BIOEDUPAT:
Pattimura Journal of Biology and Learning
https://ojs3.unpatti.ac.id/index.php/bioedupat
e-ISSN 2775-4472

Research Article

Sound of green innovation in merdeka curriculum learning science based on basic education of Ambon city

Pamella Mercy Papilaya[1],* Fredy Leiwakabessy[1], Chtherine Salhuteru[2]

[1] Biology Education Program, Universitas Pattimura, Street. Ir. M.Putuhena, Ambon, 97233, Indonesia
[2] Graduate of Biology Education, Universitas Pattimura, Street. Ir. M.Putuhena, Ambon, 97233, Indonesia
** corresponding author: pamella.mercy23@gmail.com*

Received: December 11, 2024 Accepted: February 30, 2025 Published: April 30, 2025

ABSTRACT

Maluku is an island area with small islands in the islands education that needs to be covered with the purpose of: 1) protecting, considering, rehabilitating, utilizing and enriching natural resources on small islands and an ecological system on a sustainable person; 2) strengthens the participation of the community and government agencies, and encourage community initiatives in the management of natural resources and small islands to achieve justice, balance and sustainability; 3) create social, economic, and cultural values-society through the role of society in utilizing natural resources and small islands. Actually, the education unit of currency is developed with diversification principle, a new innovation in the field of science education is Sound of Green (SOG) involves environmental as a source of learning. This study aims: 1) Knowing the increase in the understanding of the student's concept using the Sound of Green approach empowering the Estemic Plant Maluku in the village of attractive city of Ambon City and 2). Knowing the thinking of the Cratif's thinking of the students using the Sound of Green approach empowering the Estemic Plants Maluku in the village of the attractiveness of the city of Ambon City. The results of statistical analysis were found there was a critical thinking difference of garway gasid carbon treatment in different places in the students of JMP City Ambon. The type of local Makuku Fruit food, can now be used to be the type of food and drinks liked by many people. Learning with PJBL is very helpful in developing student creativity thinking and innovating creating products that can be utilized by the community in everyday life.

Keywords: *Sound of green, merdeka curriculum, basic education*

To cite this article:
Papilaya, P. M., Leiwakabessy, F., & Salhuteru, C. (2025). Sound of green innovation in merdeka curriculum learning science based on basic education of Ambon city. *Bioedupat Pattimura Journal of Biology and Learning,* 5(1), 294-303.*DOI:* https://doi.org/10.30598/bioedupat.v5.i1.pp294-303

INTRODUCTION

Learning of the 21st century is a learning that prepares the 21st century generation. There are three major subjects in the 21st century learning, namely: (1) learning skills and innovating, which includes ways of thinking and how to work. (2) Information, Media, and Technology, which includes tools that are used in work, (3) life skills and career, which includes the ability to live in the world (Gunadi et al. 2022; Fitri et al. 2023). The way of thinking is the skills of thinking that must be mastered by students to face the 21st century, the ability of the thinking, such as creative thinking, critical thinking, troubleshooting, and decision making, while the way of working is the ability to work in the world of global and digital, students must be able to communicate, cooperate and collaborate, both with individuals and communities and the network. Students should also be able to master the tool to work the 21st-century (Aslamiah et al. 2021; Panggabean et al. 2021). Technology brings new challenges to the 21st century learning process that includes the development of knowledge of technology and how technology integrates with content, teaching, and learning, in a particular context (Merta et al. 2023). One aspect that makes the student creativity is low due to less understanding of the concept, where the learning process only trains converging thinking

in general, so when facing a problem, students have trouble solving problems creatively especially in learning science (Eslit, 2023).

One aspect of being is the education curriculum. Referring to the National Education System Act. 20 Year 2003 Article 36 paragraph (1), the curriculum in all levels and types of education was developed with diversification principles according to the educational unit, regional potential, and learners. Dialsifying curriculum becomes one way to improve student ability in the field of literacy, numeration, and science through contextual curriculum charge (E2030 Position Paper (05.04.2018), N.D.). With contextual curriculum development, it is expected that learners can have life skills in accordance with the current condition of the current and future for sustainable life (all sustainable) with all future challenges (Van Dend Branden, 2015).

Differential learning is an effort to adjust the learning process by providing various ways through differentiation of content, processes, products and learning environment and initial assessments to meet individual learning needs of each student (Monica Oloo & Muteheli. Florence, 2023). The development of learning to accommodate the learning needs of learners. Teachers facilitate the disciples according to their needs, because each student has different characteristics, so it can not be given the same treatment (Mahartika et al. 2023). In implementing the development of the teaching to experience the need to think about reasonable actions that will be taken, because the development of learning is meaningless to learn to provide treatment or different actions for each student, as well as learning that distinguishes between clever disciples with less than smart (Angilaon, 2021).

