Jurnal Biolokus: Jurnal Penelitian Pendidikan Biologi dan Biologi
Vol. 6, Issue 2, December 2023
Pages: 168-177

p-ISSN: 2621-3702
e-ISSN: 2621-7538

Canva-assisted biotechnology module based on Marsialap Ari's local wisdom: The endeavor to improve students' creativity skills

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ABSTRACT

The basis of this research is that the teaching materials created by teachers in the Southern Tapanuli area have not incorporated many models based on local wisdom such as Dalihan Natolu and Marsialap ari. These teaching materials can be utilized to evoke students' cultural values, character, and creativity. Efforts to enhance student creativity in biotechnology learning still need to be implemented, as the learning process is too fast and students' understanding is still lacking. This research aims to determine whether the module developed is suitable for use as Biotechnology teaching material in high school based on the BNSP assessment criteria. Additionally, it aims to observe the effectiveness of students using a biology module based on local wisdom (Marsialap ari) assisted by the Canva application on biotechnology material as teaching material in learning for the tenth-grade students in SMA/MA majoring in science. This research is a 4D model development research with research procedures that include defining, designing, developing, and disseminating. The research results can be obtained from the data obtained from several validators, both quantitatively and qualitatively, using descriptive statistical analysis calculations. The module validity of 76.6 - 100% is categorized as valid criteria and LKPD content validity of 80 - 93% is categorized as valid criteria. The product of this research is a biotechnology teaching module based on the local wisdom of Marsialap ari for SMA/MA students. The effectiveness of the module was evaluated based on student performance, with an average of 95 categorized as effective and an average of 90.3 categorized as very creative. In conclusion, the Biotechnology module based on Marsialap ari, assisted by the Canva application, is declared valid for use in studying biology and can enhance students' creativity in learning biology.

Keywords: Biotechnology, creativity, local wisdom, marsialap ari

INTRODUCTION

The development of learning models that integrate local wisdom culture still needs improvement. According to Rummar, M. (2022), learning based on local wisdom is crucial for teachers to apply in their teaching, as it can increase students' knowledge and understanding, as well as cultivate positive character traits according to the noble values of local wisdom. This can help equip students to face problems outside of school. Kun (2013) states that Local Wisdom Based Education is a conscious, planned effort that explores and wisely utilizes the potential of the local area to create a learning atmosphere and process, so that students can actively develop their potential to have skills, knowledge, and attitudes to participate in building the nation and state.

It is essential to implement education based on local wisdom in schools. This will demonstrate the importance of preserving and promoting local culture and values (Wagiran, 2011; Shufa, 2018; Nurrahmi, 2018). Application in education in the form of developing learning media based on local wisdom has been proven to be able to increase student motivation and learning activities (Winangun, 2020), improve high level learning abilities (Lawe et al., 2021), and can foster good values in students and be able to improve students' writing literacy skills (Wahyuni & Ninawati 2020).

The southern part of Tapanuli is well-known for its "*Marsialap ari*" culture, which is a tradition of completing work by working together in a

group. According to Pulungan, D Z, (2020), the *Marsialap ari* culture is expected to shape the character of the Mandailing Community, which values family atmosphere, collaboration, cohesiveness, and enthusiasm for work. Meanwhile, Khomariah (2023) describes *Marsialap ari* as an activity of mutual assistance and cooperation carried out by the Mandailing community in turns while working on rice fields, including manajak (clearing rice fields), marsuan eme (planting rice), and manyabi (harvesting rice). By cooperating to complete a job, it is hoped that the level of creativity will increase.

Biology is the scientific study of living organisms and the natural phenomena that interact within them. In education, the emphasis is on providing direct experiences to develop teachers' abilities in teaching strategies that increase student motivation. This, in turn, leads to greater student participation in teaching and learning activities, which has a positive impact on student creativity. Hogan supports this idea by suggesting that science can be made more interesting by exploring real nature and culture. Science as an academic discipline contributes to understanding science as a scientific discipline that has the opportunity to integrate with local wisdom and sustainable education (Hogan & O'Flaherty, 2022).

In the learning process, most students are not encouraged to develop creativity. The classroom learning experience is usually focused on memorizing information conveyed by the teacher. This causes students to only retain information in their memory, without thinking about how to solve existing problems (Slameto, 2015).

