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Development of Teaching Modules in the Implementation of the Independent Curriculum to Improve the Quality of the Learning Process and Student Learning Outcomes

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Abstract: This research aims to describe and explain the characteristics, validity, practicality, and effectiveness of teaching modules in the implementation of the independent curriculum to improve the quality of the learning process and student learning outcomes. This type of research is development research to produce learning tools in the form of science project teaching modules for SMK that are valid, practical, and effective. The development model used is a 4D adaptation model, which is composed of the stages of defining, designing, developing, and disseminating. Data collection was carried out using questionnaires and test techniques. The research results show that the teaching module used had characteristics with a table format arranged based on modifications from the Ministry of Education and Culture. The teaching module was in accordance with the multimedia and computer and network engineering departments. The results of the validity test show that the summarized teaching module was classified as very valid in terms of the validity of the content, material, and language. Based on teacher assessment, the teaching module was classified as very practical. The results of the effectiveness test show that the teaching module was effective in improving the quality of the learning process and student learning outcomes.

Keywords: Learning outcomes; Quality of learning process; Teaching module

Introduction

The Independent Curriculum places critical accentuation on character training and instills positive qualities. This means fostering improvements in students' ethics and morals and expanding feelings of compassion, resistance, and respect for others (Hasibuan et al., 2023). The Independent Curriculum is an educational program designed by the Indonesian government to give educational units the authority to develop a curriculum that suits local needs, student characteristics, and the global challenges being faced (Paulus & Wuwur, 2023). The independent curriculum is socialized to all educational units, and the government provides options for the process of implementing the independent curriculum in schools, namely, freedom to learn, freedom to change, and freedom to share (Ananda et al., 2023). The school can choose these three options according to the school's criteria or readiness to implement the Merdeka curriculum (Kemendikbudristek, 2022).

Implementation of the Independent Curriculum in the learning process is student-centered, namely by focusing on students' personalities, experiences, backgrounds, perspectives, talents, interests, capacities, and needs in the learning process. In this case, new

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educational strategies must encourage interaction between educators and students (Teguh Harianto & Wibowo, 2023). The implementation of the independent curriculum in the learning process has not been fully implemented and is still limited (Sibagariang et al., 2021). The implementation of the Independent Curriculum in Vocational High Schools (SMK) aims to increase students' innovation and creative power so that they are ready to face the industrial world (Nurtamara et al., 2023).

Based on the results of a literature review regarding several obstacles in implementing the independent curriculum: first, teachers have not been optimal in developing the independent learning curriculum because there are no learning guidelines, so the learning process is less than optimal, so teachers have difficulty in making learning plans or teaching modules (Amalia et al., 2023; Susetyo, 2020). Second, teachers lack in-depth understanding of the concepts and objectives of the independent curriculum, so in the classroom learning process, teachers still use learning plans based on the 2013 curriculum, namely RPP (Arifiani & Umami, 2023). Third, the stages of making teaching modules are still constrained; not all teachers make teaching modules; the preparation of the ATP is still not carried out due to a lack of guidance in making it; and the responsibility for making teaching modules is the responsibility of the responsibility of the teachers who have been selected in the simulation of implementing the Independent Curriculum (Qomaruddin, 2022). Other teachers only help if there is confusion (Magdalena et al., 2023). Fourth, learning facilities in the classroom, for example, LCDs, projectors, several teaching aids, and laboratory equipment, are still lacking, so teachers feel hampered in preparing diverse learning content according to students' learning styles (Susetyo, 2020). Fifth, many teachers still have difficulty accessing Teaching Independent Platform (PMM), namely an inadequate telecommunications network and an unreliable electricity network, frequent power outages, and blank spot telecommunications networks, which are very disturbing (Jannah et al., 2022). Apart from that, internal constraints are influenced by teachers' ability to use Android devices due to the limitations of their retirement age, which is getting closer (Harianto & Wibowo, 2023). Apart from that, internal constraints are influenced by teachers' ability to use Android devices due to the limitations of their approaching retirement age (Masbukhin & Sausan, 2023). Sixth, teachers have difficulty compiling teaching modules both when analyzing learning outcomes (CP), then formulating them in the form of learning objectives (TP), and arranging them in the form of a learning objective flow (ATP) (Sumarmi, 2023).

