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Development of Biopreneurship Project-Based Module for Junior High School Students in Mandalika Lombok Special Economic Zone

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Abstract: The development of entrepreneurial literacy is crucial for students to prepare themselves to benefit from the current development of the Mandalika Lombok Special Economic Zone (SEZ). The purpose of this study is to develop a project-based science module focusing on biopreneurship to enhance students' entrepreneurial literacy. This research is a development study that adopts the Dick and Carey model. The research data consist of a description of the development of the science module and its theoretical feasibility. The feasibility of the science module is analyzed using Aiken's V formula. The research results indicate that the expert assessment of the feasibility of the biopreneurship-based project-based science module shows a percentage of 77.3% in the category of being suitable for use. Meanwhile, the biopreneurship project worksheets have a percentage of 73.9% in the category of being suitable for use. Additionally, the learning steps have a percentage of 80.0% in the category of being suitable for use in teaching and learning. The conclusion of this study is that the development of the project-based biopreneurship science module can be effectivelyi used to enhance students' entrepreneurial literacy.

Keywords: Biopreneurship Project; Entrepreneurial Literacy; Mandalika Lombok; Sience Module

Introduction

The Mandalika Lombok Special Economic Zone is an area encompassed within a region designated for economic functions (Mahendra, 2020). The enhancement of the economy and welfare based on the development of local resources can be realized through entrepreneurial activities (Romarina, 2016). Entrepreneurship is an endeavor that can be pursued by anyone, including students (Winarti, 2020). Students can possess an entrepreneurial spirit and mindset when the entrepreneurial aspects are cultivated through effective entrepreneurial literacy programs (Almuna, et al., 2020). Entrepreneurial literacy can enhance students' comprehension related to entrepreneurship and various positive traits, such as innovation and creativity, in recognizing and developing business opportunities (Trisnawati, 2014)

Education aims to develop knowledge and skills as well as an independent and responsible personality (Ilham, 2019). This educational objective can be achieved when supported by the quality of educational implementation and reflected in the curriculum (Noor, 2018). Both the 2013 Curriculum and the Merdeka Curriculum have integrated learning with the demands of 21st-century skills that students need, including life skills and entrepreneurial skills. The development of life skills and entrepreneurial literacy in students can be facilitated through the use of teaching materials that enable students to engage in project-based activities.

The initial observations conducted at the junior high school within the Mandalika Lombok Special Economic Zone (SEZ) revealed that the instructional

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materials used mainly consisted of school-provided textbooks. However, other instructional materials, particularly teaching modules and student worksheets that could facilitate independent learning, were not yet available. Moreover, the teaching methods were still predominantly lecture-based, with the content being derived from the provided textbooks but not connecting the concepts and principles of the material with entrepreneurship or biopreneurship concepts. These aspects serve as the foundation for the need of innovative instructional materials that can enrich students' learning resources in a suitable, practical, effective, and relevant manner, aligning with the goals of SEZ development and addressing existing contextual problems.

Biopreneurship is a learning approach that integrates biological concepts with entrepreneurship concepts (Prihatiningrum et al., 2019). Biopreneurship projects provide meaningful and practical learning experiences for students, enabling them to identify and recognize opportunities, design, create new business prospects, and produce products, goods, and services through project-based learning that fosters creativity and students' entrepreneurial literacy (Wardhani et al., 2020; Aqil et al., 2020). Biopreneurship projects require the assistance of a learning module to enhance their effectiveness. Therefore, the objective of this study is to develop a project-based science module focused on biopreneurship that is feasible for enhancing students' entrepreneurial literacy in the Mandalika Lombok Special Economic Zone.

The science module is a comprehensive and systematic learning module of the Merdeka curriculum, encompassing a set of planned learning experiences designed to assist students in mastering specific learning objectives (Rahdiyanta, 2016) and facilitating the development of students' scientific literacy (Zohri et al., 2023). The project-based biopreneurship science module that has been developed is an instructional material containing a set of learning experiences to aid students in achieving specific learning objectives, with a focus on project-based learning and an empowerment approach that integrates biological concepts with entrepreneurship concepts.

Method

The type of study was research and development (R&D) aimed at producing an appropriate science module for use in teaching (Sugiyono, 2017). The development process of the science module adopted the Dick and Carey development model (Dick et al., 2013). The preliminary study stage of this development research began with a literature review and field study to obtain initial information about the actual conditions in the field related to the teaching materials used so far, including textbooks, teaching modules, lesson plans, and student worksheets. The preliminary study also involved analyzing the responses of students and teachers in the teaching and learning process, user analysis, analysis of the availability of basic materials in biopreneurship project activities, as well as an analysis of students' interest in biotechnology subjects.

