Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

Development of Project-Based IPAS Module to Increase Students' Learning Creativity SMKN 1 Gedongtataan

Desy Natalia*, Herpratiwi, Sugeng Widodo,
Muhammad Nurwahidin, Dwi Yulianti
Lampung University
Email Coresponding*: desynatalia321@guru.smk.belajar.id

Abstract : This research is a development research that aims to analyze; (1) the potential and conditions for developing learning modules, (2) the process of developing project-based IPAS modules (3) module characteristics, (4) module effectiveness, and (5) module attractiveness. This research uses the ADDIE model development design which includes the stages of analysis, design, development, implementation and evaluation. The subjects in this study were 23 students of class X of the Plant Agribusiness Expertise Program of SMK Negeri 1 Gedongtataan. Data collection methods used questionnaires, interviews and tests. The results of this research and development indicate that the potential of students can use modules as learning materials and the condition of infrastructure at SMK Negeri 1 Gedongtataan is very supportive and allows for the development of project-based learning modules, Product criteria after being validated by a team of material experts with a score of 87.67 (very feasible), media experts score 95.29 (very feasible), and design experts score 96.84 (very feasible). The characteristics of the project-based module developed meet the requirements of being self-standing, independent, adaptive and familiar with the user. Based on the results of the t test, the sig result of 0.000 is smaller than the 5% significance level, which means that the use of project-based modules significantly increases students' learning creativity. The developed module is effective for increasing the learning creativity of IPAS students with a normalized gain value of 0.6297 (medium). The attractiveness of the developed module is in the interesting category with a score of 84.5 and the category is easy to use.

Article History
Received: 11-10-2023
Reviewed: 19-10-2023
Published: 20-10-2023

Key Words
IPAS Module, Project-Based, Learning Creativity.

How to Cite: Natalia, D., Herpratiwi, H., Widodo, S., Nurwahidin, M., & Yulianti, D. (2023). Development of Project-Based IPAS Module to Increase Students' Learning Creativity SMKN 1 Gedongtataan. Jurnal Teknologi Pendidikan : Jurnal Penelitian dan Pengembangan Pembelajaran, 8(4), 867-878. doi:https://doi.org/10.33394/jtp.v8i4.9299

https://doi.org/10.33394/jtp.v8i4.9299

Introduction

Education has a strategic role in preparing graduates who qualify according to 21st century skills, which include critical thinking and problem-solving skills, communication and collaboration as well as creativity and discovery (Trilling and Fadel). Education always strives to improve its consistency in an effort to prepare people needed by society in accordance with the times (Saifuillah, 2018). Education in the era of the industrial revolution 4.0 is expected that students have high creativity skills in order to be able to solve problems in real life everyday (Kusmiati, 2022).

SMK as one of the vocational education institutions aims to improve the knowledge and skills of human resources (students) to prepare a middle-level workforce (Zekri et al.,

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

2020). SMK graduates are directed as graduates who are ready to work, intelligent, have competence in their fields of interest, are competitive, and have strong character as professional workers who are needed in the world of work (Fajra and Novalinda, 2020).

In today's digital era, diverse learner skills are needed, one of which is creativity (Halimah, 2022). Creative and innovative abilities are needed by students to face the challenges of the future world of work (Al Muharomah, Mayasari and Kurniadi, 2019). Creativity is one part of soft skills, namely skills related to approaches in solving problems, in the form of new actions, approaches and innovations (Resti, 2015). Creativity is one of the abilities to produce a work that can be useful so that it can be considered that a person's creativity ability can be observed from the way he works or can be seen from the results of completing the work done (Suyitno et. al, 2019).

The Natural and Social Science Project subject serves to equip learners to be able to solve real-life problems in the 21st century related to natural and social phenomena around them scientifically by applying science concepts. After studying the Natural and Social Science project subjects, learners can gain the skills to make the right decisions scientifically in order to live more comfortable, healthier, and better.