Based on theoretical observations related to problems in implementing the independent curriculum, the most common problem found is the teacher's ability to prepare learning tools in the form of teaching modules. According to Setiawan et al. (2022), the solution to the problems in implementing the independent curriculum, especially the preparation of learning tools in the form of teaching modules, requires training for teachers (Setiawan et al., 2022). However, the fact that occurs in the field is that training in preparing teaching modules is not carried out evenly (Solikhah & Wahyuni, 2023). The results of observations carried out empirically at one of the vocational high schools in the East Lombok region, related to problems in implementing the independent curriculum, namely the teacher's ability to prepare learning plans such as teaching modules. 95% of teachers does not understand how to create teaching modules. 70% of teachers use teaching modules that have been provided on the website or use teaching modules from other schools, so what happens is that the teaching modules used are not in accordance with the conditions, school needs, interests, and students' talents. Another 25% of teachers still use lesson planning in the form of lesson plans in the 2013 curriculum. This is due to their lack of ability to use technology (technology failure).

The Independent Curriculum teaching module is currently seen as a very important tool for improving the quality of the learning process so that it can improve student learning outcomes (Ibrahim, 2022). The teaching module is an application of the Learning Objectives Flow, which was developed from learning outcomes with the Pancasila Student Profile as the target (Novi et al., 2023). The Independent Curriculum launched a subject at the vocational school level that combines science subjects with social studies subjects, namely the Science and Social Project (IPAS) (Fajra & Novalinda, 2020). The IPAS Project played a role in realizing the Pancasila Student Profile as an ideal description of the profile and characteristics of Indonesian students (Marlina et al., 2022). The IPAS project fosters students' curiosity about things that happen in their environment (Salsabilla & Jannah, 2023). Students can learn how the universe functions and how life on Earth interacts with it as a result of growing curiosity (Hayat et al., 2023). The various problems we can recognize face and find solutions to achieve sustainable development goals basics of scientific learning methods (Maipita et al., 2021). Students will develop wisdom as a result of the Science and Technology Project's scientific attitude training, which includes strong curiosity, the ability to think critically, analyze information, and draw valid conclusions (Hidayah et al., 2024).

The science subjects include physics, chemistry, biology, economics, geography, and sociology

(Nurmiati et al., 2023). Each IPAS Project teaching module must include science AS subject material, which is arranged based on the project theme that has been agreed upon with the IPAS Project MGMP teacher (Nesri & Kristanto, 2020). Apart from that, the teaching modules must be adapted to the vocations at each school. However, teachers' habits in creating science project teaching modules have not adapted to vocational needs and do not use project-based learning planning (Zekri et al., 2020). Meanwhile, ideally, the science and science project teaching module must be project-based and have a vocational connection, and the science and social science material must be adapted to the project theme (Magdalena et al., 2020). Based on the analysis of teaching modules on the Teaching Independent Platform (PMM) application and on certain websites related to the IPAS project teaching modules that have been uploaded by several teachers at public and private vocational schools, it was found that the teaching modules were still very dense, still general in nature (not adapted to departments), and were still arranged based on aspects or subject matter, not project themes (Natalia et al., 2023). What happened was that the teachers at Al-Qomariyah Vocational School admitted that they had difficulty understanding and compiling teaching modules according to the examples given because the teaching modules were still general in nature, very dense, and not easy to apply in the learning process. The learning process in class needs to be improved. This can create better learning, and student learning outcomes can improve (Abdullah et al., 2022; Faridah & Afridiani, 2021; Sukiman, 2020).

Based on the problems that have been described, researchers are encouraged to develop IPAS project teaching modules as a form of solution to one of the problems experienced by teachers in implementing the independent curriculum, and the teaching modules developed will be different from existing teaching modules, where the teaching modules are still general (not yet adapted to vocational needs). The teaching modules developed will be adapted to school potential, vocational needs (Vocational School Level), and student needs. This IPAS project teaching module will later be socialized to all vocational school teachers who are expected to become an example in preparing the class X Science Project teaching module for the Computer and Network Technology (TKJ) department. Apart from that, in this research, it is necessary to develop a teaching module on the even-semester SMK Science and Science project material for class X that aims to improve learning outcomes and the quality of students' learning processes. It is hoped that the learning process in the classroom can be of higher quality and student learning outcomes can improve.

Method

The development of teaching modules in the implementation of the independent curriculum in class X Science Project teaching module for the Computer and Network Technology (TKJ) department was a type of research and development (Research & Development). The adaptation research procedure for developing a 4D model was composed of the stages of defining, designing, developing and disseminating (Thiagrajan et al., 1974). In summary, the following Figure 1 illustrates the flow of this research.