The need for science literacy capabilities to learners make developed countries thinking to build science literacy early on learners (Andaresta et al. 2023). It can not be denied that the science literacy has a great contribution to the development of science. In addition it has a great impact in other fields such as social, cultural and economic (Nilyani et al. 2023). The implication is for the country that has the ability of literacy of science which is quite high then has a rapid development rate as well. It takes a curriculum with a learning approach that emphasizes the student's involvement process in order to find the material studied and connected it to the real life situation so as to encourage students to apply them to real life ("Implication and Application MBKM's Curriculum In Education (Madrasah and Universities)," 2023). Students often feel unmotivated to learn and less feel involved in the learning process. Therefore, the contextual independent curriculum is present as a more relevant alternative to the needs of students (Acedillo & Saro, 2023). Need to document local source resources in the written script so not only being a culture of (Nuterna et al. 2023).

Contextual independent curriculum is designed with the aim to ensure that learning is more related to student life. In addition, students are also able to help them overcome challenges in real life. This is the independent learning. Through the contextual curve of middle-speech students are expected to be more active and engaged in learning. In order to improve understanding and skills in the social and cultural context (Pradesa, 2023). Contextual curriculum development, which is expected to help learners to have life skills more in accordance with the current and future condition of life. One of the factors that cause local culture is forgotten in the present is; Lack of generation of successors who have interest to learn and inherit culture themselves and lack of local wisdom documents (Zort et al. 2023). The richness of local wisdom owned by Maluku is less documented in the form of academic script or written documents. In fact, the very many local wisdoms can be spoken by teachers and learners.

Learners is one of the realm of local energy resources of Maluku's economy is an important agent in the preservation and development of natural resources. This is because they have the capacity, credibility, and even the interests of the local natural resources they are preserving. Supports Ambon as a creative city of music world, the community of Basic Education of Ambon City as a local natural resource practitioning practitioner has been plunging in the development of local potential at the village level with the aim of realizing the village of the city of Ambon City. They preserve a variety of local wisdom that is nothing but local knowledge in the field of environment, life livelihood, culinary, art, and various customary social life in the village. The role of local natural resource practitioners who have a mandate to preserve local knowledge can determine the advanced of the village of the power of the city of Ambon City. They are motivated to be able to develop the power of local natural resources at the village level and produce it for the interests of the village progress of the interest of the city of Ambon City. They also compete to preserve the various local natural resources and even attempt to revive local culture that is eroded by the current and modernization. It is expected that there is an increase in mental life of students with each of the talents that have learners have and cultivate their creativity, and include a high level of intellectual learning experience (Thornhill-Miller et al. 2023).

The existence of the sound of green supports the island-based curriculum. Actually the education unit of the education unit is developed with the diversification principle of displaying a new innovation in the field of science education that is Sound of Green (SOG) involving the environment as a learning source. Ronny Loppies explains the Sound of Green approach is one of the conservation action approaches, the application of agroforesty patterns and local culinary development. An approach that leads to environmental preservation. In addition, this approach raises the economic value of the use of local Maluku plants, plant use waste, learning through natural schools and

music, calculation of carbon value from local plantations, the formation of farmer groups, formation of culinary creative communities through educational units and building the city of Music City Ambon City (Arts, 2022).

Maluku is an archipelago with small islands in the Islands Education that needs to be progressed with the purpose namely protecting, considering, rehabilitating, utilizing and enriching natural resources on small islands and an ecological system on a sustainability; strengthening roles and communities and government agencies, and promoting community initiatives in the management of natural resources and small islands to avail justice, balance and clearness; and creating social, economic, and cultural values through roles and communities in utilizing natural resources and small islands.

Sound of Green is one form of Science Technology Society approach to learners in learning can certainly accommodate this important goal, because in the approach of Sound of Green has a very important relationship with the problem of problem solving skills, because the problem solving skill more leads to the planting of attitude (Sutaryono and Prasetyaningtyas, 2020). This research aims to: 1) determine the increase in students' understanding of concepts using the sound of green approach to empower endemic Maluku plants in villages that are a music tourism attraction in the city of Ambon and 2). Knowing the differences in students' creative thinking using the sound of green approach to empower endemic Maluku plants in villages, the music tourism attraction of Ambon city.

METHODS

This research is a survey and expansion of the 4-D development model from Thiagarajan (Billingsley et al. 2017) consisting of 4 stages: define, design, develop, and disseminate and produce learning-based learning devices. This research is also a Mixed Method (qualitative and quantitative) research, to analyze the influence of e-Learning collaborative learning strategies with ethnosive approaches to mental models, student creative thinking skills. This research is also a Mixed Method (qualitative and quantitative) research, to analyze the influence of e-Learning collaborative learning strategies with ethnosive approaches to mental models, student creative thinking skills.

This research uses embedded experimental design model from Cresswell (Billingsley et al. 2017). Development research was conducted on basic education at Pilot Project Project Implementation of local headquarters of mandatory music education in the village of attractive city of Ambon City tourism which took place in the second half of 2022/2023 at SMPN 2, SMPN 6, SMPN 11 and SMPN 15 Ambon. The focus of this research is to analyze the understanding of the concept of students and the difference in students' creative thinking.

Qualitative data were analyzed descriptively in this study. While quantitative data were analyzed through the Kovarians (Ancova) in SPSS 25. The prerequisite test used normality and homogeneity test shows normal distribution. The results reveal normal and homogeneous distributed data.