The sequence of steps in the research was as follows: identified learning objectives, conducted a learning analysis, analyzed student characteristics and context, formulated learning achievement indicators, developed assessment instruments focused on creativity tests and entrepreneurship literacy, developed strategies implementing project-based biopreneurship learning, designed and developed learning materials, designed and conducted formative evaluations during the module trial stage, revised instructional materials based on the review results from validators and formative evaluation, and designed and conducted summative evaluations. The stages in this research procedure can be seen in Figure 1.

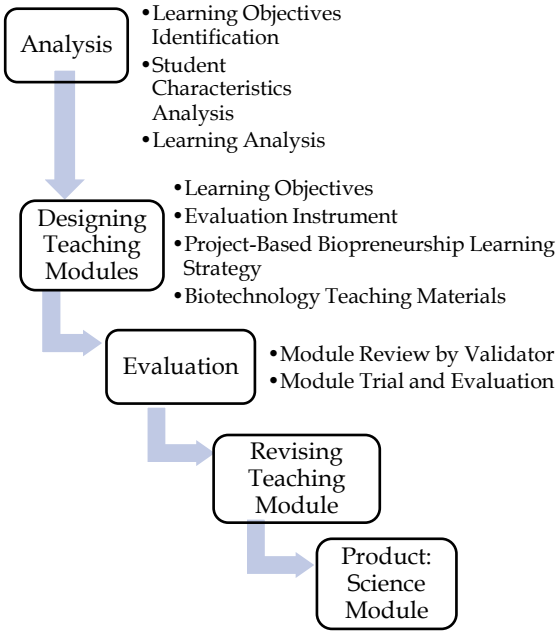

Figure 1. Science module development flowchart

The result of the development research was a product in the form of a biopreneurship project-based science module, a biopreneurship project worksheet, a lesson plan, creativity tests, and entrepreneurship literacy tests on the topic of biotechnology for 9th-grade junior high school students. The products were then subjected to feasibility testing. The feasibility test was conducted by three expert professors as validators. The feasibility score of the science module was calculated based on Aiken's V formula. The science module was

then revised based on the validators' suggestions. After the revision process, the science module was piloted in student learning activities.

Result and Discussion

Identifying the objectives is the initial stage in determining the ultimate outcomes or outputs of the development activities that can be actualized by students after participating in the learning process. Based on the results of identifying the learning problems in the school, the chosen objectives in developing the science module are as follows: first, the development of teaching materials that integrate biological concepts with entrepreneurship concepts, resulting in a biopreneurship project-based science module. Second, fostering students' creativity with the expected outcome of an increase in students' creativity after participating in the learning process using the developed module. Third, enhancing students' entrepreneurial literacy with the anticipated outcome of an improvement in students' entrepreneurial literacy after participating in the learning process using the developed module. These three development objectives have a positive correlation with the skills needed by 21st-century human resources.

The learning analysis aims to assess the learning conditions in the school and identify issues that serve as the basis for developing teaching materials. The learning analysis is conducted through direct observation and the use of questionnaires. It encompasses seven types of analyses, namely: instructional material analysis, learning strategy analysis, analysis of the need for student creativity, entrepreneurial literacy of students, project-based learning, biopreneurship approach, learning module analysis, user readiness analysis, material analysis, curriculum needs analysis, and availability analysis of basic biopreneurship project materials.

The results of the learning analysis showed that the instructional materials used in the research location were the 2017 edition of the Science textbook for both teachers and students, published by the Ministry of Education and Culture of the Republic of Indonesia. The analysis of the components of the instructional materials used in the school revealed a composition that was still inadequate in facilitating the creativity and entrepreneurial literacy of the students. It is imperative to clearly integrate students' creativity and entrepreneurial literacy into the instructional materials in order to fulfill a portion of the demands for 21st-century skills and the independent learning curriculum (Almuharomah et al., 2019; Muhali, 2019; Nandang et al., 2023; Dewi, 2019; Indrasari et al., 2022). The possession of 21st-century skills makes aspects of creativity and entrepreneurial literacy for students crucial in developing teaching materials and instruction. Moreover, none of the instructional materials in the school provided criteria regarding students' creativity and entrepreneurial literacy. Additionally, the learning evaluation instruments used in the school so far have not assessed students' creativity and entrepreneurial literacy.

The results of the analysis of the teaching strategies employed in the school indicate that the expository model is the most frequently used model in the study location, often accompanied by discussion, question and answer, and assignments. Meanwhile, across all teaching tools, the discovery model predominates. These findings indicate that project-based learning models have not yet been implemented, and the biopreneurship approach has also not been applied.

