning with the problem-based learning model. With problem-based learning, students must be proactive in learning, not only copying, following the teacher's line of thought, and not just following examples of habituation that occur in society without knowing its meaning. In addition, students also have high motivation to track literature through teaching materials, libraries and the internet. Problem-based learning improves students' higher-order thinking and problem-solving skills (Spector & Ma, 2019).

The results also showed that most problem-based learning (experimental) class students achieved a deep understanding of local wisdom. It may stem from the class features of problem-based learning, which allow students to develop their thinking processes. Thus, encouraging them to think deeply and independently allows the experimental group to construct their knowledge. Problem-based learning also helps students understand local wisdom concerning biological concepts (Hadi & Manurung, 2019).

Problem-based learning models can also help students develop their mental models in group and individual learning to solve problems (Scott, 2017). In addition, problem-based learning is more efficient in facilitating student learning independently or collaboratively than conventional learning methods (Baeten et al., 2010). Collaboration allows students to communicate better and achieve higher levels of cognitive skills (Carter et al., 2019). Problem-based learning as a learning model facilitates the development of students' higher-order thinking skills and problem-solving (Phungsuk et al., 2017). Thus, problem-based learning is different from conventional learning methods, which only direct

students to memorize knowledge. Collaboration helps construct knowledge and solve problems in groups. Therefore, students can express their ideas broadly and profoundly and negotiate their solutions in their groups. The collaboration also elaborates their biological knowledge on biochemistry, plant and animal physiology and biodiversity. Furthermore, it can equip students with high academic abilities and complete their learning.

The findings in this study also show that to understand the wealth of natural resources in Maluku, students are encouraged to play an active role in groups. Collaboration between students who pursue each other's success, encourage each other to do homework and learn to work together regardless of ethnic background or whether they are male or female, wise or struggling, disabled or not, is still rare. (Altun, 2015).

Problem-based learning is essential in learning biology. The concept of biology consists of a particular way of thinking. It uses specific terminology to talk about biological phenomena and processes (Verhoeff et al., 2018). In applying problem-based learning, students must predict in real-time, observe demonstrations, and finally discuss the results with peers to generate their conceptual knowledge through reconciliation and negotiation between their previous knowledge and new experiences. In this condition, it is necessary to provide scaffolding by the lecturer in the form of questions, directions, instructions, warnings, encouragement, giving examples, giving instructions, and steps on how to work on questions that allow students to increase their understanding very much need. (Kim et al., 2019).

The results also show that through problem-based learning, students not only strengthen teamwork, communication, and research skills but also sharpen critical thinking and problem-solving skills, which are essential for their contextual learning; lecturers only act as facilitators (Major & Mulvihill, 2018; Thorndahl & Stentoft, 2020). The ability of students to formulate research problems is quite varied because the ability to reason and express ideas in critical thinking is quite varied. Lecturers need to do scaffolding on the low ability of students to understand each content in the research. Students' difficulty formulating research problems is influenced by several internal factors such as intelligence, motivation, achievement, cognitive abilities, and external factors such as curriculum, learning models, internet networks and students' ability to master technology and information. (Clarindo et al, 2020; Valdez & Sobremisana, 2021).

The application of problem-based learning motivates students to play an active role in groups having an excellent understanding of formulating problems according to the specified topic. The nature of the concepts studied is related to the difficulty of understanding, adequate basic knowledge, motivation, concentration, curriculum load, and language affect students' ability to follow the lecturer's explanation (van Peppen et al., 2018). The development of problem-based learning facilitates conceptual changes and their effectiveness in students' understanding of certain basic concepts and principles (Winarno et al., 2017), for example, the basic principles in biology material. Better conceptualization is fundamental and allows students to retain these new conceptions in their long-term memory (Patterson & Xu, 2020). Learning achievement is also a self-perception of the success of one's academic goals (Herodotou et al., 2019).