Natural and Social Science Project consists of three competency elements that refer to scientific literacy competencies, namely explaining phenomena scientifically, designing and evaluating scientific investigations, interpreting data and evidence scientifically. Natural and Social Science Project subjects aim to equip learners with the basics of knowledge, skills, and attitudes (hard skills and soft skills):

1. Implement mindsets, behaviours, and build learners' characters to care and be responsible for themselves, society, and the universe, as well as the problems they face.
2. Be able to analyse the potential benefits and risks of using natural and social sciences.
3. Be able to make more informed decisions using natural and social sciences and technology.
4. Able to find solutions to problems encountered through science both individual and community problems.

Project Based Learning (PBL) is often associated with the education system as 21st century learning, which in PBL facilitates learning that focuses on education for the 21st century. Learning practices through PBL train learners to have skills such as critical thinking, communication, problem solving and collaboration (Ulrich, 2016; Turski, 2015). If PBL is implemented well, it will provide opportunities for learners to practice the skills needed for 21st century life, such as critical thinking skills, collaboration, communication, creativity and innovation, use of technology for learning as an effort that reflects education for future work. According to Yang and Guo (2013), the activities generated in project-based learning can increase creativity in learning. As the results of Sani's research (2015), showed that project-based learning using modules has an effect on learning outcomes. The results of research by Novianto, et al., (2018) state that learning using PBL-based physics learning modules on static fluid material can increase student learning creativity with a gain value of 0.46 or in the medium category, while the results of research (Zekri, 2020) show that there is an increase in student collaboration skills by using a project-based Digital Simulation and Communication learning module with a medium category of 31.54% from the sufficient category to the good category.

The importance of a meaningful learning process in order to produce graduates who have appropriate competencies in the world of work is a must. The learning process will achieve its goals if educators can use the right learning model during the process of active learning activities. One of the models that can be applied is the use of project-based learning.

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

Project-based learning is a learning model that uses projects or activities as media. Students conduct exploration, assessment, synthesis interpretation and information to produce various forms of learning outcomes (Kumalaretna and Mulyono, 2017). Project-based learning is a learning method that provides opportunities for educators to manage learning in the classroom by involving project work. Project work contains complex tasks based on questions and problems that are very challenging and require students to design, solve problems, make decisions, conduct investigations and provide opportunities for students to work independently and in groups. PBL is student-centred learning, the teacher acts as a motivator and facilitator, students are given the opportunity to learn independently in constructing their learning. Goodman and Stivers (2010) define Project Based Learning (PBL) as a teaching approach built on real learning activities and tasks that provide challenges for students related to everyday life to be solved in groups.

In the PBL model, learners not only understand the content, but also foster skills in learners how to play a role in society. Skills fostered in PBL include communication and presentation skills, organisational and time management skills, research and inquiry skills, self-assessment and reflection skills, group participation and leadership, and critical thinking. According to Farihatun and Rusdiarti, (2019) that PBL is considered as one of the learning models that directs students to solve real-world problems through the investigation process, besides that it is also a learning that applies constructivist principles where students will use knowledge and skill abilities in finding solutions to existing problems.

Based on observations with teachers at SMK Negeri 1 Gedongtataan, it was found that in the IPAS learning process, teachers still use learning resources in the form of teaching materials available in the form of textbooks from certain publishers and are limited in utilising other media in the learning process due to the limited facilities owned by students and limited school facilities. Existing IPAS learning resources come from several other sources that are sorted out by the subject teacher. The absence of complete learning resources that provide teaching materials in the form of readings that contain all aspects/content of material in accordance with the new curriculum causes teachers to experience difficulties in developing their learning process in the classroom.

The results of observations made of students at SMK Negeri 1 Gedongtataan found that the learning outcomes of students are quite low, this can be caused because students only depend on one printed learning resource, namely books, which has an impact on low learning creativity. As said by Indriawati S, (2019) that creativity reflects divergent thinking, namely the ability to provide various alternative answers. In addition, creativity can be used as a reference in predicting the success or failure of a lesson. In addition, student learning creativity in learning can be reflected in the presence of learning motivation, asking questions and expressing opinions, being able to work alone and try new things and being able to develop or detail an elaboration idea. These things can happen when learning is done using project-based learning.