The analysis of development needs is based on the shortcomings and weaknesses of the existing instructional materials, as well as the potential for developing a project-based biopreneurship science module to enhance student creativity and entrepreneurial literacy. The need analysis relies on feedback from teachers and students obtained through the use of questionnaires. The results of the analysis concerning aspects of student creativity, entrepreneurial literacy, project-based learning, the biopreneurship approach, and instructional modules can be observed in Table 1.

Biopreneurship holds potential as a framework in the development of instructional materials, especially in learning modules that can integrate student creativity and entrepreneurial literacy. This framework's potential is evident through the indicators of the biopreneurship approach, which include recognizing business opportunities for a product, determining necessary tools and materials for the production process, designing the product manufacturing process, conducting SWOT analysis on the product, implementing the production process as planned, innovating the product, and determining the product's best quality through testing (Prihatiningrum et al., 2019). Integrating biological concepts and entrepreneurship concepts in learning can be most effective when students undergo direct experiential processes. Assignments to create a product collectively, as conducted in the biopreneurship approach, can nurture student creativity and entrepreneurial literacy through project-based learning. Project-based learning is one of the most effective teaching models for enhancing student creativity and entrepreneurial literacy in the Industry 4.0 era (Abdullahi et al., 2020).

The results of the analysis of the current instructional materials in the field and the potential of the biopreneurship approach, along with project-based

learning models, indicate a need for new instructional materials to be developed. A learning module capable of accommodating both student creativity and entrepreneurial literacy components is a form of instructional material that can enhance the state of the existing materials. This need aligns with the findings of the needs analysis, where the requirements for student creativity, entrepreneurial literacy, the biopreneurship approach, project-based learning, and instructional modules fall under the "very high" category (Table 1). Additionally, it's been confirmed that the existing instructional materials in schools are perceived to be insufficient for supporting student creativity and entrepreneurial literacy.

Table 1. Results of the Development Needs Analysis

Item	Aspects				
	Module	PjBl	Biopreneurship	Creativity	Entrepreneurship Literacy
Teacher's Response					
Level of familiarity	1	1	0	1	0
Level of application to learning	0	0	0	0	0
The level of need to learn the natural sciences	1	1	1	1	1
Student Response					
Level of familiarity	25.7%	9.5%	0%	35.1%	20%
Level of application to learning	0%	0%	0%	27%	6.7%
The level of need to learn the natural sciences	97.3%	94.6%	93.2%	87.8%	83.8%

The teacher's response has a score of 1 if there are mentioned components and a score of 0 if the intended components are not present. A student response of 0–25% indicates a category score of very low, 26–50% indicates a low category, 51–75% indicates a high category, and 76–100% indicates a very high category score.

Interesting responses are evident in the aspect of biopreneurship. Students and teachers agree that biopreneurship can act as a catalyst for increasing students' attention to learning. This is marked by the results of this study (Table 1), where teachers and students express that their level of need for science learning with a biopreneurship approach is classified as very high. This aligns with the findings of Hudaya et al. (2020), where the integration of biopreneurship into education is positively received in the educational landscape today. Additionally, Aqil et al. (2021), on two different occasions, stated that the integration of biopreneurship can enhance attitudes, interests, and motivation, resulting in livelier and more effective learning that influences the achievement of learning objectives.

Another intriguing response is observed concerning the use of modules and project-based learning in schools (Table 1). The level of module utilization as a learning tool for students and project-based learning is categorized as very low (Table 1). This presents an ironic fact, as modules and project-based learning models are widely used, and furthermore, they have become necessities in education today. Moreover, it is revealed that, based on the needs analysis, almost all students have a positive response (Table 1). This indicates that the implementation of modules and project-based learning in education is still lacking, even though students exhibit a strong interest in project-based learning. Ule et al. (2021) and Mawati et al. (2023) state that current instructional modules need to be developed and refined to support education in schools.

User readiness analysis aims to gather information about the appropriate type of technological media to be used in implementing the instructional module. The technologies referred to in this study are Android smartphones and computers. The respondents used to analyze the user readiness aspects are 74 ninth-grade students from SMP Negeri 7 Pujut, SMP Negeri 1 Pujut, and MTs Nurul Ijtihad Al-Ma'arif NU Lenser. The user readiness aspects analyzed are related to whether it is better to use electronic modules or printed modules. The analysis is based on the ownership of smartphones and computers, the operating systems and browsers on the devices, the level of proficiency in using the devices, and/or the interest in using electronic modules or printed modules. The results of the student response analysis are presented in Table 2.