The results showed that students still faced difficulties explaining the facts of natural resource processing. Several factors also influence, among others, the ability to communicate. Language also affects information. Local wisdom is part of the culture of a Maluku society that cannot be separated from the language of the community itself. Along with the times, local cultural values are quickly left behind with modernity and sophistication. It makes the students' understanding of local history and cultural traditions increasingly depleted (Framujiastri et al., 2020; Selasih & Sudarsana, 2018). Students still need to do a library search to find out the scientific name of the plant used to give a bitter-sweet taste to the Sageru drink. Some of the weaknesses found in this study are the geographical differences of the islands, the internet facilities owned by students are not evenly distributed, and the various needs of media. Furthermore, another weakness may come from the learning strategy that does not facilitate problem-solving skills by students. Scaffolding is given to students to concentrate more on learning

and independent activities. Students need to understand the concepts or principles of physics and chemistry in the processing of Sageru.

The ability of students to predict and their reasons for natural phenomena has been done well. However, there is still scaffolding provided by the lecturer. On the subject of collaborative learning skills students in terms of verbal and nonverbal behaviour have shown a reasonably high intensity of practicing skills in student groups through integrating collaborative and cooperative behaviour in groups and performing collaborative and cooperative behaviour independently (Vladova et al., 2021). The ability of students to express ideas is influenced by the resilience of students in searching for literature from libraries, the internet, and journals as study material for discussing research variables and as a basis for formulating research hypotheses (Wang et al., 2020). The research findings reveal that competitive and facilitator styles significantly mediate the relationship between technology user acceptance and mixed learning on students' creative thinking skills. Local knowledge benefits the defense and development of biodiversity, so it should be passed on to the next generation. Inheritance of local knowledge is significant because as one of the wealth of knowledge from ancestors who are vital partners to solve problems of hunger, malnutrition, and food insecurity (Habibi, 2018).

Problem-based learning stimulates students to exhaust their minds and express their thoughts in written form, namely mathematical statements about the solution of a problem. The problems trigger and motivate students to think hard so that critical thinking skills arise in students (Gaol et al., 2019). This stimulus made the nerves of the student's brain work. In the realm of thought, students were not spoiled with ready-made food, but students were treated to bait that made them struggle to process their reasoning. Because this is done repeatedly, a critical brain work habit is formed. It means that learning has built critical thinking skills in students (Najjar et al., 2021).

Problem-based learning facilitates students to collaborate usefully to build knowledge, solve problems in their groups. Students have the opportunity to express their ideas, broadly and deeply, and negotiate their solutions in their groups. Furthermore, it equipped students with high academic abilities and complemented their academic learning. Problem-based learning has invited students to investigate and analyze experimental results and train students to solve problems based on data. This learning helped students develop problem-solving skills in daily processing local Maluku natural resources. This study indicates an increase in creative thinking skills in solving problem-solving problems in managing Maluku's natural resources.

Although there are better opportunities to improve problem-solving approaches, the findings of this study indicate that there are still students who have not implemented problem-based learning optimally. This happens because some students have still not been able to analyze problems qualitatively in the problem-solving process, such as simplifying the flow of mapping the concept of processing Maluku's natural resources and describing problems that are important aspects in starting the problem-solving process. The results of this study support research which states that qualitative problem analysis is a critical factor in problem-solving, and students often have difficulty doing this (Franco et al., 2018). Qualitative analysis of concept mapping is included in problem-solving solutions to understand the problem better and visualize the problem (Woldeamanuel et al., 2020).

Many students have not optimally undergone problem-based learning in the problem-solving process of processing Maluku's natural resources because students do not understand the concept. One of the factors that influence the approach used by students in problem-solving is their conceptual understanding and experience (Dekker & Jolles, 2015). The results of this study are supported by research (Ulger, 2018) which shows that problem-based learning can help students with non-routine problem-solving processes by maintaining uncertainty and increasing creative thinking. However, a similar conclusion cannot be reached for critical thinking dispositions. Therefore, future studies on critical thinking dispositions and problem-based learning approaches are critical. According to students, problem-based learning, creative thinking, finding information, and writing reports are problem-solving features that contribute the most to student learning.