Based on the analysis of student needs, it is found that most students do not have learning resources in the form of IPAS textbooks to support the learning process due to the limited availability of textbook learning resources in the library, so that students have difficulty learning and the lack of access to information from the internet where students only have chat packages but to access information using student data is still difficult. Whereas according to Kosasih (2021; 9) states that teaching materials can stimulate creativity and the ability to think critically, solve problems in learning, and develop new skills to students. Based on the limited facilities and infrastructure regarding printed teaching materials available in the library, it is

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

one of the causes of low student learning creativity. Based on the mid-semester assessment and end-of-semester assessment where students in the crop agribusiness expertise programme have a fairly low assessment. This can be seen in the following table.

Table 1. Learning outcome assessment table

No	Expertise Programme	Average IPAS Learning Outcome Score
1	Automotive	58
2	Telecommunication Network and Computer Engineering	57
3	Software and Game Programmes	52
4	Crop Agribusiness	49
5	Fisheries Agribusiness	49
6	Institutional Accounting and Finance	72
7	Office Management and Business Services	66

Source. Curriculum Document 2021-2022

Data from the subject teacher's analysis states that more than 50% of students experience learning difficulties due to the lack of printed learning resources. In addition, teachers are still unable to develop effective, innovative, creative and effective learning tools based on the implementation of the ideal independent curriculum. Teachers still use printed learning resources that come from publishers. The limited learning facilities cause low learning creativity which has an impact on the learning outcomes of students at SMK Negeri 1 Gedongtataan. The availability of learning resources in the form of printed teaching materials at SMK Negeri 1 Gedongtataan can be seen in the following table.

Table 2. Availability of printed teaching materials for IPAS Subjects

No	Book Title	Number of Book	Number of Students	Year	Description
1	Natural Science	16	380	2014	KTSP Curriculum (All fields, level X, XI and XII)
2	Natural Science	48	70	2018	Curriculum 2013 Revised 2018(Only used in Business and Management, Grade X)
3	Natural and Social Sciences	60	272	2022	Independent Curriculum(Class X, all fields)

Source: SMKN 1 Gedongtataan Library Data

Based on the table above, the availability of learning resources in the form of printed teaching materials is very low, this can be the cause of low learning outcomes so that students cannot utilise learning resources as materials to support the learning process. As stated by Kosasih, (2021; 1) that teaching material is something that students use to facilitate the learning process. In teaching materials there are descriptions of material regarding knowledge, experience and theory that are specifically used by teachers or students to make it easier to understand a certain amount of material or subject matter that has been outlined in the

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

curriculum. The existence of teaching materials allows students to study a material according to their own pace.

Tabel 3. Weakness of Printed Teaching Material

No	Book Title	Disadvantages
1	Science	1) Learners find it difficult because the book is not organised based on learners' needs. 2) The book is not used for independent learning but learners need a teacher. 3) Not all learners and teachers are able to use the handbook because the material is not specific. 4) Learners tend not to study the topics and materials in the handbook well. 5) There is a possibility that the teacher encounters some parts of the material that are not appropriate. 6) The teaching materials have parts of the material that are cut into pieces and the learning seems to be loose and not integrative. 7) Because it is not neatly documented, teachers always look for more designs so that when learning students do not understand the material presented clearly. 8) Not all learners and teachers are able to use the guidebook because the material is not specific.

Source: Mulhayatiah et al (2019: 16)

Based on the above problems, an alternative solution is needed to overcome the learning problems of these students, one of which is through the preparation of modules. the author wants to develop teaching materials in the form of project-based modules that can be used by students in order to support the learning process of students and with the limited facilities owned by students, modules are very suitable to be developed. From the results of the analysis, it was found that students stated that they needed teaching materials that could help their learning creativity, for example with Project-based modules and as many as 90% of students agreed if a Project-based IPAS learning module was developed.