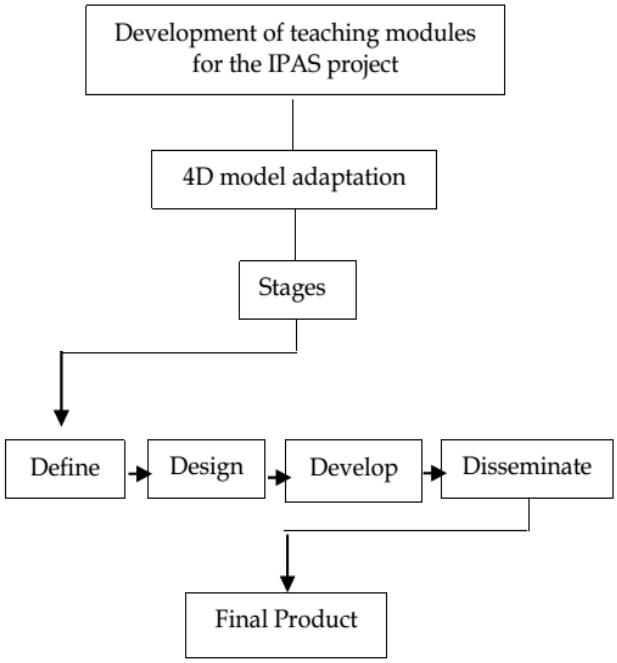

Figure 1. Research procedures

Result and Discussion

Define

The research results at the definition stage include needs analysis carried out through literature studies and field studies. Literature studies include task analysis and the specification of learning objectives. Meanwhile, field studies were carried out to obtain the school's supporting capacity for the teaching modules that will be developed, namely by analyzing the needs for teaching modules and the characteristics (interests and talents) of students. A product needs analysis was carried out to obtain information related to the science project teaching modules used by teachers in planning learning implementation. The use of teaching modules in schools can be described in Figure 2.

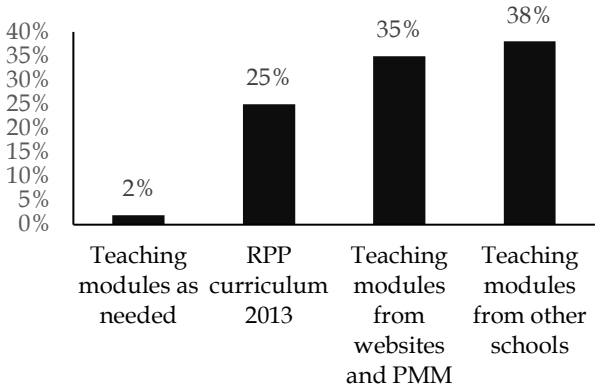

Figure 2. Used of teaching modules in schools Al-qomariyah vocational school

Based on the results of field observations, namely at Al-Qomariyah Jenggik Utara Vocational School, 38% of teachers use teaching modules from other schools, 35% of teachers use teaching modules that have been provided on the Teaching Independent Platform and certain websites such as Akunbelajar.id, GuruBerbagi.com and so on, so what happens is that the teaching modules used are not in accordance with the conditions, school needs, interests and talents of students, 25% of other teachers still use learning planning in the form of lesson plans in the 2013 curriculum and only 2% of teachers are able to prepare teaching modules according to the needs or potential of the school, the characteristics of the students and the interests and talents of the students. The teaching modules used are still general in nature and not yet arranged based on project themes for each department. Apart from identifying the use of teaching modules in schools, at the definition stage, a test of students' interests and talents is also carried out. The following data on students' interests and talents can be seen in Figure 3.

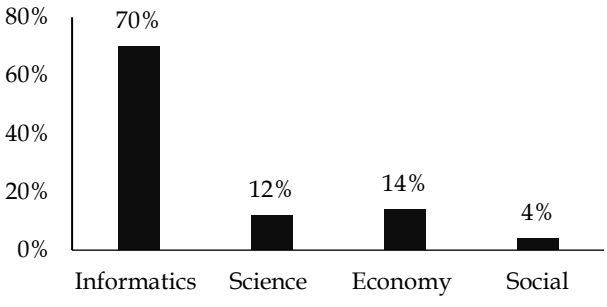

Figure 3. Data on student interests and talents

Based on the interest and talent tests on the website http://www.riddle.com/, the results are sorted based on recommendations for the subjects most interested in by students. This can be used as a reference in compiling teaching modules that suit students' interests and talents.