RESULTS AND DISCUSSION

The application of Sound of Green on the Basic Education Units at Pilot School Project Implementation of local mutant curriculum is required to be in the village of the attractiveness of Ambon City Music Tourism successfully implemented in this study there are 3 programs, among others:

1. Calculation of local forest carbon value especially in endemic plants.
2. The formation of culinary creative groups in the unit of educational.
3. Utilization of plant waste.

Basic Education at Pilot School Project Implementation of local headquarters of mandatory music education in the village of attractive city of Ambon City tourist. These programs we describe as follows:

1. Calculation of Local Forest Carbon Value Especially in Endemic Plants

a. Mastery of the Concept of Learners

The data of understanding the concept before and after learning is analyzed by reviewing and conducting the qualification of the achievements achieved by the BK's KKM. The results of the average value of the value of the student's concept is still low enough under the KKM 75 there is a SMP country of 11 and SMP Negeri 15 of 72. This value provides the understanding that the role of schools in developing the control of the concept is not yet optimal. This can be due to several factors, the first factor is the ability of learners to receive lessons, completing the task and reporting it is a different attitude of view is a consequence of the attitude of learning responsibilities. If the ability to learn learners is low, it is logically the responsibility of learning is also low, and vice versa that will affect the achievement of learning outcomes (Batolona and Mahapoonyanont, 2019).

The second factor is a different motivation of learning on each student. According to Filgona et al. (2020) the position of motivational learning students in learning is said that the success of learning participants in the learning process is highly influenced by the motivation available to him. The learning quality indicator of one of them is a

high motivation of the participants, the participants who have high learning motivation on learning will be moved or breeding to have the desire to do something that can earn certain results or purposes (Mantiri, 2020).

The third factor is the characteristics of different characteristics and learning styles in each student. The ethnic aspect, the cultural aspect, aspect of social status and also a different learning style on each student certainly greatly affect the ability of learners in understanding a concept (Mantiri, 2020).

Learning using contextual LKPD not only focuses on the control of the IPA concept, but also the learning process that can affect the control of the concept of science learners (Riong, 2022). Development of learning concept using contextual LKPD is a learning model that provides an authentic experience so as to encourage learners to learn actively, and construct the structured knowledge, one of the forms of learning outcomes is to have cognitive abilities (Riong, 2022). In this research the cognitive ability in question is the mastery of the concept of carbon absorption. Mastery of concept is an important aspect for students as the basis of mastery of science in solving a problem and finding ideas to solve problems (Ridho et al., 2023). With the control of the concept, all science problems can be solved, both the existence of science existing in everyday life and general science issues (Silva, 2022).

b. Critical Thinking Ability

The results of the assessment of critical thinking ability of students in the Fourth school as a research sample show that students still need the assistance in whole according to the needs of students (Figure 1). Lionenko and Huzar, (2023) explained that in connection with the growing future development, demanding every student to be able to think critically against the changes. Halim, (2022) explains that critical thinking aims to develop basic skills that develop exciting practice and initial learning activities, teaching with various methods of learning, depending on the actual educational situation and the critical thinking stage of the (Ramadhani et al. 2023).

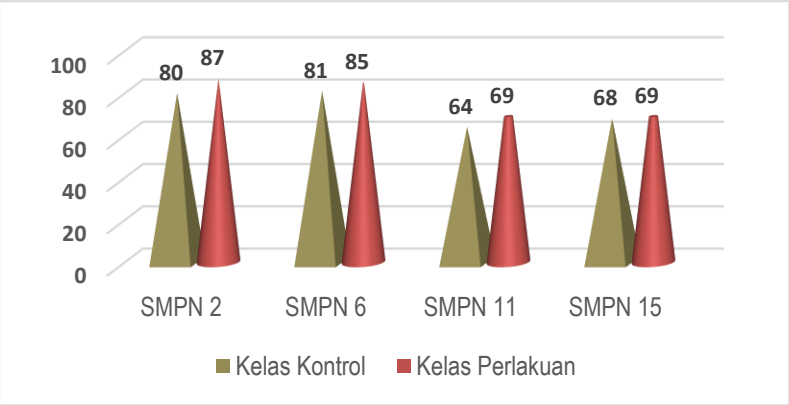

Figure 1. Results of critical thinking analysis

The results of this study provide the meaning that teachers should review and reinforce the teaching practices that have been implemented. Recognizing the importance of a learning system to develop students' skills, so absolutely needed learning more actively involving students in the learning process itself (Solovyeva et al. 2023). This can be awarded through a form of learning system planned in such a way that reflects the active student engagement that instills critical thinking conscience (Heard et al. 2020).

Students need to prepare themselves with critical thinking skills to complete a problem. The results of the Facione (2011) suggest that critical thinking is based on the knowledge reform analyzing differences and comparisons, namely the establishment of equality and differences, observing and identifying causal relationships, extracting ideas and evaluation about science learning aims to teach individuals to make the right assessment (judgment valid) of the values of scientific science and science. Learning Science is expected to be a help for learners to learn about nature around himself and itself (Leasa et al. 2023).

Based on the results of the statistical test of students in SMP State 2 using contextual LKPD has a meal value of the average critical point of 80.80, SMP state 6 average 77.06, SMP state 11 average average of 63.46, and SMP state 15 average 72.60 (Table 1). Data is shown in the average 32 average value of the skills of the critical thinking and looks in the understanding of the concea of absorption of carbon absorbed.