Practically, the results of this study can be used as information and consideration in making decisions as an effort to improve students' learning creativity, can provide information about the right model to be applied to the learning process in an effort to achieve the educational goals of Vocational High Schools (SMK), namely creating workers with good character and creativity. This study aims to analyse the potential and conditions, know the process of developing module teaching materials, know the characteristics, analyse the attractiveness, and effectiveness of project-based modules in increasing students' learning creativity at SMK Negeri 1 Gedongtataan.

Research Methods

This research is an R & D (research and development) development research because it develops a product and tests the effectiveness of the product. The product developed in this research is a project-based IPAS learning module to increase the learning creativity of vocational students with the ADDIE approach. The subjects of this research were class X students of SMK Negeri 1 Gedongtataan with the research sample being class X Agribusiness Crop students. This research was conducted in the 2022-2023 academic year at SMK Negeri 1 Gedongtataan. The object of this research is a Project-based IPAS teaching module to improve

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

the learning creativity of grade X SMK students. Non-test data collection techniques, tests, research instruments. Data analysis used quantitative analysis, normality test, and N-gain.

Results and Discussion

1. Potential and Condition

During the observation, the instrument used was a questionnaire. Questionnaire technique, a way of collecting data by giving or distributing a list of questions to respondents. the condition of student learning outcomes is quite low, where students only depend on one printed learning resource, namely books, which has an impact on low learning creativity. Based on the analysis of student needs, most students do not have learning resources in the form of IPAS textbooks to support the learning process due to the limited availability of textbook learning resources in the library and limited costs.

2. Development Process

Analysis

In Merdeka Curriculum, there are no Core Competencies and Basic Competencies, but Learning Outcomes. Learning objectives are formulated by subject teachers themselves. In the analysis stage, the activities carried out include (1) analysing the learning objectives that must be mastered by students; based on learning outcomes. Based on observations and interviews with IPAS Project subject teachers and students of SMKN 1 Gedongtataan in learning activities and outside learning activities, researchers found that the characteristics of students in learning IPAS Project are in the sufficient category, not stuttering technology, but have limitations in accessing information due to inadequate internet data ownership. In addition, according to the subject teacher, most students are still dependent on the teacher, meaning that students are not yet able to learn independently with the limited facilities they have. Based on the explanation above, taking into account the existing facilities and infrastructure, these conditions and potentials support the development of teaching materials in the form of project-based modules on aspects of living things and their environment. This development is expected to make it easier for students to understand and learn the material provided by the teacher and can increase students' learning creativity.

Design

This second step begins to design the module by formulating learning objectives first. Learning objectives are contained in the Flow of Learning Objectives and Modules, which are adjusted to the learning outcomes in the Merdeka curriculum. This module consists of 2 aspects that contain material about living things and their environment and about waste and is equipped with project activities. The outline of the module includes

a) The outer cover contains a large title of teaching materials
b) Inner cover and french page
c) The opening section consists of a preface, table of contents and a position map of concept material
d) The content section consists of an introduction consisting of: description, time, prerequisites, instructions for using the module, CP, final objectives and learning activities of teaching materials.
e) The closing section consists of a bibliography.

Development

Project-based module development is carried out in accordance with the design. There are several activities at this development stage, namely the expert validation test, the revision obtained is a project-based module that is in accordance with the module composition components.