Design

The teaching module design stage consists of designing the module, including selecting the format and initial design of the module, and then preparing the research instrument. The teaching module format used was a modification and simplification of the independent curriculum teaching module format launched by the Ministry of Education and Culture (2020). The simplification of the independent curriculum teaching module format aims to make it easier for teachers in schools to compose teaching modules independently. This was in accordance with notes from the Ministry of Education and Culture that teachers have the right to modify and simplify several component items of teaching modules according to school potential and learning needs in the classroom. Modifications were made by adapting the project theme in the teaching module to the major at Al-Qomariyah Vocational School. The applications used in developing the IPAS project teaching module are Microsoft Word and Canva Design. The design of the IPAS project teaching module developed in Figure 4.

Figure 4. Design cover module

Based on Figure 4, the teaching module is adjusted based on the project theme. There are 2 themes for the modules, namely the project theme for teaching module 1, which is entitled Making Simple Disaster Mitigation Tools for Earth and Space Materials, and the project theme for teaching module 2, which is entitled Care and Maintenance of Practical Tools. In this case, the science project teachers majoring in TKJ and multimedia agreed to create a project title in the form of a simple liquid for cleaning laptop or computer hardware.

Develop

The development stages consist of a validity test, a practicality test, and a product effectiveness test. The validity test was carried out by three validators, consisting of two material experts and one language expert. The material expert validator is a science graduate lecturer who has a minimum qualification of doctoral education and has a science education field of study. The results of the validity test of the material that has been processed using the Gregory coefficient calculation are presented in Table 1.

Table 1. Material validation test results

Aspect	KVG Values	Criteria
Eligibility of material content	1.00	Very good
Presentation of material	1.00	Very good
Overall aspect average	1.00	Very good

Table 1 indicates that the validity test of the material in the teaching module consists of two assessment components, namely the suitability aspect of the material or content and the suitability aspect of the content presentation of the teaching module components. The average assessment for all aspects is 1.00 (the validity and qualification of the teaching module material are very high).

The language validity test is carried out by a linguist, namely one Indonesian language education lecturer with a doctoral education qualification. The results of the language validity test are presented in Table 2.

Table 2. Language Validity Test Results

Motion Phase	Validity Value	Validity Criteria
General information	75.0	Valid
Learning outcomes	87.5	Very Valid
Learning objectives	87.5	Very Valid
Sparking questions and learning preparation	75.0	Valid
Learning activities (introduction)	75.0	Valid
Core activities	79.1	Valid
Closing activities	87.5	Very Valid
Reflection	87.5	Very valid
Assessment	75.0	Valid
Attachments (Materials and LKPD)	87.5	Very Valid
Learning outcomes	87.5	Very Valid

Based on the data from the language validity test results in Table 2, information is obtained that the teaching module developed received an average score for the entire teaching module section of 81.05 with very valid language validity criteria both in terms of spelling and punctuation, grammar, word choice or diction, and sentence structure.

The practicality test was carried out by 10 IPAS project teachers at SMK East Lombok district. The practicality test result data is processed by calculating the average score, which has been converted to a scale of 100, and then compared with the practicality qualification. A recapitulation of the practicality test of the teaching module can be shown in Table 3.

Table 3. Practicality Test Results

Aspect	Value	Criteria
Time effectiveness	80.62	Very practical
Media use	85	Very practical
Average of all aspects	82.81	Very Practical

The practicality test by the teacher consists of two aspects of assessment, namely time effectiveness and media use. From the average assessment of all aspects, it can be concluded that the teaching module received practicality criteria from the teacher, with the criteria being "very practical."

Effectiveness test data, which includes data on the quality of the learning process, is collected by observation, and learning achievements and results are collected through tests. Testing the quality of the learning process was carried out by two science project teachers at Al-Qomariyah Vocational School (as observers). Effective test result data is processed by calculating the average score, which has been converted to a scale of 100, and then compared with the effectiveness qualification. The results of testing the effectiveness and quality of the learning process can be displayed in Table 4.

Table 4. Quality of the Learning Process Test Results

Aspect	Value	Criteria
Suitability	76.13	Effective
Attractiveness	79.16	Effective
Effectiveness	84.37	Very effective
Efficiency	78.12	Effective
Learning Productivity	66.67	Effective
Overall Aspect Average	76.89	(Effective)

The effectiveness test by 2 observers consists of 5 aspects of the quality of the learning process, namely aspects of suitability, attractiveness, effectiveness, efficiency, and learning productivity (Sukiman, 2020). On average, it can be concluded that effective teaching modules can improve the quality of the learning process.