Based on Table 2, it is revealed that most students possess smartphones, but very few have computers. Furthermore, students who have smartphones or computers also demonstrate proficiency in using both devices. Additionally, regarding the level of interest, there is a higher preference for printed modules compared to electronic modules. These findings indicate a significant potential for the use of printed modules in classroom learning, and students are more inclined to use printed modules than electronic ones.

Table 2. Results of User Readiness Analysis

Statement	Response	
	Agree	Disagree
Smartphone Usage		
Students have a personal smartphone	79.7%	20.3%
Smartphones owned using the Android operating system	79.7%	20.3%
Students are skilled in using Android smartphones	98.6%	1.4%
Personal Computer (PC) Usage		
Students have a personal computer (PC)	22.0%	78.0%
A personal computer (PC) owned by an installed web browser	22.0%	78.0%
Students skilled in operating personal computers (PC)	22.0%	78.0%
Electronic Module Usage		
Interest level using electronic modules	47.3%	52.7%
Print Module Usage		
Interest level using the print module	52.7%	47.3%

The analysis of teaching materials aims to determine the components of the teaching module development. The material developed in this module is about biotechnology for Grade IX, second semester, at the junior high school/Madrasah Tsanawiyah level. The selection of biotechnology as the subject matter in this research is based on several reasons: firstly, biotechnology is a subject that must be taught in the science curriculum for Grade IX, second semester, according to the junior high school/Madrasah Tsanawiyah curriculum. Secondly, biotechnology material is related to real-life issues for students, which can encourage the relationship and interaction between their knowledge and its application in daily life. Thirdly, biotechnology is a subject that can be integrated into project-based learning and the biopreneurship approach, making it easier for projects that combine biological concepts with students' entrepreneurship concepts. Fourthly, the selection of material is aimed at providing teaching materials in the form of modules that are suitable for achieving the learning objectives, which is to enhance students' creativity and entrepreneurial literacy.

The learning outcomes (LO) for biotechnology in the 9th-grade second semester are based on the decision of the Head of the National Standards, Curriculum, and Education Assessment Agency of the Ministry of Education, Culture, Research, and Technology, Number 008/H/KR/2022 concerning Learning Outcomes for Early Childhood Education, Basic Education Level, and Secondary Education Level in the Merdeka Curriculum. The achievement of learning outcomes for Phase D of 9th-grade junior high school students, in element 1, understanding of science, and in element 2, process skills, are presented in Table 3.

The LO for element 1, science understanding, and for element 2, process skills, are further elaborated in the sequence of learning objectives (SLO) for science in junior high school. The formulation of SLO is aligned with LO and can be seen in Table 4.

Table 3. Learning Outcomes (LO)

Element 1 Science Understanding	Element 2 Process Skills
Having the determination to make the right decisions to avoid harmful additives and addictive substances for oneself and the environment.	Evaluating conclusions through comparison with existing theories. Presenting the strengths and weaknesses of the investigative process and its impact on data. Identifying issues in the methodology. Communicating comprehensive research results supported by relevant arguments, language, and scientific conventions. Demonstrating systematic thinking according to the prescribed format.

Table 4. Learning Objectives Flow

Learning Materials	Learning Objectives	Pancasila Student Profile	Lesson Hour
Biotech-nology	Applying the concept of biotechnology and its role in human life	Believe and fearing the One God, and be noble, critical, self-reliant, global, creative, and Collaborative.	18
	Making one of the conventional biotechnology products that exist in the surrounding environment		

The next material analysis is related to the depth and breadth of knowledge aspects and process skills to facilitate the integration of content and learning concepts by applying Project-Based Learning (PjBL) and subject matter that can be linked between biological concepts and student entrepreneurial concepts. The results of the analysis regarding the depth and breadth of biotechnology content are presented in Table 5 below.

Table 5. Results of Analysis of Depth and Breadth of Biotechnology

Element	Depth			Breadth	
	Aspect	Operational Verb	Bloom Taxonomy	Sub Material	Thinking Level
9.1	Cognitive	Applying	C3	Conventional and Modern Biotechnology The application of biotechnology in various fields as well as its impact	Conceptual
9.2	Psychomotor	Create	P6	Food Biotechnology	Procedural

Based on Table 5, regarding the analysis of the depth and breadth of the content, it indicates that the aspects to be achieved by students in element 1 of cognitive domain knowledge are at Bloom's taxonomy level C3 with a conceptual thinking level. Meanwhile, in element 2 of psychomotor domain process skills, it's at level P6 with a procedural thinking level. The analysis of depth, breadth, and content needs leads to the conclusion that the learning process for biology content is implemented using project-based learning. The content and sub-content in biotechnology can be integrated between biological concepts and student entrepreneurial concepts.