The results of the Child's projection suggest that the magnitude of the difference in critical thinking ability learners in carbon absorption materials between treatment as a research sample after controlled control variable found the value of F FOR 5,349 with significant value of 0.003. This can be declared different differences in critical thinking skills learners in different treatment classes significantly because of significant value < 0.05. Thus it can be concluded is significantly although controlled with the variable of conventional method of use as a cvarian. These results indicate that the use of contextual LKPD to the critical thinking differences learners in the mastery of the concept of carbon absorption.

Table 1. The mean value of critical thinking

School	Mean	N	Std. Deviation
SMPN 2	80.800	15	7.37951
SMPN 6	77.0667	15	13.72415
SMPN 11	63.4667	15	11.06388
SMPN 15	72.6000	15	8.43293
Total	73.4833	60	12.08794

Conventional learning or which has been used by daily teachers in learning is Student Teams Achievement Division (STAD) where one type of cooperative learning is used as a covarian in the study. STAD emphasizes the interaction among students to motivate and mutual help in mastering the material and achieves the maximum achievement or called by the group of students will be more free to ask his group of friends about the material that has not been mastered (Setiyaningsih and Sujarwo, 2023).

The results of statistical analysis show that the use of conventional learning in the control group affects the difference in critical thinking ability of the global parking absorption of Banda Gasandar (*B. macrophylla*). This provides the understanding that when teachers use conventional learning in this case co-operative STAD type should be based on group work. However, the teacher must realize that the real estate or the percentage is the achievement of each individual student. Likewise teachers need to pay attention to the success of conventional learning or the model of the Stop type of coopratives in the effort to develop group awareness requires a period of time long, this may not be achieved only once or once the application of this strategy (Yasin et al. 2020).

Table 2. Anacova test table at critical thinking values

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	3761.519[a]	4	940.380	10.643	0.000
Intercept	317.475	1	317.475	3.593	0.063
Controll	1249.202	1	1249.202	14.139	0.000
School	1417.754	3	472.585	5.349	0.003
Error	4859.465	55	88.354		
Total	332609.000	60			
Corrected total	8620.983	59			

Critical thinking of learners in responding to carbon absorption issues showing enough skills. Because this theme is also a new thing for learners, so the need for teamwork skills is very important. Social skills required for teamwork, as well as the relevance of control over the number of students in a group, basic social skills, or student academic levels are the factors to note (Mendo-Lázaro et al. 2018). To improve the critical thinking skills of learners in understanding the issues discussed, need to develop the ability to analyze questions and then choose and develop solutions, designing projects cultivate students' ability to evaluate results and apply feedback (Febliz et al., 2023). With this pattern of the study, the learning process of students is cultivated to avoid just assimilation (absorb knowledge), but combined with accommodation (constructive knowledge) (Faizah et al. 2022).

Tabel 3. LSD's advanced test on critical thinking values

School (I)	School (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
SMPN 2	SMPN 6	-5.27	4.086	.217	-13.98	3.44
	SMPN 11	10.07*	4.086	.026	1.36	18.78
	SMPN 15	11.60*	4.086	.012	2.89	20.31
SMPN 6	SMPN 2	5.27	4.086	.217	-3.44	13.98
	SMPN 11	15.33*	4.086	.002	6.62	24.04
	SMPN 15	16.87*	4.086	.001	8.16	25.58
SMPN 11	SMPN 2	-10.07*	4.086	.026	-18.78	-1.36
	SMPN 6	-15.33*	4.086	.002	-24.04	-6.62
	SMPN 15	1.53	4.086	.713	-7.18	10.24
SMPN 15	SMPN 2	-11.60*	4.086	.012	-20.31	-2.89
	SMPN 6	-16.87*	4.086	.001	-25.58	-8.16

	SMPN 11	-1.53	4.086	.713	-10.24	7.18

Based on observed means.
The error term is Mean Square(Error) = 125.211.
*. The mean difference is significant at the ,05 level.

Based on advanced test results using the LSD test indicated in Table 34 can describe that there is a difference in critical thinking ability between learners in the four schools that are sample. The difference in critical thinking ability also according to the researcher is influenced by several factors. Factors that affect the critical thinking ability include motivation, intelligence, learning climate, learning model used, technological combination and learning strategy used, the approach of learning applied, the ability of learners in understanding the problem, as well as the ability to exchange ideas and cooperation in the study group (Nold, 2017). The first factor that affects the critical thinking ability is motivation. Motivation can come from within the students and from others (Sa et al. 2022). With these activities make learners more interested and active in the learning process and can develop their critical thinking skills. In line with the results of research done so it is known that motivation affects the critical thinking ability to learners (Wahyuni et al. 2021).