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

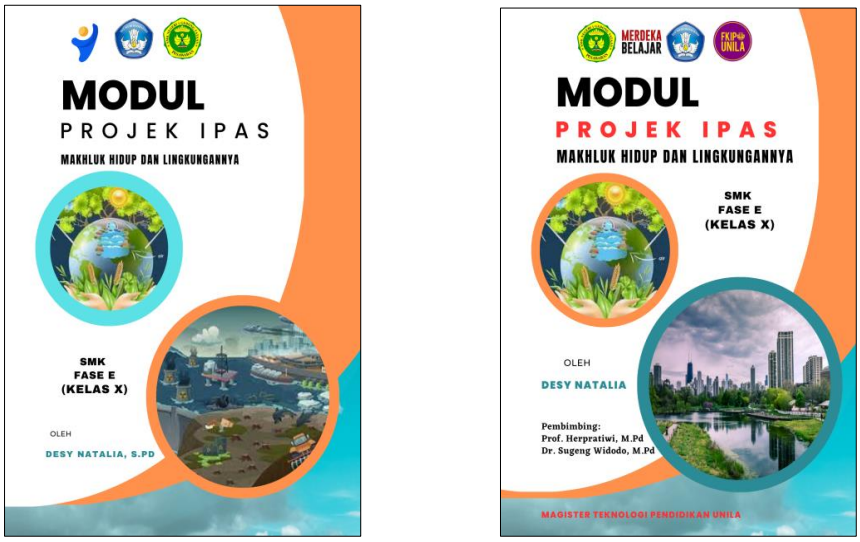

Figure 1. IPAS Project Module

The average value of the design expert validator has met the criteria for the feasibility of the product developed. The value obtained is 96.84% which lies in the range of 90 - 100 which indicates the eligibility criteria, namely very feasible and very good. the average score of six students as individual group practitioners then the researcher made an average and obtained an average of 83.8. The value is interpreted against the attractiveness criteria to give meaning or meaning to the product developed based on the attractiveness and ease of the product. The value obtained lies in the range of 70 - 89 which shows the eligibility criteria, namely interesting and easy. the average score of fifteen students as practitioners then the researchers made an average and obtained an average of 84.7. The value is interpreted against the criteria of attractiveness to give meaning or meaning to the product developed based on the practicality of the product. The value obtained lies in the range of 70 - 89 which shows the eligibility criteria, namely interesting and the level of ease in the easy category.

Implementation

The results of the post-test were used as a reference to determine the effectiveness of the use of modules in increasing students' learning creativity. Furthermore, the IPAS module that has been validated by experts is then tested on teachers and students to determine the effectiveness in use after the trial is carried out, students are asked to fill out a questionnaire to find out the students' response to the module that has been developed. Project-based module trials carried out at this stage are large group practicality tests, and IPAS Project subject teachers.

Based on the average score from class X AT as the next practitioner, the researcher made an average and obtained an average of 84.5. The value is interpreted against the attractiveness criteria to give meaning or meaning to the product developed based on the practicality of the product. The value obtained lies in the range of 70-89 which shows the eligibility criteria, namely interesting / easy.

The results of the practitioners obtained then the researchers made an average and obtained an average of 98.4 The value is interpreted against the attractiveness criteria to give meaning or meaning to the product developed based on the practicality of the product. The

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

value obtained lies in the range of 90 - 100 which indicates the eligibility criteria, namely very interesting.

The evaluation stage is the final stage of this development research. At this stage, there is an evaluation of the developed product from the research data obtained. Furthermore, the formative evaluation stage was carried out in class X AT to review the increase in learning creativity in students after using the module. Followed by the distribution of questionnaires conducted after students do the posttest.

3. Characteristics

The characteristics of the Project-based IPAS module that distinguish it from other modules are:

a. he module is interactive, as it has the ability to accommodate user responses.
b. This module is a combination of several elements, namely using internet media, in accessing YouTube links students use QR codes and the module itself. However, this module can stand alone without having to be used with other media/applications.
c. The module is independent because it provides convenience and completeness of content so that users can use it without depending on others.
d. Project-based IPAS modules have adaptive power, which can be adjusted to science and technology.
e. This module is familiar with the user (user friendly).

In addition, this IPAS learning material development product has several advantages, including: (1) Learning materials are prepared according to the needs of students and teachers; (2) the material in the learning materials is arranged systematically starting from detailed explanations, assignments, LKPD, formative tests and their answers; (3) feedback is provided so that students know the level of material assignment on each learning objective; (4) teaching materials can be used individually, which is adjusted to student learning time, motivating and easy to use.