One of the factors considered in product development is the utilization of the curriculum. Both the 2013 curriculum and the Merdeka curriculum provide a fundamental framework for product design, so it is necessary to determine which curriculum will serve as the reference for product development from the outset. In this study, the chosen curriculum is the Merdeka curriculum. The rationale for selecting the Merdeka curriculum is that the government, through the Ministry of Education, Culture, Research, and Technology, has mandated the implementation of the Merdeka curriculum for 7th-grade junior high school students during the academic year 2022/2023. Furthermore, in the subsequent academic year 2023/2024, the implementation of the Merdeka curriculum will be expanded to include 7th and 8th grades, and then in the academic year 2024/2025, it will be further extended to cover 7th, 8th, and 9th grades. The developed product is prepared for use to fulfill current, future, and long-term needs. Therefore, the development process also involves various stages that need to be traversed, including periods for improvement and refinement to achieve the desired product excellence.

The analysis of the availability of basic materials for biopreneurship projects is based on the availability of fundamental materials that can be integrated into biotechnology content through project-based biopreneurship learning. The available basic materials are predominantly coconut, soybean, cassava, and corn. This data was obtained from teacher responses through questionnaires and was considered in determining the projects undertaken, such as the production of Virgin Coconut Oil (VCO), making cassava tape, and producing nata de coco.

Initial student needs data were obtained through observation, interviews, and questionnaires. Observations were conducted at junior high schools located in the Mandalika Special Economic Zone in Lombok to gather data about facilities, infrastructure, and classroom learning processes. This activity was carried out with teachers and students using questionnaires consisting of various assessment criteria. The characteristics of the students targeted for development are crucial to consider. Students in grades 7, 8, and 9 of junior high school with ages ranging from 11 to 14 years old have varying levels of maturity. They undergo rapid transformative phases. Typically, they can fully concentrate for no more than half an hour or have a short-term interest in an object (Jufri, 2017). One of the instructional models that aids students in actively engaging in direct investigation activities to find solutions related to real-world events or phenomena is project-based learning.

The learning objectives in this study are based on the developed learning outcomes organized into a sequence of learning objectives that are relevant, continuous, appropriate, and achievable. There are ten learning objectives that students are expected to achieve after participating in the learning process, outlined in the module's learning objectives and the developed instructional steps. The learning objectives are structured around the content of biotechnology, biopreneurship projects, and the Pancasila student profile. The learning objectives are as follows: first, students should be able to apply biotechnology concepts to identify their applications in food processing. Second, students should be capable of analyzing processed biotechnology products suitable for entrepreneurship. Third, students should be able to distinguish between the basic principles of conventional and modern biotechnology. Fourth, students should be able to analyze the role of microorganisms in conventional biotechnology. Fifth, students should be able to apply biotechnology concepts to recognize modern biotechnology applications. Sixth, students should be able to evaluate the impact of implementing biotechnology in various fields. Seventh, students should be able to design biopreneurship project

activities. Eighth, students should be capable of producing cooking oil from coconuts or virgin coconut oil (VCO), creating cassava tape, and developing nata de coco. Ninth, students should be able to generate project activity reports, present outcomes, and market products. Lastly, students should demonstrate attitudes of faith and devotion to the Almighty God, exhibit noble character, think critically, be independent, appreciate global diversity, demonstrate creativity, and collaborate effectively.

The assessment instruments developed in this study consist of feasibility instruments, practicality instruments, and effectiveness instruments. The feasibility instruments encompass a module feasibility instrument, project worksheet feasibility instrument, an instructional steps feasibility instrument, a creativity test, and an entrepreneurship literacy test for students. Then, the practicality instruments include: an observation sheet for lesson implementation; a questionnaire on the teacher's response to the module, project worksheets, a creativity test, and an entrepreneurship literacy test for students; and questionnaire on the student's response to the module and biopreneurship project worksheets (BPW).

The data from the previous stages' analysis, including the analysis of teaching strategies, approaches, needs, and materials, as well as learning outcomes, the sequence of learning objectives, and student characteristics, serves as a reference for developing the teaching strategy. The teaching strategy developed in this research comprises three components. Firstly, it includes general information such as school identity, initial competencies, Pancasila student profile, facilities and infrastructure, student targets, teaching models, media, and learning resources. Secondly, it encompasses core components covering learning outcomes, the sequence of learning objectives, learning objectives, and meaningful understanding. Thirdly, it outlines the steps of learning activities, starting with an introduction in the initial session, followed by identifying fundamental questions to discover opportunities, and concluding with the design of the project implementation. In the second session, the learning step involves creating the product and monitoring project completion. Moving to the third session, the learning step involves presenting and marketing the product and concluding. At the end of the module activities, students are required to complete reflection and evaluation activities.