Initial interviews with 8 students revealed that most consider biology lessons as rote learning, and there is no emphasis on testing and applying biological knowledge. As a result, students tend to take notes narratively and listen to explanations from the teacher. Student activities and character are less visible, which leads to a lack of creativity in learning. This can be seen in the inability of students to answer questions in the form of descriptions and the inability to analyze problems or find solutions creatively in solving problems in the environment. Budiarto and Natalia's statement that learning innovation is important because it plays a role in creating creative and skilled students in the midst of high competition to obtain the demands of life-sustaining abilities supports this idea (Budiarti & Harlis, 2020).

In schools, it is still common to find teachers providing learning without using media prepared by themselves. It is also rare to find teaching media related to local wisdom, especially in the Southern Tapanuli area, such as *Dalihan Na Tolu, Marsialap ari,* traditional culture such as Lubuk Ban, and others. The goal is to increase student creativity, especially in biotechnology material. However, findings in schools show that biology learning still uses currently developed methods, but there is less improvement in creativity and direct skills in applying the knowledge gained by students.

According to Guilford in Thabroni (2022), Indicators such as fluency, flexibility, originality, elaboration, and redefinition can measure the increase in students' creative abilities. In formal education, teachers must be able to develop students' creative thinking abilities (Ririn, 2015). Students should be able to express their opinions and not just accept the information conveyed by the teacher. They should also be able to develop that information so that learning objectives can be achieved effectively.

Collaborating *Marsialap ari* culture with teaching modules assisted by the Canva application can strengthen concepts in real-life situations. It can help students solve problems, make decisions, explore information, and increase self-confidence, responsibility, cooperation, and communication. Nowadays, many applications are available to help teachers create innovative teaching media, making the learning process more active and motivating for students. By working together on projects, students can be more creative in producing biotechnology products and increase their entrepreneurial spirit (Situmorang et al., 2020). However, many teachers still do not use these

models and approaches in accordance with the material being taught, making it even more difficult for teaching modules to be supportive. According to Ramdani et al. (2020), local wisdom is a culture owned by a certain community in a specific location that is thought to be able to survive against the flow of globalization. This is because local wisdom contains values that can function as builders of national character.

Student learning outcomes are affected by the adjustment of learning models. According to Rahman (2018), when choosing an appropriate learning model, it is best to consider the students' condition, the nature of the teaching module material, the available media facilities, and the condition of the teaching staff themselves. Based on this explanation, students can use a module to study independently or without teacher assistance, and the Canva results are in the form of videos so that students can repeat the material over and over again until they understand the concepts being taught. Budiarti & Harlis (2020) support this idea, stating that learning innovation is important because it plays a role in creating creative and skilled students amidst high competition to obtain life-sustaining abilities.

Students are expected to have high creativity and good personalities, such as being independent, responsible, hardworking, highly motivated, optimistic, curious, self-confident, open, tolerant, and rich in thinking. These qualities can be realized through strong student motivation. Therefore, students' creativity skills can grow if accompanied by high motivation (Aprilia et al., 2021). Low thinking abilities among students pose a challenge for teachers to improve the teaching and learning process. One way to address this is by designing learning media that is as attractive as possible, making it easier for students to understand concepts and construct their own opinions. By creating a teaching module based on local wisdom "*Marsialap ari*" with the help of the Canva application, students can be trained to solve problems and hone their creative thinking skills. This module directs students to find solutions to the problems they face. According to Marrone et al. (2022) most students demonstrated a thorough understanding of creativity and reported that artificial intelligence could never match human creativity.

In this teaching module, a large group formed by the teacher is directed to establish cooperation between several small groups in producing biotechnology products up to the marketing stage. They make reports in the form of activity video products to make the learning process interesting and fun in small groups and provide new experiences that are useful, leaving the impression and character of working together in solving problems. With the discovery of this problem, research needs to be carried out by developing a teaching module based on *Marsialap ari* local wisdom assisted by the Canva application on biotechnology material to increase student creativity at SMAN 6 Padangsidimpuan.

METHOD

The research used is research and development, which produces products. Thiagarajan et al. (1974) proposed the 4-D development model, which consists of four stages: definition, design, development, and dissemination, as shown in Figure 1.