CONCLUSION

Based on the results and discussion of this research, it can be concluded that students' creative thinking skills about local wisdom in small islands in Maluku, mainly student responses to local wisdom problems, show good results through cooperative learning. Creative thinking skills have been demonstrated through verbal and nonverbal behaviour with a reasonably high intensity of practice in student groups by independently integrating collaborative and cooperative behaviour in groups. There are differences in students' creative thinking skills in the experimental class (using problem-based learning) and the conventional class on small islands in Maluku. There are differences in students' creative thinking skills on different topics of local wisdom on small islands in Maluku. This study suggests that students' understanding of the concepts of processing Maluku's natural resources should be improved. Therefore, future studies on critical thinking dispositions and problem-based learning approaches should be carried out. The results of research using problem-based learning impact student misconceptions because the problem-based learning approach can facilitate investigating scientific phenomena in small groups. Problem-based learning can facilitate students in conceptual understanding and deep learning, so it is suggested that the problem-based learning approach is fundamental and useful for use in biology learning because the problem-based learning approach facilitates changes in student concepts.

The weaknesses encountered in this research are the geographical differences between the islands. The regional languages on the small islands in Maluku are pretty diverse. The number of islands 1,340 large and small islands, is exceptionally influential on communication. Internet facilities are very minimal on the small islands in Indonesia. Maluku and the needs of the media are pretty diverse. Another weakness faced is learning strategies that do not facilitate problem-solving skills by students. Students need to understand the concepts or principles of physics and chemistry in the local natural resource processing process.

Methodologically, the researcher longitudinally suggests further research with several repeated measurements over a more extended period, especially in developing lectures oriented towards understanding student concepts, and lecturers must understand how students learn biology. The implementation of Problem Based Learning promises to improve students' abilities to reach Surface, Matching, and Deep levels. In the future, research should focus on improving the biological conceptual framework of students for relevant variables as an alternative to overcome students' low creativity and scientific responsibility. Therefore, students can also maintain the noble values of the nation's culture by growing local wisdom.

ACKNOWLEDGEMENT

The researchers would like to express their gratitude to various parties who have helped so that this research can run well, namely: 1) Head of the village of Negeri Latuhalat, Nusaniwe sub-district, Ambon island, 2) Head of Yafila village, Teon Nila district, Serua, Central Maluku on Seram island, 3) Village head Ihamahu country on Saparua Island, 4) Head of Allang State Village, Central Maluku, and 5) Head of Jerili Village, TNS sub-district on Seram Island

REFERENCES

- Ahmed, D. A. K., Henari, T. F., & Maklef, A. A. (2021). Investigating students' development of 21 century and lifelong skills during covid-19 crisis education. *TESOL International Journal*, 16(May), 103–126.
- Altun, S. (2015). The effect of cooperative learning on students' achievement and views on the science and technology course. *International Electronic Journal of Elementary Education*, 7(3), 451–468.
- Anggraeni, T. E., & Mundilarto, M. (2020). The development of local wisdom-based physics cognitive ability assessment instrument for senior high school students. *Jurnal Penelitian Dan Pembelajaran IPA*, 6(1), 102. <https://doi.org/10.30870/jppi.v6i1.5718>
- Azizi, G. N. (2019). Indonesia's efforts to achieve globally competitive human resources. 7(08), 1–6. <https://doi.org/10.31227/osf.io/q7pdv>
- Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010). Using student-centred learning environments