4. Attractiveness

Some important things related to student responses to module development from the results of questionnaire data analysis Based on the results of the recapitulation of the questionnaire of attractiveness and convenience to 6 students in the individual test obtained an average of 83.8 and in the limited test on 15 students obtained an average of 84.7 If interpreted in the conversion table that the attractiveness and convenience of the IPAS module based on aspects of living things and their environment is easy to understand. The students' response to the development product based on the attractiveness and convenience questionnaire was influenced by several factors including: the attractive presentation of the module, the QR code and the available links are something new and make students motivated to learn, examples of questions that allow students to learn independently, formative tests with answers to questions that help students understand the questions, modules that can be studied anywhere, anytime, and the use of language in the module is easy to understand.

5. Effectiveness

The posttest average for the experimental class increased, namely 77.74. for the descriptives section obtained data that the average gain index of the experimental class was 62.97. the tests of Normality section obtained data in the Shapiro-Wilk table shows the sig value of the experimental class of 0. 324 on the pretest and 0.173 on the posttest and has a value higher than 0.05, this means that it is normally distributed. Based on the results of the paired sample t-test above the SPSS output results obtained the significance value of the t-test is 0.000 less than the predetermined significance of 0.05 so that H0 is rejected and H1 is accepted. Where the sig

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

value is less than 0.05 (sig.2-tailed 0.000 <0.05) thus it is concluded that there is a significant difference in learning outcomes that measure student creativity.

Discussion

Potential is an opportunity to improve quality or provide action. Conditions according to the Big Indonesian Dictionary are requirements or conditions. Conditions are the scope of something that is happening somewhere either socially or individually. Analysis of preliminary research shows the condition of the low learning outcomes of class X AT students. This condition is caused by students finding it difficult to understand the material presented by the teacher and the use of learning methods that are still teacher-centred. In addition, the IPAS Project teacher has not utilised other innovative media in the learning process. Learning is limited to using textbooks and using the lecture method. This research process uses the ADDIE design stage.

Potential is an opportunity to improve quality or provide action. Conditions according to the Big Indonesian Dictionary are requirements or conditions. Conditions are the scope of something that is happening somewhere either socially or individually. Analysis of preliminary research shows the condition of the low learning outcomes of class X AT students. This condition is caused by students finding it difficult to understand the material presented by the teacher and the use of learning methods that are still teacher-centred. In addition, the IPAS Project teacher has not utilised other innovative media in the learning process. Learning is limited to using textbooks and using the lecture method. This research process uses the ADDIE design stage.

These good results were obtained after going through a series of revision stages after conducting limited tests with experts and small group tests with students. The inputs given in terms of design, media, material are taken into consideration in developing the module so as to get product results with better improvements. This is to fulfil the characteristics that modules must have, including self instruction, self contained, standalone, adaptive and user friendly.

Students' response to the attractiveness of the project-based IPAS module developed is known based on the results of the questionnaire given after students follow the learning. The questionnaire contains questions on the aspects of attractiveness and convenience. The results of the recapitulation of the questionnaire of attractiveness and convenience to individual tests totalling 6 students obtained an average of 83.8 and in the limited test on 15 students obtained an average score of 84.7. While the results of the attractiveness response in the large group of attractiveness score of 84.5% with interesting and easy to understand criteria which is not much different from the attractiveness score given by individual groups and small groups. This can be interpreted that the module products developed are in the same category based on the responses given by students. If interpreted in the conversion table that the attractiveness and ease of the project-based IPAS module aspects of living things and the environment fall into the category of interesting and easy to understand.

This means that IPAS learning using project-based modules can make students creative to carry out the learning process because the existing projects stimulate students to be creative. The use of modules can help teachers to maximise learning time with available projects and teachers are not confused about what projects students will do.