The Formation of Culinary Creative Groups in the Educational Unit

Learners as a local natural resource practitioner is a very important agent in the preservation and development of natural resources. This is because they have the capacity, credibility, and even the interests of the local natural resources they are preserving. Supports Ambon as a city of creative music world, learners Ambon City Floral Processing Properly Local Resources has been plunging in the development of local potential at the level of education unit with the aim of realizing the village of the city of Ambon City. They preserve a variety of local wisdom that is nothing but local knowledge in the field of environment, life livelihood, culinary, art, and various customary social life in the village. Tourists come to appreciate and understand the various local wisdom. The role of learners local local resources that have mandates to preserve local knowledge can determine the advanced village of ambon city music attraction. Learners are motivated to be able to develop the power of local natural resources at the village level and reproduce for the interests of promotion of the village of the Important of the city of Ambon City. Learners are also competing to preserve local natural resources and even attempt to revive local culture that is eroded by the current and modernization.

One of the important purposes of learning through the formation of culinary creative groups in the units of education are the birth of individuals who are always responsive and thinking about the development of science and technology, as well as sensitive to social issues arising as an impact on developing determining that critical thinking education increases problem solving skills. Students will be more prompted to construct knowledge and skills in researching facts from a phenomenon or incident (Gholam, 2019). The formation of culinary creative groups in educational units in learning can certainly accommodate this important purpose, as it has a very important relationship with the problem of solving skilling of the participants' led farm (Redhana, 2019).

The creative economic practitioners at the level of education unit hope hiring not only to facilitate the development of the means of means and culture of infrastructure as they have taken traditional citizens, arts building and cultural, but also supports the creative economic strengths, but they also realize the importance of government support and stakeholders' sources of local fruit-based music sciences so that they can self-stand up to manage Gandaria plants (*B. macrophylla*) as a local fruit and preserving food and benefit them for the purpose of improving the well-being of the well-being of the westers. Local Fruit Development Idees will be realized when the participants of the city tourism towns also understand the concept of community empowerment and can implement it wholeheartedly. Therefore, with the spirit of community technology science, the doses of the Biology Education Study Program are called to promote the empowerment of Gandaria plant as a local fruit as the form of Sound of Green expansion of the village tourism array for the potential. This research then announces attention on how to work with the community and control the process of compilation of the tourist village program in the city of the Ambon in the public. This research aims to develop the city's tourist travelers for the city of Tok Ambon music for the preparation of Music Tour Village Program as the Capitality Action Plan.

Utilization of Plant Waste

The use of plant waste in learning is implemented using all objects available around the student environment, including garbage. The transplant waste management is taught to students through the implementation of the exact learning model, one of which is Project Based Learning (PJBL). PJBL is a student-based learning model, making students more autonomy because they build a meaningful artifact in their learning process. Additionally, autonomy increases student interest and motivates them to be responsible for their own learning. The role of teachers in PJBL is motivating students and creates a conducive class environment to learn. On PJBL, the role of the teacher is set up to be a facilitator who works to help students develop a problem-breaking project, pursuing active discovery,

developing potential solutions, and implementing solutions to meet specifications and criteria, so for new knowledge for themselves. PJBL is assessed enough to promote high-level thinking skills, among them are problem solving skills, critical thinking and creative skills. The PJBL model allows students to produce their learning process and develop unique personal solutions for specific project problems (Rati et al. 2017). The Pendant Participant should be trained to think high-level in addressing the surrounding problems including the problem of trash, so since the case has the concern and sense of responsibility as a good citizen (Mendo-lázaro et al. 2018).

One form of activity in waste management is recycled. This action is oriented to effort to promote the sustainability environment, such as the use of efficient resources, reduces and reuse the waste. In the context of reuse, reduce and recycle (reuse, reduce, and recycle) cancer is done by asking students to make new stuff from waste or waste, or used clothes. This process is often called creative remake or upcicycling as a concept that is often considered to promote sustainable behavior to produce creative products / artificial value of the creative economy (Junaidi & Utama, 2023).

A required activity can facilitate the teacher in developing its pedagogic capabilities (Mardhatillah & Surjunianti, 2023). The activity is the development of high-level thinking skill learning technologies by applying the PJBL for teachers, especially for teachers in the Master's Working Group in Powangan Yangik Puerta Music Tourism. Related to the abundant waste handling in Ambon City, the direction of learning can be set by using PJBL so that the waste can be produced into creative economical products. Master in KKG has difficulty in the knowledge, skill, and best practices related to design, action, and learning evaluation with PJBL for empowering students' high-level thinking skills. Therefore, this research is considered quite effective and potentially to overcome and anticipate the problems and phenomena in the environment. It is expected through this activity of knowledge and skills of SMP teachers in designing devices, media, and learning instruments as well as learning practices that are useful for empowering high-level thinking skills to be superior and qualified.

Based on the results of observation, some of the successful identified problems that occur in most of the junior high schools of ambiance music attractions include constraints faced in the learning process including: 1). Teachers' limitations in creating the lessons oriented in empowering high-level thinking skills especially for junior high school students; 2). Teachers' limitations in designing and implementing learning by using the PBL learning model; 3) Teachers' limitations in preparing evaluating the instrument and measuring the higher order thinking skills; 4) Trash around the environment and the people are ignored just, and when it has an economic value; 5) Teachers' difficulties in finding the appropriate practice in optimizing the high order thinking skills for the junior students; 6) Students are less trained in developing high-level thinking skills. While the constraints faced in related learning results, students of learning cognitive students are still oriented to low-level and utilities learning and student learning aspects are less empowered.