- to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. *Educational Research Review*, 5(3), 243–260. <https://doi.org/10.1016/j.edurev.2010.06.001>
- Boelens, R., Voet, M., & De Wever, B. (2018). The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning. *Computers and Education*, 120, 197–212. <https://doi.org/10.1016/j.compedu.2018.02.009>
- Burgess, A., Roberts, C., Ayton, T., & Mellis, C. (2018). Implementation of modified team-based learning within a problem based learning medical curriculum: A focus group study. *BMC Medical Education*, 18(1), 1–8. <https://doi.org/10.1186/s12909-018-1172-8>
- Carter, J. L., Richards, M., Hotopf, M., & Hatch, S. L. (2019). The roles of non-cognitive and cognitive skills in the life course development of adult health inequalities. *Social Science & Medicine*, 232, 190–198. <https://doi.org/10.1016/J.SOCSCIMED.2019.04.041>
- Chu, S. K. W., Reynolds, R. B., Tavares, N. J., Notari, M., & Lee, C. W. Y. (2017). 21st Century Skills Development Through Inquiry-Based Learning. In *21st Century Skills Development Through Inquiry-Based Learning: From Theory to Practice* (Issue August 2018).
- Clarindo, C. B. da S., Miller, S., & Kohle, É. C. (2020). Learning Activity as a Means of Developing Theoretical Thinking Capacities. *Frontiers in Psychology*, 11(December), 1–11. <https://doi.org/10.3389/fpsyg.2020.603753>
- Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability (Switzerland)*, 12(24), 1–22. <https://doi.org/10.3390/su122410367>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
- Dekker, S., & Jolles, J. (2015). Teaching about “Brain and Learning” in high school biology classes: Effects on teachers' knowledge and students' theory of intelligence. *Frontiers in Psychology*, 6, 1–8. <https://doi.org/10.3389/fpsyg.2015.01848>
- Dewi, I. N., Poedjiastoeti, S., & Prahani, B. K. (2017). ELSII learning model based local wisdom to improve students' problem solving skills and scientific communication. *International Journal of Education and Research*, 5(1), 107–118.
- Ennis, R. H. (2015). The nature of critical thinking: outlines of general critical thinking disposition and abilities. Sixth International Conference on Thinking at MIT, 2013, 1–8. <http://criticalthinking.net/wp-content/uploads/2018/01/The-Nature-of-Critical-Thinking.pdf>
- Framujiastri, N. E., Iskarni, P., & ... (2020). Local wisdom values for managing the conservation forest area in mountain Kaba Selupu Rejang sub-district. *Sumatra Journal of ...*, 4(1), 120–124. <http://sjdgge.pppj.unp.ac.id/index.php/Sjdgge/article/view/303>
- Franco, A., Marques Vieira, R., & Tenreiro-Vieira, C. (2018). Educating for critical thinking in university: The criticality of critical thinking in education and everyday life. *ESSACHESS - Journal for Communication Studies*, 11(2), 131–144.
- Furtak, E. M., Hardy, I., Beinbrech, C., Shavelson, R. J., & Shemwell, J. T. (2010). A framework for analyzing evidence-based reasoning in science classroom discourse. *Educational Assessment*, 15(3), 175–196. <https://doi.org/10.1080/10627197.2010.530553>
- Gaol, M. L., Prabawanto, S., & Usdiyana, D. (2019). Students' mathematical critical thinking ability on cube and cuboid problems. *Journal of Physics: Conference Series*, 1157(4). <https://doi.org/10.1088/1742-6596/1157/4/042055>
- Giatman, M., Siswati, S., & Basri, I. Y. (2020). Online learning quality control in the pandemic covid-19 era in indonesia. *Journal of Nonformal Education*, 6(2), 168–175. <https://journal.unnes.ac.id/nju/index.php/jne>
- Ginaya, G. (2018). The effects of blended learning to students' speaking ability. *International Journal of Linguistics, Literature, and Culture*, August. <https://doi.org/10.21744/ijllc.v4i3.661>
- Habibi, H. (2018). Protecting national identity based on the value of nation local wisdom. *International Journal of Malay-Nusantara Studies*, 1(2), 24–40. <http://journal.unhas.ac.id/index.php/IJoM->