Project-based module teaching will provide opportunities for students to learn at their own pace and in their own way. Therefore, they use different techniques in solving problems with their respective background knowledge and habits. The advantages of modules as teaching materials include being able to be studied in various places, independently or not having to be studied in groups, and can be studied flexibly (Sungkono, 2018). Modules can be developed

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

by teachers according to the needs and characteristics of students. Teachers as an element of education who are directly involved in learning in the classroom are required to have competence in using and developing teaching materials.

The use of modules in learning this IPAS Project is as a feed back for students and teachers, for teachers Project-based modules can be used to make it easier to provide or explain material while for students as a tool for independent and responsible learning. A teaching process can be said to be successful if the lesson can generate an effective learning process. Learning outcomes are the result of an interaction of learning and teaching actions. Learning outcomes are used by teachers to serve as a measure or criterion in achieving an educational goal.

The increase in knowledge is because the developed module provides learning to students by constructing prior knowledge and learning is student centered where the teacher's role does not directly provide the core or conclusion, but students are given the time and opportunity to investigate, search, find and solve their own problems that they learn coherently, so that students can understand the basic concepts of multiplying learning experiences independently. As stated by Winatha, (2018) that project-based learning is one approach to creating a learning environment that can encourage students to construct knowledge and skills personally.

Based on constructivism learning theory, learning events are basically no longer like the previous concept where a teacher or educator transfers knowledge to students but students who find a problem and the purpose of each learning material (Herpratiwi, 2019). This means that knowledge is also not something that already exists but a process that develops continuously. In this process, a person's activeness is very decisive in developing his knowledge.

Conclusion

The conclusion in this study is : 1) The results of the analysis of potential and problems at SMKN 1 Gedongtataan, especially in the subject of IPAS aspects of living things and the environment are very supportive for the development of Project-based Modules to increase student learning creativity. Other potentials that support IPAS Project learning such as: (1) professional educators who are certified educators, (2) infrastructure facilities in the form of an adequate library, (3) a conducive learning environment and learning atmosphere. 2) The process of developing a project-based module includes 5 stages, namely: analysis, design, development, implementation, and evaluation. The product was then validated by material experts with a score of 87.67% in the feasible category, media experts 95.29% with a very feasible category and design experts at 96.84 with a very feasible category. 3) The characteristics of the developed module are that the Project-based module is a printed teaching material, in which there is an OR Code and links that help students in learning. This module consists of a cover, francis page (inside cover), preface, table of contents, concept map, glossary, introduction consisting of description, time, prerequisites, instructions for using the module, final objectives, competencies that must be mastered. Next, enter the learning which consists of learning 1 with objective components, material descriptions, summaries, tasks, LKPD, formative tests, answer keys. This module is interactive, independent, stand-alone, has adaptive power and is familiar with the user. 4) The effectiveness of using the product developed in the IPAS Project learning subject on the material of living things and their environment based on the results of the average normalised gain of 0.6297 with moderate criteria means that the project-based module effectively increases the learning creativity of

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

students with moderate categories. 5) Based on the results of the attractiveness test, it is stated that the project-based IPAS module has an attractiveness value of 84.5 (attractive category) which means that this module is liked by students.

Reference

Almuharomah, F.A., Mayasari, T., & Kurniadi, E. (2019). Development of Physics Module stem of local wisdom "Beduk" to improve creative thinking skills of junior high school students. Scientific Journal of Physics Education, 7(1).

Fajra, Melda, and Rina Novalinda. (2020). "Project Based Learning: Innovation to Improve the Suitability of Productive Competencies in Vocational High Schools with the Needs of the World of Work." International Journal of Multi Science, vol. 1, no. 08, pp. 1-11.

Farihatun, S. M., & Rusdarti. (2019). Economic Education Analysis Journal. EEAJ, 8(2), 640.

Goodman, B., & Stivers, J. (2010). Project-based learning. Educational psychology, 2010, 1-8.

Halimah, Leli and Iis Marwati. (2022). Project Based Learning. For 21st Century Learning. PT Refika Aditama. Bandung.

Handayani, P. (2019). The effectiveness of project-based learning (PJBL) with ethnoscience content on creative thinking skills of elementary school students. Thesis.