Based on the problems that have been found, then the solutions of the problem is thought and implemented are: 1) Train teachers to think high levels, and in composing high-level thinking skill-to-day learning techniques; 2) Train teachers to do Best Practices about design, pental, as well as learning practices with Project Based Learning (PJBL); 3) Training teachers to develop creative economic-based products by utilizing various garbage in the school environment; 5) Training teachers to develop the evaluation of learning in the form of grits of tests, instruments about tests, rubric and answer guidelined oriented to the development of high-level thinking skills for elementary students with regard to washing issues; 6) Training teachers to perform Real Teaching with the PJBL learning model to students; 4) Training teachers and students to process garbage into various creative-based economic products to exorpilate; and 5) Training students to empower high-level thinking skills in learning with PJBL.

Observation of research results to the application of learning practices with PJBL in each school focused on one class alone, although all participant teachers do learning practice as well. In the observation, the Master's model on one class, observed by the team of researchers and peers. Learning with the PJBL is done following the scenario that has been prepared by the teacher in previous learning devices. The average value of achievement of learning implementation with PJBL of observation results is 94.07% as described in Table 4 below.

Table 4. The results of the observation of learning implementation with PJBL

Nu	Teacher's activities	Persentation (%)
1	Performs apperception by reminding some of the actual problems related to the learning topic	90
2	Stimulate students to recognize the problem	90
3	Stimulate students in identifying alternative solutions and choose an alternative as the best solution (HOTS)	92.5
4	Forming an effective working group, containing 4-5 heterogeneous students	95
5	Conformity of learning flow according to PJBL syntax	95
6	Applying learning educating by using garbage in producing economical products	100

7	Skills produce student creativity in managing waste	92.5
8	Skills in carrying out differentiated learning	95
9	Skills in organizing learning resources and / or teaching materials	90
10	Encourage students' high-level thinking skills in learning activities through PJBL	97.5
11	Skills encourages students to implement garbage utilization projects	100
12	Motivate students thinking and work to produce products that value economically in learning	97.5
13	Skills Implementing the PJBL model	90
14	The ability to create a fun learning atmosphere	92.5
15	The ability to encourage students to produce products from original and innovative waste	90
16	Implementing the assessment of learning, assessment of learning, assessment of learning) and utilization of the results	87.5
17	The ability to provide reinforcement and punishment strengthening	100
18	Skills in time management	97.5
19	Skills in closing the learning session	95
	Mean	94.07

The table informs that there are 3 items of teachers activities that can be done perfectly: 1) Learning educating by using waste in producing economical products, 2) Skills encouraging learners to implement the waste utilization project, and 3) the ability to provide reinforcement and punishment strengthening. In addition, it is found that learning with PJBL is able to encourage students to think high levels in changing garbage in its environment into a useful product for the wider community. That is, learning with PJBL is very helpful in developing student creativity thinking and innovating creating products that can be utilized by the community in everyday life (Zainuddin et al. 2023).

CONCLUSION

1. The application of the sound of innovation of the green and its implementation in the Merdeka curriculum learning IPA increased the understanding of the concept of the students of the Ambon City's Basic Education.
2. Based on the results of statistical analysis found there was a difference in critical thinking crisket material of garandar plant carrier in different places on the students of junior high school (SMP) in Ambon city.
3. The local type of food fruit is only used as a proposal, can now be taken into the type of food and drinks liked by many people.
4. Learning with PJBL is very helpful in developing student creativity thinking and innovating creating products that can be utilized by the community in everyday life.

REFERENCES

Acedillo, N. B., & Saro, J. M. (2023). Students' lack of interest, motivation in learning, and classroom participation: how to motivate them? *Psychology and Education: A Multidisciplinary Journal*, 7(8), 636-645.

All Fine Loretha. (2023). The Efforts of lifelong education through life skills for early childhood in play groups. *Jurnal Pendidikan dan Pemberdayaan Masyarakat*, 10(1), 83–95. https://doi.org/10.21831/jppm.v10i1.59248

Andaresta, O., Sakdiah, H., & Novita, N. (2023). *Development of Assessments to Measure Students ' Science Literacy Ability : Rasch Modeling Analysis*. 9(2).

Angilan, J. (2021). Differentiated instruction and students' literary competence: an experimental study. *Middle Eastern Journal of Research in Education and Social Sciences*, 2(2), 110–125. https://doi.org/10.47631/mejress.v2i2.230

Arts, F. (2022). *CRAFTS and FOLK ARTS [. 3*.

Aslamiah, A., Abbas, E. W., & Mutiani, M. (2021). 21st-century skills and social studies education. *The Innovation of Social Studies Journal*, 2(2), 82. https://doi.org/10.20527/iis.v2i2.3066

Batlolona, J. R., & Mahapoonyanont, N. (2019). Academic learning outcome and creative thinking skills on projectile motion topic. *Jurnal Pendidikan Indonesia*, 8(1), 1. https://doi.org/10.23887/jpi-undiksha.v8i1.14524

Billingsley, B., Brownell, M., Lewis, T., & Rodriguez, J. (2017). High-Leverage practices in special education. *Teaching Exceptional Children*, 49(5). https://doi.org/10.1177/0040059917713206

E2030 Position Paper (05.04.2018). (n.d.).