The instructional material development phase in this research aims to produce a product in the form of a project-based biopreneurship-focused science module and its supporting tools. The development of instructional material in the form of a module is delineated through the design of the basic framework, the design of the supporting product layout, and the design of the development product testing.

The results of the analysis of the instructional materials that have been used indicate deficiencies in the materials utilized at the school. Based on the identified deficiencies, alternative solutions were generated to enhance students' activities, creativity, and entrepreneurial literacy. By combining the results of the analysis of the instructional materials used in the school with the proposed solutions, the components for composing the project-based biopreneurship-focused science module are formulated, as shown in Table 6.

Based on the data in Table 6, a basic framework of the independent curriculum teaching module is formed, which is commonly used and developed into the foundational framework of the instructional module. The basic framework aims to illustrate the differences between the instructional materials found in schools, the general module, and the project-based biopreneurship-focused science module. Furthermore, the basic framework aims to show how the creativity chamber and entrepreneurship literacy corner work together to boost students' creativity and business skills in the project-based biopreneurship-focused science module.

The fundamental framework of instructional materials commonly found in schools consists of classical components such as content presentation, exercises, and usage instructions. The indicated components are not yet adequate for facilitating students' creativity and entrepreneurial literacy. Moreover, the learning orientation primarily centers around the basic competencies present in the curriculum

The basic framework of the project-based biopreneurship-oriented science module demonstrates an enhancement in terms of items and components compared to the instructional materials found at the research site. The items in the project-based biopreneurship-oriented science module are developed into general items, foundational items, and competency items. General items constitute the common elements present in the instructional materials used based on observation results. Foundational items serve as a framework to accommodate the components of general items and enhance their capacity to support students' creativity and entrepreneurial literacy. Competency items encompass the skill and knowledge components intended to be mastered through the utilization of the project-based biopreneurship-oriented science module. The framework of the developed project-based biopreneurship-oriented science module in this research is presented in Figure 2.

Table 6. Items of Project-Based Biopreneurship-themed Science Module

Item	Description
General Item	
Front cover	Loading about the module identity
Back cover	Loading about the author's profile
Title Page	Loads about the title, author name, guide, validator, layout, and year of compilation
Instructions for use	Loading explanations about biopreneurship and module usage instructions
Introduction	Uploading the composer's greeting regarding the learning module and biopreneurship project
List of contents	displays information about the components of the module compiler item and the module content page
List of tables	Loading some tables and checking the location
Picture list	Loading some pictures and location pages
Concept map	Loading a map of the material contained in the biotechnology material presented through material analysis
General information	Loading school identity, initial competence, student profile, facilities and facilities, student target, learning model, media, and learning resources
Core components	Loading learning access, learning objectives, learning goals, and meaningful understanding
Base item	
Learning activities	Consisting of learning activities 1 (food biotechnology), 2 (conventional and modern biotech), and 3 (impact of biotechnology implementation)
Purpose of learning	Loading learning objectives into each learning activity
Creativity Room	Loading some questions to facilitate increased creativity, especially on indicators: (1) have a strong imagination; (2) give a lot of ideas and suggestions on a problem; (3) can work on their own; and (4) enjoy trying new things
Student entrepreneurship literacy corner	Load some questions to facilitate student entrepreneurship literacy improvement, especially on indicators: (1) have confidence, (2) dare to take risks, (3) be creative and innovative, (4) have discipline and hard work, (5) be future-oriented, (6) have curiosity, and (7) be honest and independent
Biopreneurship Project	Uploading an overview of the project to be carried out, tools and materials, and procedures for making VCOs, tapes, and nata de coco can facilitate students to: (1) be able to recognize the business opportunities of a product; (2) determine the tools and materials needed in the production process; (3) make a design of the product manufacturing process; (4) conduct SWOT analysis of products; (5) implement production processes as planned; (6) be capable of innovating products; and (7) determine the best quality of products based on testing
Biopreneurship project worksheet	It is a worksheet where students work on the entire learning activity using a biopreneurship-based natural science module
Competency items	
Experience Evaluation	Loading some questions about the experience of making virgin coconut oil, coriander tape, and nata de coco
Reflection	Contains material comprehension reflections, learning process reflections, attitude reflections, and modular reflections
Summary	Loading a summary of learning activities
Glossary	Loading explanations of important terms on the learning material