NS/article/view/5516

- Hadi, K., & Manurung, B. (2019). Integration of local wisdom and problem based learning model in the innovation of biology teaching materials for senior high school students in aceh - indonesia. *International Journal of Humanities, Social Sciences and Education*, 6(1), 52–60. <https://doi.org/10.20431/2349-0381.0601006>
- Hamburg, I. (2020). Supporting Digital innovations by interdisciplinary entrepreneurial learning. *Advances in Social Sciences Research Journal*, 7(4), 8–17. <https://doi.org/10.14738/assrj.74.8046>
- Heindorf, C., Reyes-Agüero, J. A., & van't Hooft, A. (2021). Local markets: agrobiodiversity reservoirs and access points for farmers' plant propagation materials. *Frontiers in Sustainable Food Systems*, 5(February), 1–16. <https://doi.org/10.3389/fsufs.2021.597822>
- Herodotou, C., Sharples, M., Gaved, M., Kukulska-Hulme, A., Rienties, B., Scanlon, E., & Whitelock, D. (2019). Innovative pedagogies of the future: an evidence-based selection. *Frontiers in Education*, 4(October), 1–14. <https://doi.org/10.3389/feduc.2019.00113>
- Hestiana, H., & Rosana, D. (2020). The Effect of problem based learning based sosio-scientific issues on scientific literacy and problem-solving skills of junior high school students. *Journal of Science Education Research*, 4(1), 15–21. <https://doi.org/10.21831/jser.v4i1.34234>
- Huda, N., Irsan Pawannei, A. R. & V. L. T. (2020). Making indonesia's research and development better. December, 90.
- Hyun, C. C., Wijayanti, L. M., Asbari, M., Purwanto, A., Santoso, P. B., Igak, W., Bernarto, I., & Pramono, R. (2020). Implementation of contextual teaching and learning (CTL) to improve the concept and practice of love for faith-learning integration. *International Journal of Control and Automation*, 13(1), 365–383.
- Indonesia Hametin Associates Hanom Bashari Meabh Cryan Jihad Hilda Lionata, B., Saryanthi Nina Dwisasanti Virza Sasmitawidjaja Laksmi Savitri Armi Susandi Tri Susanti, R., Tetuka Agus Hermansyah Tom Walsh Shinta Pardede Pete Wood, B., Bunting Dedy Darnaedi John Cornell Ibnu Maryanto Mike Evans Richard Grimmett, G., Kusri Tjatur Kukuh Neviaty Zamani Nonette Royo iii, M., Ellen Rijal Idrus Agus Budi Utomo Jamaludin Jompa, G., Rothberg Rignolda Djamaluddin, D., Rauf Noviar Andayani Stuart Campbell Hametin Associates John Tasirin Arlindo Marcel, S., Khan Areca Vestiaria, B., Sulawesi Arief Rahman Aspirasi KSB, N., Nusa Tenggara Benny Tanaya Atsiri, W., Jusuf Pokwayla, M. E., Crosby BLHPM Lombok Timur, M., Nusa Tenggara Muhammad Ali Bogani Nani Wartabone National Park, W., Sulawesi Yakub, N. A., Hamid Burung Indonesia Dian Agista Burung Indonesia Yohanis Balla Djawarai iv Burung Indonesia Umbu Marambandamu Burung Indonesia Ani Mardiasuti, H., Wilson, G., Eno Customary Leader, Y., Eliza Kissya Customary Leader, M., ... Maluku Daniel Kasiang, N. (2014). Wallacea Biodiversity Hotspot. North Maluku Puji Waluyo AL KINDI, June 2014.
- Iordanou, K., & Rapanta, C. (2021). "Argue With Me": A Method for Developing Argument Skills. *Frontiers in Psychology*, 12(March). <https://doi.org/10.3389/fpsyg.2021.631203>
- Jeng, Y. L., Lai, C. F., Huang, S. B., Chiu, P. S., & Zhong, H. X. (2020). To cultivate creativity and a maker mindset through an internet-of-things programming course. *Frontiers in Psychology*, 11(July), 1–11. <https://doi.org/10.3389/fpsyg.2020.01572>
- 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>
- Kim, N. J., Belland, B. R., & Axelrod, D. (2019). Scaffolding for optimal challenge in k–12 problem-based learning. *Interdisciplinary Journal of Problem-Based Learning*, 13(1), 11–15. <https://doi.org/10.7771/1541-5015.1712>
- Kundu, A., Bej, T., & Nath Dey, K. (2021). Time to Achieve: Implementing blended learning routines in an indian elementary classroom. *Journal of Educational Technology Systems*, 49(4), 405–431. <https://doi.org/10.1177/0047239520984406>
- Lawhon, D. (1976). Instructional development for training teachers of exceptional children: A sourcebook. *Journal of School Psychology*, 14(1), 75. [https://doi.org/10.1016/0022-4405\(76\)90066-2](https://doi.org/10.1016/0022-4405(76)90066-2)