Using the Canva application is one way to help students study independently and repeat material whenever necessary. Walle (2008) explained that technology is important in the process of learning and teaching biology, as it can influence the material taught and improve the learning process. Canva is one of the tools used to record activities, or more precisely, to record all activities carried out by the computer. The use of media based on local wisdom is also necessary for developing the learning process, where modules as learning guides play an active role in the learning process that is adapted to the culture of the environment (Hadi & Dazrullisa, 2018).

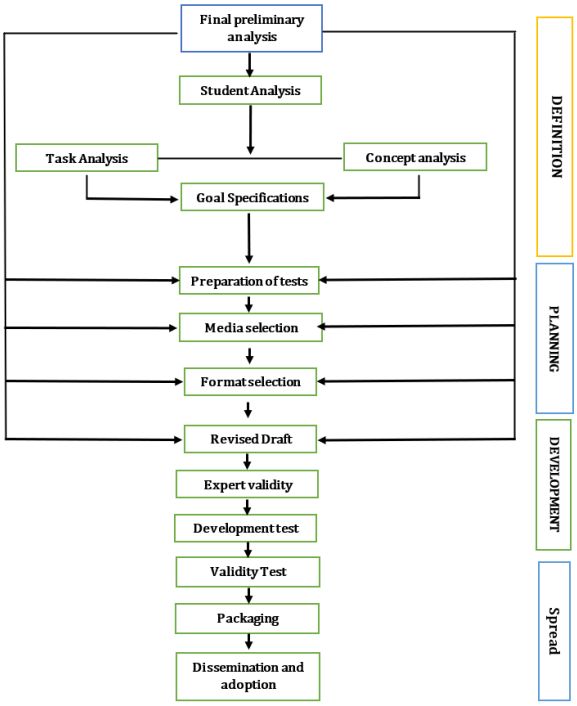

Figure 1. Research implementation flow chart

The research was conducted at SMA Negeri 6 Padangsidimpuan using a validity sheet as an instrument. The validity of learning tools was categorized based on the final score obtained on a scale of 0-100, and the practicality of the teaching module was analyzed using quantitative descriptive analysis. This involved describing the validity, practicality, and effectiveness of the teaching module using the *Marsialap ari* local wisdom-based learning model.

RESULTS AND DISCUSSION

Defining step

Based on data from research results at the Define stage, analyzing competency standards and subject matter limitations based on the Independent Curriculum regarding Learning Achievements at the Secondary Education level number 008/H/KR/2022 (Sapitri, 2022), the independent curriculum is a natural learning process to achieve independence (Fianingrum et al., 2023). The learning environment here emphasizes the importance of learning without pressure or stress from personal or environmental problems. Students are encouraged to be creative and innovative, and not feel shackled by any constraints. According to Feng et al. (2023), the biological innovation material enters phase E, where students are required to recognize their potential and talents before entering a higher-class level. This is demonstrated by the obligation of each student to choose at least one arts and crafts subject. In phase F, students can choose the subject they like based on their interests and talents. In this phase, the biological science learning process is carried out using a contextual and student-centered inquiry approach. Through this approach, students have authentic learning experiences that enable them to solve problems in their daily lives, according to the stages of scientific work.

Marsialap ari-based learning enables students to independently hone their reasoning, generate creativity, collaborate, and communicate knowledge with other students. The aim is to instill a sense of awe and gratitude towards the creator (spiritual attitude) while respecting living creatures and helping to protect the environment. Students develop the ability to communicate and collaborate by paying attention to applicable ethics and norms. They also gain an understanding of the development of biological science over time through the dynamics of the work processes of scientists who are able to influence society in personal, local, and global contexts. Students learn to understand biological problems within the individual, family, environmental, and global scope and apply biological science to overcome these problems. They generate ideas as a result of adaptation, adoption, modification, and various new creations based on experimental results.

Based on the learning outcomes, students are expected to be able to create solutions to problems in biological innovation and have the skills to understand, identify, plan, process, and analyze data. They should also be able to evaluate and communicate the results of investigations in accordance with the limitations of the biological innovation material in the biotechnology chapter.