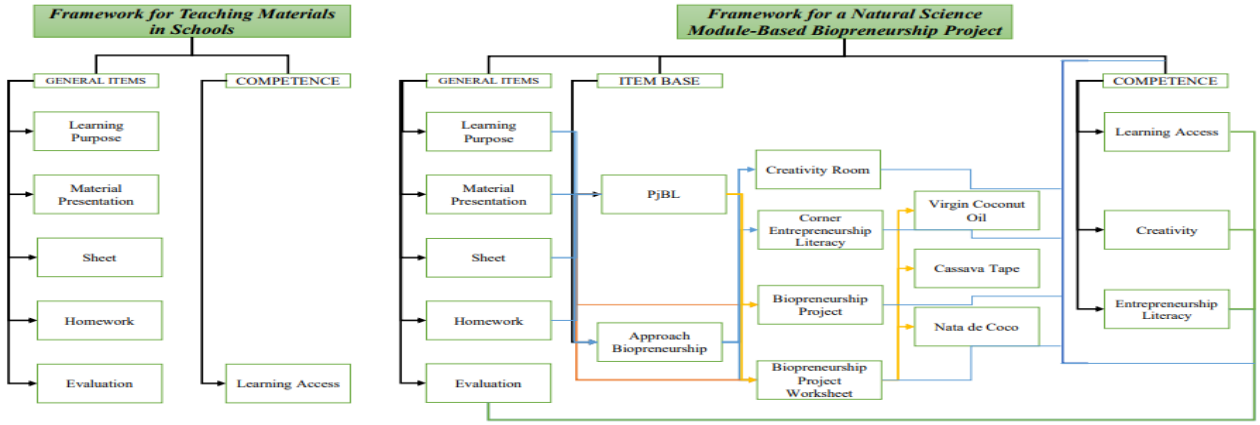

Figure 2. Framework of the Project-Based Biopreneurship-themed Science Module

The analysis phase obtains information about the overview of instructional materials commonly used in schools, which is modeled in the form of a basic framework. The basic framework of instructional materials commonly used in schools is then developed to enhance the capacity of instructional materials in supporting students' creativity and entrepreneurial literacy. The development of the basic framework for instructional materials in schools forms the foundational design of the project-based biopreneurship-oriented Science module developed in the research. The developed module concept has specifications that include students' creativity, entrepreneurial literacy, biopreneurship, and project-based learning (Table 6). The module concept in this research is elaborated based on the analysis of existing instructional materials and is formulated into general items, foundational items, and competencies.

General items are components present in the module, obtained through the observation of instructional materials in the field. In general, the components of instructional materials include learning objectives, content presentation, worksheets, and assessment instruments/quizzes (Akpan et al., 2018; Pursitasari et al., 2019). General items are essential in instructional materials for systematic presentation of content or subject matter, organized sequentially and systematically, and demonstrating a comprehensive mechanism of the competencies that students will master as tools in the learning process. Akpan et al. (2018) state that good instructional materials serve as tools that enable teachers to logically and sequentially present subject matter to students.

Basis items are items used as a framework to accommodate student creativity, entrepreneurship literacy, biopreneurship, and project-based learning (Table 6). These basis items include learning objectives, creativity corner, entrepreneurship literacy corner, biopreneurship project, and biopreneurship project worksheet (Table 6; Figure 2).

Competency items are components of skills and knowledge aimed to confirm the abilities acquired through the use of the developed project-based biopreneurship-oriented module. Confirming abilities through items is carried out to assess students' competence related to the conducted project and their response to the learning process.

The developed module needs to be tested to determine its level of suitability for use in teaching and learning. Several aspects of suitability that instructional materials need to meet are readability, validity and reliability, practicality, and effectiveness (Leton et al., 2021; Amrulloh and Suprapto, 2018; Permatasari et al., 2019; Tinja et al., 2017; Susanti et al., 2015). Suitability testing is conducted to analyze the accuracy and consistency of the instructional material in achieving the desired skills (Sintia et al., 2018; Permatasari et al., 2019). Practicality testing is essential to assess the ease of use of the instructional material in teaching activities (Permatasari et al., 2019; Tinja et al., 2017). Subsequently, effectiveness testing aims to analyze the reliability of the instructional material in enhancing the desired skills (Permatasari et al., 2018, Tinja et al., 2017, and Susanti et al., 2015).

