



Development of Kodular Based Interactive Teaching Materials in Meeting Organizing Materials in SMK Negeri 2 Buduran

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Abstract

This study describes the development of kodular-based interactive teaching materials in the essential competencies of holding meetings and making notes, analyzing the feasibility of teaching materials, analyzing student responses, and analyzing the effectiveness of using teaching materials to improve student learning outcomes at SMK Negeri 2 Buduran. This research is development research that refers to the 4D model: define, design, develop, and disseminate. Students from class XII OTKP 1 as the experimental class and class XII OTKP 2 as the control class were used as subjects and samples in this study. Material expert validation sheets, language, graphs, student response questionnaires, and student learning outcomes tests were all used as part of the data collection instrument. Expert validation of questions and materials, language, graphics, item analysis, N-Gain analysis, completeness of student learning outcomes, homogeneity test, normality test, and hypothesis testing are data analysis techniques used. The developed interactive teaching materials were scored in the appropriate category, with 87.6% material experts, 90.6 % linguists, and 94.2 % graphic experts, with the overall criteria assessed in the very decent range. Meanwhile, students' responses to the developed interactive teaching materials got a %age of 90.26% with excellent criteria. It can be concluded that the interactive teaching materials developed are effective as supporting teaching materials to improve student learning outcomes of SMK Negeri 2 Buduran in class XII OTKP.

How to Cite

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INTRODUCTION

Education always follows the situation of developments and conditions in its time, not least for now. Learning has been conducted online in the last two years due to the Covid-19 virus pandemic. Covid-19 makes the whole world feel the need to make digital innovations that can meet the needs of every citizen, including in the field of education and teaching. Covid-19 has a destructive impact on the mental health of students almost all students experience anxiety and confusion in designing effective learning strategies during the Covid-19 pandemic (Baloran, 2020). Not only about the Covid-19 problem that makes students experience disruptions in terms of learning, but also digital technology that is less capable of causing constrained learning in the learning process that takes place by the Karana is needed adaptive digital technology so that it can provide an outdoor learning experience and improve learning (Hills, Thomas, 2019)

Contributions to technological advancements play an active role in being used as a device to create and design learning (Asrowi, Hadaya, & Hanif, 2019). Digital technology can be potential support for the online learning process based on digital technology, including software, the internet, applications, and so on (Afifulloh & Cahyanto, 2021). Online education is necessary to adapt to the era of globalization and limitations with the Covid-19 pandemic that has not subsided until now (Dzhamaldinova, Kurdyukova et al., 2020). Online learning is a teaching and learning process with interaction over the internet for more massive coverage (Bilfaqih Yusuf & Nur Qomarudin, 2015). Online learning also refers delivering of material through electronic media without using traditional methods (Castro, 2021). Online learning has its effectiveness in educating learners, its use as professional development, cost-effectiveness, and the ability to provide good education to anyone (Lorenzetti, 2013).

With the advancement of digital science and technology, there is an excellent opportunity to run distance education programs where electronic resources play an essential role in learning (Czajka & McConnell, 2019). E-learning also addresses learners' problem of relying on teachers and textbooks as knowledge delivery centers (Siamey, Farida, & Syazali, 2018). The implementation of E-learning can reduce the risk of transmission from contamination infected with Covid-19 and increase the proportion of increasing learning options (Stuby et al., 2021). E-learning is learning that utilizes electronic media in its implementation is divided into two, namely Internet-based and electronic-based learning. Learning based on information and communication technology is known as electronic-based learning. What is meant by "internet-based" is the learning process by utilizing the internet as the main means (Rusli & Supuwingsih, 2020). With this, teachers must to adapt to the circumstances in the learning process by creating either learning media or teaching materials that are relevant both in theory and practice (Norman & Furnes, 2016). The use of digital technology, including E-learning, interactive teaching materials, and learning media, can improve learners' learning outcomes by facilitating the delivery of materials.

Interactive teaching resources that increase learners' capacity to adapt to changing circumstances are one type of E-learning. Teaching materials are sources of information used during the learning process. All components of the educational process are represented in teaching materials, which can be used as a source of learning in learning activities (Prastowo, 2018). Teaching materials present all the components produced and created from the educational process to be used in learning activities as a learning source (Prastowo, 2018). If the learning topic is less clear, the teaching material will help students to be able to repeat it (Logan, Johnson, & Worsham, 2021). Permendikbud support the statement (2016) The Ministry of Education

and Culture states that teaching materials or textbooks can be used in educational institutions as a basic learning source to achieve basic and core competencies. Therefore, teaching materials should be designed by teachers according to the needs of learners and their level of intelligence. Teaching materials with contextual approaches provide a process of formulating examples of variations based on actual conditions, letting learners integrate learning content with case studies based on the situation in school (Saputri & Susilowibowo, 2020). Contextual teaching materials have an impact, namely the understanding of learners easily and quickly on the learning materials to be learned. Contextual learning that uses technology is a more advanced type of technological learning than e-learning. Therefore, one of the developments of electronic learning is contextual learning using android technology (Böhm & Constantine, 2016).