Designing step

At the stage of producing a design for a biotechnology teaching module in phase E based

on *Marsialap ari*, Canva was used to create a Canva-based learning video on a YouTube link. Book literature was also consulted to create the material that will be used in the teaching module. Student worksheets (LKPD) were prepared with the help of Canva Module, which has been completed. After the design was validated by experts offline and online, modules and student worksheets were created and combined using the Canva application. The module cover (Figure 2) demonstrates the effectiveness of this approach.

Figure 2. The cover of biotechnology module based on *Marsialap ari*.

Development step

At this stage, expert appraisers or evaluators (expert appraisal) are the only ones who implement the module. The module, lesson plan, and students' worksheet are validated by three validators each (Table 1).

Table 1. Results data on the validity of the module and worksheet which have been assessed by three validators.

No	Aspects	Steps		Criteria
		I	II	
1.	Validity results of the module	76-100%	83-100%	Valid
2.	Validity results of learning tools and worksheet	63,46%	81,62%	Valid

From the data, it can be seen in the comparison graph of the validation results which have been carried out in 2 stages, namely the initial stage to the revision stage and are suitable for use. Based on data on the validity of worksheets and learning tools, obtained the data as in Figure 3.

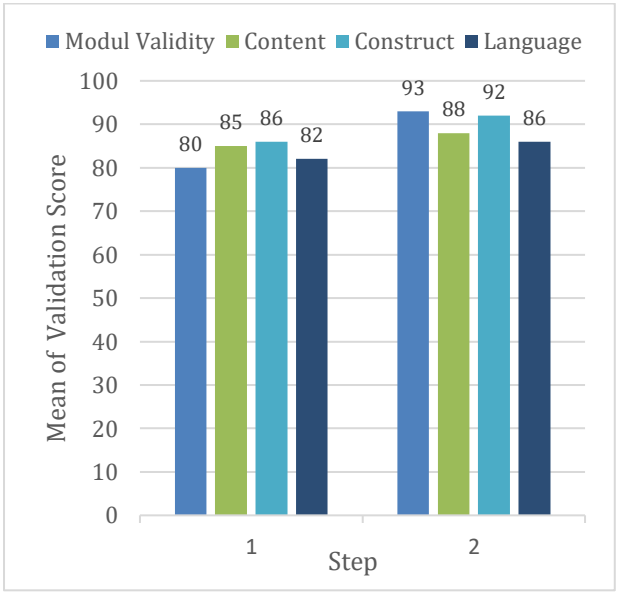

Figure 3. Student module and worksheet validity results.

Based on Figure 3, it can be concluded that the *Marsialap ari* local wisdom-based biotechnology module is valid and can be tested on either a limited or large scale to increase student creativity. This is in accordance with Nasution's (2017) opinion that learning is an activity to regulate or manage the environment in the best way possible and to relate to students so that a process called learning occurs. Meanwhile, Sagala (2017) defines learning as student learning using pedagogical principles and learning theories which are used as benchmarks for academic success. The *Marsialap ari* local wisdom-based biotechnology module is valid and can help students develop problem-solving skills, increase understanding and knowledge, and be active in gaining knowledge. This is proven by the results of students' understanding of completing student worksheets that have been done by each student in group work and completing projects in the form of work products. Birgili (2015) has put forward a requirement that every individual must approach learning with everyday problems connecting these two competencies. Therefore, a problem-based learning environment in the classroom that is applied in everyday life is one of

the useful tools for developing creativity and critical thinking skills.

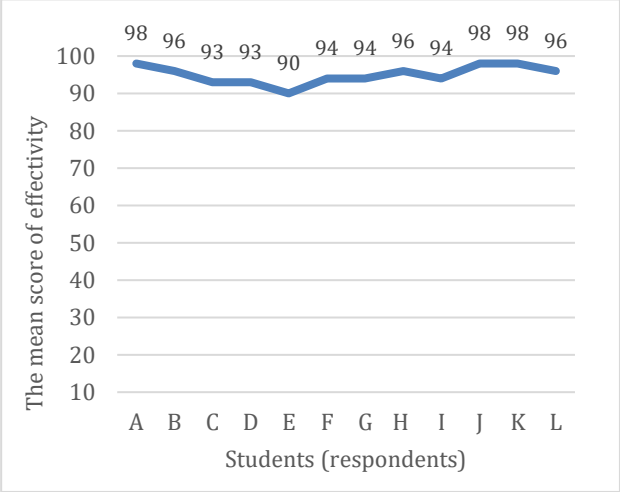

Figure 4. Students' learning effectiveness.