The learning outcomes test aims to determine the level of students' understanding of the aspects or material of the Science and Technology Project that have been taught by the teacher after using learning tools in the form of teaching modules that have been developed.

The test used is a multiple-choice test with 40 questions in the chapter studied, namely Earth and Space, which is designed for 3 face-to-face learning meetings and 2 meetings for collecting pretest and post test data.

The data from the effectiveness test on learning outcomes is then processed using a normalized gain score. The post test result data was compared with the criteria for achieving learning objectives (KKTP) for the science project subjects of 70. The following are the results of the effectiveness test using normalized N-gain in Table 5.

Table 5. Learning Outcomes Test Result

Descriptive Data	Value	Pretest Qualification	Value	Posttest Criteria
Average value	33.75	Low	74.5	Good
Standard Deviation		8.05		9.30
Lowest Value	17.5	Very Low	57.5	Enough
The highest score	45	Low	92.5	Very Good
N		20		20
Normalized N-gain Score				0.61
Qualification				Medium
Normalized N-Gain Score Small Category				1 student (5%)
Normalized N-Gain Score Medium Category				14 students (70%)
Normalized N-Gain Score High Category				5 students (25%)

Based on the table above, the normalized gain score obtained is 0.61, so it is included in the "medium" category. As many as 70% of students obtained medium normalized n-gain, 5% of students obtained low normalized n-gain, and 25% of students obtained high normalized n-gain. To see an increase in learning outcomes, normality and proportion tests were carried out in one sample. In the normality test, a significance value of 0.595 was obtained. This result is greater than the significance level of 0.05. This shows that the posttest scores on student learning outcomes are normally distributed, so it can be continued with the one sample proportion test. Following are the results of the proportion test for one sample, which can be shown in Table 6.

Table 6. One Sample Proportion Test Results

Category			N	Observed Prop.	Exact Sig. (2-Tailed)
Postest	Group 1	70	5	0.25	0.041
	Group 2	70	15	0.75	
	Total		20	1.00	

Based on the table above, the one sample proportion test shows that the significance value obtained is 0.041. This means that the significance value obtained is <0.05, so H0 is rejected and Ha is accepted. This means that the teaching module of the Phase E SMK/MAK Science and Technology project is effective in improving student learning outcomes. The results of the one-sample proportion test also showed that 15 students got a score greater than the KKTP. The KKTP value used refers to the criteria for achieving school learning objectives of 70.

Disseminate

In the distribution stage, it was carried out at Al-Qomariyah Jenggik Utara Vocational School, East Lombok district, on a limited basis and socialized with teachers. The documentation for the dissemination stage can be seen in Figure 5.

Figure 5. Socialization of teaching modules

Conclusion

Based on the results and discussion of the research, the product in the form of a science project teaching module developed has the following characteristics: First, the teaching module has a table format and is distributed in file (word) form; second, the teaching module is developed and arranged based on a project-based learning model; third, the teaching module It has been adapted to the needs of schools and students in vocational schools majoring in TKJ and fourth, The teaching module is a modification of the teaching module format according to the Ministry of Education and Culture (2022) in sub-sub-sections of the teaching module such as learning objectives, learning activities, and assessment, adapted to the needs of the school or department and the needs of students. The teaching module received an assessment in terms of valid material and language. The results of the content validity test carried out by material experts obtained valid results with a value of 1.00 and very valid criteria. The language validity test carried out by a linguist obtained valid results with a score of 81.05 and very valid criteria. The teaching module for the SMK IPAS project that was developed obtained practical assessment results. The practicality test by the teacher obtained practical results with a score of 81.56 in the very

practical category. The SMK Science and Technology project teaching module developed is effective in improving the quality of the learning process and student learning outcomes. Test the effectiveness of the quality of the learning process with a score of 76.89 in the effective category, and the normalized N-gain score obtained was 0.61 in the medium category. The one-sample proportion test shows that the significance value obtained is 0.041. This means that the significance value obtained is <0.05, so H0 is rejected and Ha is accepted. This means that the teaching module for the Class X Vocational School Science and Science project is effective in improving student learning outcomes.

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Author Contributions
E F I collected data both empirically and theoretically, composed and developed products, analyzes data, and produced results and discussions. I W S guided research and provided ideas, suggestions, and recommendations for the research. K S was guided the research and provided recommendations and suggestions in the process of preparing the article.

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