Eslit, E. R. (2023). *21st Century Teaching : Updates , Challenges , and Best Practices*. *July*. https://doi.org/10.13140/RG.2.2.21864.65284

Facione, P. a. (2011). Critical Thinking : What It Is and Why It Counts. *Insight assessment* (Issue ISBN 13: 978-1-

891557-07-1.).https://www.insightassessment.com/CT-Resources/Teaching-For-and-About-Critical-Thinking/Critical-Thinking-What-It-Is-and-Why-It-Counts/Critical-Thinking-What-It-Is-and-Why-It-Counts-PDF

Faizah, S., Nusantara, T., Sudirman, & Rahardi, R. (2022). Constructing students' thinking process through assimilation and accommodation framework. *Mathematics Teaching-Research Journal*, 14(1), 253–269.

Febliza, A., Afdal, Z., & Copriady, J. (2023). Improving students' critical thinking skills: is interactive video and interactive web module beneficial? *International Journal of Interactive Mobile Technologies*, 17(3), 70–86. https://doi.org/10.3991/ijim.v17i03.34699

Fitri Siti Sundari, Lina Novita, E. H. (2023). Analysis of 21st century skills through. 6(1), 110–118.

Gholam, A. (2019). Inquiry-based learning: student teachers' challenges and perceptions. *Journal of Inquiry & Action in Education*, 10(2).

Gunadi, G., Haryono, H., Purwanti, E., Raya, B. R., Pinoh Barat Melawi, T., & Kalimantan, W. (2022). The analysis of 21 st century learning implementation and competency achievement of junior high school students in 3t regions. *Innovative Journal of Curriculum and Educational Technology*, 11(1), 10–18. https://journal.unnes.ac.id/sju/index.php/ujet/article/view/

Heard, J., Scoular, C., Duckworth, D., Ramalingam, D., & Teo, I. (2020). Critical thinking : skill development framework. *Australian Council for Educational Research*, 1–23.

Implication And Application MBKM's Curriculum In Education (Madrasah And Universities). (2023). *At-Ta'dib*, 18(1), 106–122. https://doi.org/10.21111/attadib.v18i1.9910

Junaidi, J., & Utama, A. A. (2023). Analisis pengelolaan sampah dengan prinsip 3r (reduce, reuse, recycle) (studi kasus di Desa Mamak Kabupaten Sumbawa). *Jurnal Ilmu Sosial Dan Pendidikan*, 7(1), 706–713. https://doi.org/10.58258/jisip.v7i1.4509

Leasa, M., Papilaya, P. M., Batlolona, J. R., & Nuniary, S. (2023). Project-based learning: changing students' scientific thinking to be creative from waste natural materials. *Jurnal Penelitian Pendidikan IPA*, 9(1), 350-359. https://doi.org/10.29303/jppipa.v9i1.2459

Lionenko, M., & Huzar, O. (2023). Development of critical thinking in the context of digital learning. *Economics & Education*, 8(2), 29-35. https://doi.org/10.30525/2500-946x/2023-2-5

Mahartika, I., Aisyah, S. N., Meisyalla, L. N., & Ilhami, A. (2023). What are the characteristics of learners and the variations of non-electronic learning media? *Jurnal Pendidikan Indonesia*, 12(2), 305–316. https://doi.org/10.23887/jpiundiksha.v12i2.51325

Mantiri, O. (2020). Motivation in learning. *Asian Journal of Education and Social Studies*, *September*, 16–37. https://doi.org/10.9734/ajess/2020/v10i430273

Mardhatillah, O., & Surjanti, J. (2023). Peningkatan kompetensi pedagogik dan profesionalitas guru di indonesia melalui pendidikan profesi guru (PPG). *Jurnal Pendidikan Ekonomi Undiksha*, 15(1), 102–111. https://doi.org/10.23887/jjpe.v15i1.65200

Mendo-Lázaro, S., León-del-Barco, B., Felipe-Castaño, E., Polo-del-Río, M. I., & Iglesias-Gallego, D. (2018). Cooperative team learning and the development of social skills in higher education: The variables involved. *Frontiers in Psychology*, 9 (AUG). https://doi.org/10.3389/fpsyg.2018.01536

Merta, L. W. S., Ratminingsih, N. M., & Budasi, I. G. (2023). The integration of technology in english language teaching to stimulate students' critical thinking. *Language Circle: Journal of Language and Literature*, 17(2), 333–341. https://doi.org/10.15294/lc.v17i2.39097

Monica Oloo, O., & Muteheli. Florence, A. (2023). Learning profile mapping for differentiated instruction implementation. *International Journal of Humanities, Social Sciences and Education*, 10(7), 51–56. https://doi.org/10.20431/2349-0381.1007006

Nilyani, K., Asrizal, A., & Usmeldi, U. (2023). Effect of STEM integrated science learning on scientific literacy and critical thinking skills of students: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, 9(6), 65–72. https://doi.org/10.29303/jppipa.v9i6.2614

Nold, H. (2017). Using critical thinking teaching methods to increase student success: an action research project. *International Journal of Teaching and Learning in Higher Education*, 29(1), 17–32. http://www.isetl.org/ijtlhe/