- Leunufna, S., & Evans, M. (2014). Ensuring food security in the small islands of Maluku: A community genebank approach. *Journal of Marine and Island Cultures*, 3(2), 125–133. <https://doi.org/10.1016/j.imic.2014.11.001>
- Maison, Darmaji, Astalini, Kurniawan, D. A., & Indrawati, P. S. (2019). Science process skills and motivation. *Humanities and Social Sciences Reviews*, 7(5), 48–56. <https://doi.org/10.18510/hssr.2019.756>
- Major, T., & Mulvihill, T. M. (2018). Problem-based learning pedagogies in teacher education: The case of Botswana. *Interdisciplinary Journal of Problem-Based Learning*, 12(1). <https://doi.org/10.7771/1541-5015.1543>
- Matilainen, R., Nuora, P., & Valto, P. (2021). Student experiences of project-based learning in an analytical chemistry laboratory course in higher education. *Chemistry Teacher International*, 3(3), 229–238. <https://doi.org/10.1515/cti-2020-0032>
- Nadeak, B., & Naibaho, L. (2020). the Effectiveness of Problem-based learning on students' critical thinking. *Jurnal Dinamika Pendidikan*, 13(1), 1–7. <https://doi.org/10.33541/jdp.v13i1>
- Najjar, H. Al, Khalil, A. I., & Bakar, S. A. A. (2021). Nursing students' critical thinking, problem solving and self directive learning skills: the effect of problem-based learning (pbl) versus lecture based learning (LBL). *Issues and Development in Health Research* Vol. 5, 8(3), 100–120. <https://doi.org/10.9734/bpi/idhr/v5/1884c>
- Nambiar, D., Karki, S., Rahardiani, D., Putri, M., & Singh, K. (2019). Study on skills for the future in Indonesia. Oxford Policy Management, July, 1–117. www.opml.co.uk
- OECD. (2019). PISA 2021 creative thinking framework. *Oecd*, 53(9), 1689–1699. <https://www.oecd.org/pisa/publications/PISA-2021-creative-thinking-framework.pdf>
- Papaleontiou- Louca, E., Varnava-Marouchou, D., Mihai, S., & Konis, E. (2014). Teaching for Creativity in Universities. *Journal of Education and Human Development*, 3(4). <https://doi.org/10.15640/jehd.v3n4a13>
- Park, M. (2019). An investigation of how students use information to answer energy questions. *International Journal of Research in Education and Science*, 5(2), 388–399.
- Patterson, L., & Xu, Y. (2020). Enhancing Teachers' Competence in Building Students' Numeracy in Grades K-3. *Frontiers in Education*, 5(April), 1–6. <https://doi.org/10.3389/feduc.2020.00031>
- Phungsuk, R., Viriyavejakul, C., & Ratanaolarn, T. (2017). Development of a problem-based learning model via a virtual learning environment. *Kasetsart Journal of Social Sciences*, 38(3), 297–306. <https://doi.org/10.1016/j.kjss.2017.01.001>
- Renjaan, M. J., Purnaweni, H., & Anggoro, D. D. (2013). Studi Kearifan Lokal Sasi Kelapa Pada Masyarakat Adat Di Desa Ngilngof Kabupaten Maluku Tenggara [Study of Sasi Coconut Local Wisdom on Indigenous Peoples in Ngilngof Village, Southeast Maluku Regency]. *Jurnal Ilmu Lingkungan*, 12(2), 23. <https://doi.org/10.14710/jil.11.1.23-29>
- Saputra, M. D., Joyoatmojo, S., Wardani, D. K., & Sangka, K. B. (2019). Developing critical-thinking skills through the collaboration of Jigsaw model with problem-based learning model. *International Journal of Instruction*, 12(1), 1077–1094. <https://doi.org/10.29333/iji.2019.12169a>
- Scott, K. S. (2017). An integrative framework for problem-based learning and action learning: promoting evidence-based design and evaluation in leadership development. In *Human Resource Development Review* (Vol. 16, Issue 1). <https://doi.org/10.1177/1534484317693090>
- Seibert, S. A. (2020). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . January.
- Selasih, N. N., & Sudarsana, I. K. (2018). Education based on ethnopedagogy in maintaining and conserving the local wisdom: a literature study. *Jurnal Ilmiah Peuradeun*, 6(2), 293. <https://doi.org/10.26811/peuradeun.v6i2.219>
- Servant-Miklos, V. F. C. (2019). Fifty years on: a retrospective on the world's first problem-based learning programme at McMaster University Medical School. *Health Professions Education*, 5(1),