Module validation based on expert assessment aims to analyze suitability aspects. Validity data were obtained through the assessment of three expert professors at Universitas Mataram. The expert assessment focused on the project-based biopreneurship science module, the Project Biopreneurship Worksheet (PBW), the learning steps, creativity instrument, and student entrepreneurship literacy instrument. Validation of the project-based biopreneurship-based science module by experts focused on aspects such as module size, module design, content, and language. The data from the module validation results by experts is presented in Table 7 below.

Table 7. Learning Module Validation Result

Validators	Score
I	63.0%
II	83.7%
III	85.2%
Average	77.3%
Category	Proper to use (Feasible)

Note: 0-20 (Not Feasible); 21-40 (Less Feasible); 41-60 (Moderately Feasible); 61-80 (Feasible); 81-100 (Highly Feasible).

The results of expert validity testing indicate that all development products (Project-Based Biopreneurship Science Module, PBW, Learning Steps, and Test Instruments) have high scores. Expert validation of the project-based biopreneurship science module focused on module size, module design, content, and language. Meanwhile, expert validation of the Project Biopreneurship Worksheet (PBW) focused on appearance, content, and language. Subsequently, expert validation of the Lesson Plan focused on content, language, and timing. Furthermore, expert validation of the creativity and entrepreneurship literacy instruments focused on content, sentence structure, and language quality.

The expert assessment determined that the Project-Based Biopreneurship Science Module has a percentage of 77.3% in the category of being suitable for use (Table 7). As for the supporting products (Table 8), the Project Biopreneurship Worksheet has a percentage of 73.9% in

the category of being suitable for use. The learning steps have a percentage of 80.0% in the category of being suitable for use. Furthermore, the creativity instrument has a percentage of 72.0% in the category of being suitable for use, and finally, the entrepreneurship literacy instrument for students has a percentage of 75.1% in the category of being feasible for use.

The validation of the supporting components of the Project-Based Biopreneurship-oriented module was also analyzed to meet the feasibility standards. The mentioned components consist of the Biopreneurship Project Worksheet (BPW), the Lesson Plan, creativity instrument, and the student entrepreneurship literacy instrument. The data from the expert validation of the supporting components is presented in the following Table 8.

Table 8. Validation Results of Supporting Module Tools

Validators	Biopreneur Project Work Sheet	Learning Steps	Creativity Instrument	Entrepreneurial Literacy Instrument
I	54.5%	65.0%	57.3%	56.0%
II	85.5%	88.3%	74.7%	81.3%
III	81.8%	86.7%	84.0%	88.0%
Average	73.9%	80.0%	72.0%	75.1%
Category	Proper to use	Proper to use	Proper to use	Proper to use

Note: 0-20 (Not Feasible); 21-40 (Less Feasible); 41-60 (Moderately Feasible); 61-80 (Feasible); 81-100 (Highly Feasible).

The developed module and supporting components are deemed feasible for use after undergoing expert assessment using expert validation sheets across several assessment aspects. Based on these expert evaluations, the module and its supporting components obtained an average score of ≥ 61%, indicating that the developed products fall within the category of being suitable for use. Validity testing by experts is essential to assess the accuracy level of the developmental products concerning the orientation towards student creativity and entrepreneurship literacy in learning (Rini, 2022).

In addition to evaluating the developed products and instructional tools, the three expert validators also provided suggestions for improvements to enhance the quality of the developed products and supporting materials, resulting in what is referred to as Draft II. The input and recommendations from the validators can be used by the researcher as considerations for revising and refining the products and supporting materials to be deemed suitable for use (Ibrahim et al., 2020; Utami et al., 2019; Sudiarman et al., 2017). The project-based biopreneurship module and other supporting components, including the Biopreneurship Project Worksheet (BPW), Lesson Plans, and creativity and entrepreneurship literacy instruments, have been revised according to the expert suggestions and are now ready for use in teaching.

Conclusion

The project-based biopreneurship science module is a learning module that emphasizes project-based learning by integrating biological concepts with entrepreneurship concepts. This module is designed to accommodate aspects of student creativity and entrepreneurship literacy. The project-based biopreneurship science module is deemed feasible for use, as evidenced by the score obtained from the assessment of three expert validators in science education, which is 77.3%.

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Author Contributions

I Putu Artayasa contributed to preparing the research design, analyzing research data, and reviewing the article. M. Akhyar Rosyidi contributed to preparing learning plans and collecting research data, while A. Wahab Jufri contributed to preparing teaching modules and reviewing creativity and entrepreneurial literacy tests.

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Conflicts of Interest

The authors declare that there are no conflicts of interest related to the results of this research and published articles.

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