Nurdiana, N., Shafwati, D., & Heriyanto. (2023). *Speaking Learning Based on Local Cultural Wisdom*. Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-046-6_39

Panggabean, F. T. M., Pardede, P. O., Sitorus, R. M. D. S., Situmorang, Y. K., Naibaho, E. S., & Simanjuntak, J. S. (2021). Application of 21st century learning skills oriented digital-age literacy to improve student literacy hots in science learning in class IX SMP. *Jurnal Mantik*, 5(3), 1922–1930. https://iocscience.org/ejournal/index.php/mantik/article/view/1796

Pradesa, K. (2023). Learning analysis: implementation of the independent curriculum in improving numeracy literacy in elementary schools. *EDUHUMANIORA : Journal Pendidikan Dasar*, *15*(2), 173–182.

Ramadhani, N., Salija, K., & Baa, S. (2023). The correlation between students' critical thinking skills and their

reading comprehension at undergarduate study program english department faculty of languages and literature Universitas Negeri Makassar. *Klasikal : Journal of Education, Language Teaching and Science*, 5(1), 25–36. https://doi.org/10.52208/klasikal.v5i1.612

Rati, N. W., Kusmaryatni, N., & Rediani, N. (2017). Model pembelajaran berbasis proyek, kreativitas dan hasil belajar mahasiswa [Project-based learning model, creativity and student learning outcomes]. *Jurnal Pendidikan Indonesia*, 6(1), 60–71. https://ejournal.undiksha.ac.id/index.php/JPI/index

Redhana, I. W. (2019). Mengembangkan keterampilan abad ke-21 dalam pembelajaran kimia. *Jurnal Inovasi Pendidikan Kimia*, 13(1).

Ridho, M. H., Witarsa, R., Daulay, M. I., & Pebriana, P. H. (2023). Improving mastery of science concepts using problem based learning models in class V in Elementary School. 6(2), 3193–3202.

Riong. (2022). Development of LKPD with a contextual approach to material opportunities in SMP. *Holistic Science*, 2(3), 117–126. https://doi.org/10.56495/hs.v2i3.51

Sa', N., Jamaluddin, A. B., Fikri Masaha, M., & Sa'adah Jamaluddin, N. (2022). The influence of motivational factors on student academic achievement. *International Journal of Advanced Education and Development*, 4(2). http://www.amcs-press.com/index.php/ijaed/article/view/335

Setiyaningsih, I., & Sujarwo. (2023). The STAD learning model supported by scientific student worksheets on learning outcomes and collaboration skills of elementary school students. *International Journal of Elementary Education*, 7(1), 154–161. https://doi.org/10.23887/ijee.v7i1.57964

Silva, D. (2022). Science and scientific method. *Journal of Science and Research (IJSR)*, 368–410. https://doi.org/10.1037/13915-014

Solovyeva, N., Tapalova, O., & Smirnov, S. (2023). Specifics of the students' critical thinking formation within active learning space. *Frontiers in Education*, 8(March). https://doi.org/10.3389/feduc.2023.1132525

Sutaryono, S., & Prasetyaningtyas, F. D. (2020). Penanaman sikap inspiratif melalui pendekatan sains teknologi masyarakat. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, 10(2), 179–186. https://doi.org/10.24246/j.js.2020.v10.i2.p179-186

Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J. M., Morisseau, T., Bourgeois-Bougrine, S., Vinchon, F., El Hayek, S., Augereau-Landais, M., Mourey, F., Feybesse, C., Sundquist, D., & Lubart, T. (2023). Creativity, critical thinking, communication, and collaboration: assessment, certification, and promotion of 21st century skills for the future of work and education. *Journal of Intelligence*, 11(3). https://doi.org/10.3390/jintelligence11030054

Van Den Branden, K. (2015). Sustainable education: Exploiting students' energy for learning as a renewable resource. *Sustainability (Switzerland)*, 7(5), 5471–5487. https://doi.org/10.3390/su7055471

Wahyuni, E. S., Rahmayanti, H., & Ichsan, I. Z. (2021). Hubungan berpikir kritis dan motivasi belajar terhadap hasil belajar di masa pandemi covid 19. *Jurnal PenSil*, 10(3), 120–129. https://doi.org/10.21009/jpensil.v10i3.19275

Yasin, F., Bachri, B. S., & Arianto, F. (2020). The interaction between cooperative model and achievement motivation towards the students. *Academic Research International*, 11(3), 88–93.

Zainuddin, A., Harahap, P., & Naldi, W. (2023). Motivasi guru menulis karya ilmiah; faktor penyebab dan solusi (studi kasus pada guru IPA di Sekolah Menengah Atas Negeri Rejang Lebong -Bengkulu). *Edukasi Islami: Jurnal Pendidikan Islam*, 12(01), 601–614. https://doi.org/10.30868/ei.v12i01.3839

Zort, Ç., Karabacak, E., Öznur, Ş., & Dağlı, G. (2023). Sharing of cultural values and heritage through storytelling in the digital age. *Frontiers in Psychology*, 14(February). https://doi.org/10.3389/fpsyg.2023.1104121