By using the Canva application, this book can be made available to high school students, which can increase their creativity. This is evident from the results of observations of the effectiveness of 12 students' learning in the class, as shown in Figure 4.

The graph shows that students scored an average of 95 in the active category during the implementation of learning. This was observed when the teacher explained the learning process and during group work while observing Canva-based learning modules and videos that were already available in the classroom. The YouTube link provides more information.

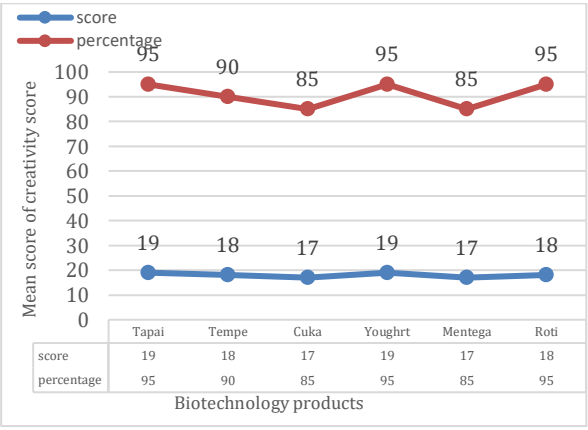

Figure 5. Students' creativity results in learning.

The learning results using the student group creativity module used for 6 small groups can be seen in Figure 5. The graph above shows that the percentage of students' group scores in producing work projects at the conventional biotechnology stage reached the 'very creative' category. This is because, at the stage of completing the worksheet, students are expected to have an understanding, application, and synthesis of biotechnology material, with the final result being a work product. All students work together to complete their group assignments, and each group helps each other until the work product of all groups is perfect. According to Oje et al. (2023), Virtual Reality (VR) is an advanced technology that can improve engineering education by providing an immersive and interactive learning experience. Direct student interaction at the stages of biotechnology learning, as outlined in the module, can lead to a very high level of student creativity. Arends (2012) suggests that the learning model used can be effective if it is supported by teaching media that helps solve problems and create innovative learning. This can help educators make more informed decisions when creating and implementing learning activities. Analysis of interviews highlighted that students viewed the relationship between AI and creativity in terms of four main concepts: social, affective, technological, and learning factors. Oje et al. (2023) stated that considering cognitive results (such as procedural knowledge) and affective results (such as student motivation), instructional designers can create effective products if they are supported by virtual media prepared by teachers.

Students with a better understanding of creativity reported more positive attitudes towards integrating creativity into their classrooms. According to Yang (2023), collaborative learning can eliminate potential student frustration in the learning process. This application increases personal creativity in instructional design, encourages empathy and practice, improves pedagogy, and increases student engagement and satisfaction. The resulting module consists of four chapters, namely:

Chapter 1, Biotechnology (Figure 6), which includes *Marsialap ari*-based LKPD assisted by Canva and learning videos which are available at

the following link https://youtu.be/yDJ-8bx5Y_U?feature=shared

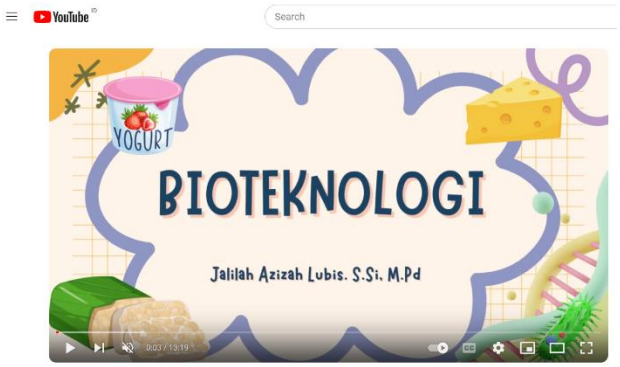

Figure 6. Chapter 1 display.