Herpratiwi. (2019). Learning System Design. Graha Ilmu. Yogyakarta.

Indriawati, S., Arip, A.G., & Nur, S.H. 2019. Implementation of Project Based Learning (PJBL) model towards students' scientific attitude and creativity. Edu Biologica. Journal of Biology Science and Education Research, 7(20), 89-95.

Janah, S. R., Suyitno, H., & Rosyida, I. (2019, February). The importance of mathematical literacy and mathematical critical thinking in facing the 21st century. In PRISMA, Proceedings of the National Seminar on Mathematics (Vol. 2, pp. 905-910).

Kosasih. (2021). Teaching Material Development. Bumi Aksara. Jakarta.

Kumalaretna, Wahyu Ning dewi, and Mulyono. (2017). Mathematical Communication Ability in View of Collaboration Character in Project Based Learning (PjBL). No. 2, pp. 195-205.

Kusmiyati, K., Hadiyanto, H., & Fudholi, A. (2022). Treatment updates of microalgae biomass for bioethanol production: A comparative study. Journal of Cleaner Production, 135236.

Mulhayatiah, D., Purwanti, P., Setya, W., Suhendi, H. Y., Kariadinata, R., & Hartini, S. (2019). The impact of digital learning module in improving students" problem-solving skills. Al-Biruni Scientific Journal of Physics Education, 8(1), 11-22.

Novianto, Nur Kholis, et al. (2018). "Development of a Project Based Learning Module on Static Fluid Materials to Improve Learning Creativity of Class X SMA/MA Students." INKUIRI: Journal of Science Education, vol. 7, no. 1, p. 81, doi:10.20961/inkuiri.v7i1.19792.

Resti, V.D.A. (2015). Analysis of student creativity in preparing concept maps in the form of e-mind maps based on neuroscience studies. Journal of Biology Education Volume, 6 (2), 128-134.

Saifuillah, Aep. (2018) "Implementation of Project Based Learning Model to Develop Soft Skills and Quality of Student Learning Outcomes." Journal of Citizenship Education, vol. 5, no. 2, pp. 137-50.

Saifuillah, Aep. (2018) "Implementation of Project Based Learning Model to Develop Soft Skills and Quality of Student Learning Outcomes." Journal of Citizenship Education, vol. 5, no. 2, pp. 137-50.

Oktober 2023 Vol. 8, No.4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
Pp 867-878

Sani, Maulidia. (2015) "Development of Project Based Learning Modules in Electrical Machine Maintenance and Repair Course." Journal of Electrical Engineering Education, vol. 04, no. 01, pp. 259-67.

Sungkono, K. R., & Sarno, R. (2018). Constructing control-flow patterns containing invisible tasks and non-free choice based on declarative models. International Journal of Innovative Computing, Information and Control (IJICIC), 14(4), 1285-1299.

Trilling, Bernie, and Charles Fadel. (2009) "21st Century Skills_ Learning for Life in Our Times." Journal of Sustainable Development Education and Research, vol. 2, no. 1, p. 243.

Ulrich, K.T. and Eppinger, S.D. (2012). Product Design and Development. New York: Mc. Graw Hill.

Winatha, Komang Redy. (2018). "Development of Project-Based Interactive E-Modules for Digital Simulation Subjects." Journal of Technology and Vocational Education, vol. 15, no. 2, 2018, pp. 188-99, doi:10.23887/jptk-undiksha.v15i2.14021.

Yang, Y & Guo, Y. (2013). Project Based Learning: an Effective Approach to Link Teacher Professional Development and Student Learning. Journal of Educational Technology Development and Exchange, 5 (20) 41-45.

Zekri, Zekri, et al. (2020). "Development of Project-Based Learning Modules in Digital Simulation and Communication Subjects of Vocational Schools." Pedagogy: Journal of Educational Sciences, vol. 20, no. 1, pp. 33-42, http://pedagogi.ppj.unp.ac.id/index.php/pedagogi/article/view/827.