- 3–12. <https://doi.org/10.1016/j.hpe.2018.04.002>
- Spector, J. M., & Ma, S. (2019). Inquiry and critical thinking skills for the next generation: from artificial intelligence back to human intelligence. *Smart Learning Environments*, 6(1). <https://doi.org/10.1186/s40561-019-0088-z>
- Sy. (2006). The Nature of Creativity Robert. *Creativity Research Journal*, 18(1), 87–98. <https://doi.org/10.1207/s15326934crj1801>
- 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(August 2020). <https://doi.org/10.1016/j.tsc.2020.100696>
- Thorndahl, K. L., & Stentoft, D. (2020). Thinking critically about critical thinking and problem-based learning in higher education: A scoping review. *Interdisciplinary Journal of Problem-Based Learning*, 14(1), 1–21. <https://doi.org/10.14434/ijpbl.v14i1.28773>
- Türkmen, H., & Sertkahya, M. (2019). Creative Thinking Skills Analyzes of Vocational High School. *Journal of Educational and Instructional Studies*, 5(1), 74–84.
- Ulger, K. (2018). The effect of problem-based learning on the creative thinking and critical thinking disposition of students in visual arts education. *Interdisciplinary Journal of Problem-Based Learning*, 12(1), 3–6. <https://doi.org/10.7771/1541-5015.1649>
- Valdez, L. M., & Sobremisana, V. S. (2021). The Syntectics Teaching Method : Effects on the Problem-Solving and Creative Thinking Skills of Learners in Physics. February. <https://doi.org/10.21275/SR201220172445>
- van Peppen, L. M., Verkoeijen, P. P. J. L., Heijltjes, A. E. G., Janssen, E. M., Koopmans, D., & van Gog, T. (2018). Effects of Self-Explaining on Learning and Transfer of Critical Thinking Skills. *Frontiers in Education*, 3(November), 1–11. <https://doi.org/10.3389/feduc.2018.00100>
- Verhoeff, R. P., Knippels, M. C. P. J., Gilissen, M. G. R., & Boersma, K. T. (2018). The theoretical nature of systems thinking. perspectives on systems thinking in biology education. *Frontiers in Education*, 3(June), 1–11. <https://doi.org/10.3389/feduc.2018.00040>
- Vladova, G., Ullrich, A., Bender, B., & Gronau, N. (2021). Students' Acceptance of Technology-Mediated Teaching – How It Was Influenced During the COVID-19 Pandemic in 2020: A Study From Germany. *Frontiers in Psychology*, 12(January), 1–15. <https://doi.org/10.3389/fpsyg.2021.636086>
- Wang, Y., Sun, X., Chong, W., & Xin, T. (2020). Attribute discrimination index-based method to balance attribute coverage for short-length cognitive diagnostic computerized adaptive testing. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.00224>
- Winarno, S., Muthu, K. S., & Ling, L. S. (2017). Direct problem-based learning (DPBL): a framework for integrating direct instruction and problem-based learning approach. *International Education Studies*, 11(1), 119. <https://doi.org/10.5539/ies.v11n1p119>
- Woldeamanuel, Y. W., Abate, N. T., & Berhane, D. E. (2020). Effectiveness of concept mapping based teaching methodson grade eight students' conceptual understanding of photo synthesisat ewket fana primary school, BahirDar, Ethiopia. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(12), 1–16. <https://doi.org/10.29333/ejmste/9276>
- Yew, E. H. J., & Goh, K. (2016). Problem-based learning: an overview of its process and impact on learning. *Health Professions Education*, 2(2), 75–79. <https://doi.org/10.1016/j.hpe.2016.01.004>
- Živković, S. (2016). A Model of critical thinking as an important attribute for success in the 21st century. *Procedia - Social and Behavioral Sciences*, 232(April), 102–108. <https://doi.org/10.1016/j.sbspro.2016.10.034>

This page is intentionally left blank