During the limited test, it was observed that the 12 students were very active in working on the LKPD and understanding the material from the learning modules and videos. To achieve high effectiveness, it is concluded that teachers must be active in creating complete media and modules in LKPD. According to Beritahu and Hoveskog in Han & Abdarahim (2023) , students not only need professional skills but also soft skills, which include the ability to creatively overcome complex problems, collaborate with others, and overcome economic, social, and cultural challenges in order to navigate the ever-changing world effectively (Han & Abdrahim, 2023).

Chapter 2, Conventional Biotechnology (Figure 7), includes a *Marsialap ari*-based LKPD that is assisted by Canva and a learning video. The video is available at the following link: https://youtu.be/WDNuFu1f8Mo?feature=shared. In Chapter 2, we discuss the process of making conventional biotechnology products and their characteristics. The video emphasizes the importance of understanding these characteristics and their benefits for society. This material is linked to learning experiences and the results of student collaboration in completing *Marsialap ari*-based products. Each large group consists of three small groups that collaborate with each other to complete their respective product assignments. They produce three videos of conventional biotechnology material and share creative ideas between groups. This process is in accordance with Hauze and Marshall's opinion in Banjar Areej that the diffuse integration of MR technology in education has benefited students by increasing their motivation, problem-solving skills, and overall learning experience (Banjar et al., 2023).

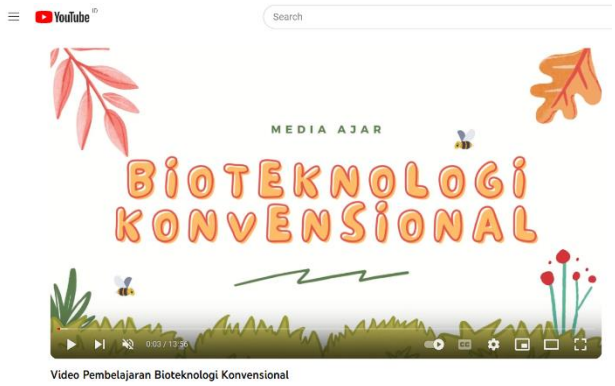

Figure 7. Chapter 2 display

Chapter 3, Modern Biotechnology (Figure 8), also includes *Marsialap ari*-based LKPD with the help of Canva and learning videos which are available at the following link: https://youtu.be/UwqUe3Xf32M?feature=shared. In this chapter, we emphasize examples of biotechnology products in real life that have an effect on students. Students can more easily understand processes and activities because they affect everyday life. Completion of LKPD on modern biotechnology material is carried out by small groups who share discussions and examples of modern biotechnology. Then, small groups share the results of their respective discussions in the large group, and conclusions are drawn from each task. In this large group discussion, the results obtained were that small group students understood the discussion that was shared and understood the discussion of all members of the large group. This activity enabled *Marsialap ari*-based learning. This is in accordance with previous research where a common opinion was found that immersive virtual reality (VR), as a new technology that is widely accepted in the field of education, can improve people's learning outcomes by imitating real-life scenarios. The advancement of immersive VR technology provides new opportunities to simulate targeted conditions/environments in a vivid manner,

which provides a suitable platform in an educational environment for learners to participate and serves as a learning environment by immersing learners in the scenario (Ma et al., 2024).

Figure 8. Chapter 3 display.

Chapter 4 discusses the role of active microorganisms in biotechnology and their products. It also highlights the uses of these products in daily life and their associated side effects. The chapter shows that student creativity increases as seen from the contents of the LKPD they complete and the completion of cognitive tests. According to Maor et al. (2023), teachers themselves must be proficient in metacognition, creativity, and critical thinking skills to help students achieve the 21st century cognition skills associated with PBL implementation in their lessons. Previous research has found that metacognition, creativity, and critical thinking are complementary skills in teaching. Therefore, it is necessary to collaborate between these three criteria in learning, especially biotechnology, and this has been included in this teaching module.

CONCLUSION

Based on the above description, we can conclude that the *Marsialap ari* local wisdom-based Biotechnology Module, assisted by the Canva application, is valid and effective. It can be used in learning to increase student creativity. Suggestions from this research are that further research should be carried out analyzing students' motivation and artificial intelligence.

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