Learning is a method of achieving the goal, not the goal itself (Oemar, 2015). Based on the findings of a preliminary study that includes observations by researchers and interviews with teachers of Based on the findings of a preliminary study includes observations by researchers and interviews with teachers of Office Governance Automation (OTKP) in charge of Automation of Public Relations and Tourism Governance during PLP (School Field Introduction) activities in the Department of Office Governance Automation (OTKP), teaching and learning activities, especially in Basic Competencies 3.15 and 3.16 in meeting implementation materials. The use of WhatsApp, Google Classroom, and textbooks belonging to learners in the classroom is also limited. Because the educational tools and media used do not arouse the interest of learners' learning, this results in disappointing learning outcomes. Learners in Vocational High Schools (SMK) study not only theory but also need practice, which requires the creation of teaching materials and learning media to meet these demands.

Applications developed with android will make learning teaching materials more

accessible, android application developers also need developer tools that suit one's needs and abilities in making them. The results of research on the Global Stats, (2021) show that on smartphones, android is the most popular operating system compared to other operating systems, this is because android users can download many applications because they are open source, allowing developers to develop their own applications (Maiyana, 2018).

Making android applications for people who are not familiar will be difficult because makers need to understand programming languages, because this is an android application development website without the need to understand programming languages such as Kodular, MIT, and Appypie, where each development has its own advantages and disadvantages. In this scenario, researchers use the kodular as an application developer. Kodular is a website that allows users to create android-based applications for free using programming blocks without the need to write a programming language (Ronaldo & Ardoni, 2020).

The research that was in line with those previously conducted by (Rismayanti & Sukirwan, 2022) is the development of a kodular assisted e-module to get an average assessment result from validators of 83% so that it is categorized as very feasible and also obtains an average score of N-gain of 0.37 which can be interpreted as a medium category to improve the ability of learners to think critically. Research conducted by by developing android-based teaching materials received a result of 94.52% by validators so as to get the predicate *sangat* worthy. In line with the research (Aprilia, Yudiyanto, & Hakim, 2022) which obtained an average validation score of 86.45% with a decent category where e-books have effectiveness when used in the learning process. Furthermore, the research conducted (Sarita, Sujud, Jati, & Ayundasari, 2021) using kodular as the development of teaching materials got a score of 85% in terms of effectiveness, so it is said that the teaching materials it develops with kodular are very effective in learning. Then the research (Yulaika, 2020) using elec-

tronic teaching materials gained influence on the learning outcomes of learners as evidenced by pretest results of 10.57 while post-test results got 81.71 results. The last relevant research conducted by (Syarlisjisman, Sukarmin, & Wahyuningsih, 2021) who developed a kodular-based e-module, received a very decent category with an average score from validators of 87.2% and also gained high effectiveness of use in learning with a percentage of 86.5%.

The following are the purpose of the research: (1) how is the process of developing kodular-based interactive teaching materials in meeting materials; (2) how is the feasibility of developing kodular-based interactive teaching materials in meeting materials; (3) how do students respond to coding-based interactive teaching materials in meeting materials; and (4) how effective are kodular-based interactive teaching materials in meeting organizing materials. Researchers can plan a study called "Development of Kodular-Based Interactive Teaching Materials on Meeting Implementation Materials."

METHODS

Research and development (R&D) according to Thiagarajan (1974) is a type of research used and consists of four stages: definition (define), design (design), development (develop), and deployment stage (disseminate). R&D research is a study used to develop a product and assess its feasibility (Sugiyono, 2019). The interactive teaching resources produced are only limited to automation of public relations governance and protocol, namely KD 3.15 and KD 3.16 materials for meeting and meeting minutes. The materials in teaching materials were chosen because students' access to teaching materials was limited, learners were less involved in conventional teaching materials, and SMKN 2 Buduran teachers had not used interactive teaching materials.

The focus of this research is on interactive training tools for kodular-based meeting planning. The subjects of the product trial were students of class XII OTKP 1 and XII

OTKP 2. Material, language, and graphics experts must first authenticate these interactive teaching materials before they can be tested on learners. Validation sheets from experts and learner response surveys are used as research tools. Qualitative data is taken from validator commentators, while quantitative data is taken from validator. Quantitative data is obtained from the manufacture of kodular-based interactive teaching materials, as well as the evaluation of validators and learner reactions. The collected data is then examined, with the findings being used to enhance the researcher's interactive teaching materials. Assessment of kodular-based interactive teaching material validation sheets using the Likert scale and using the Guttman scale for learner response questionnaires.

After that, the percentage of expert validation will be checked and calculated using the below formula:

$$\text{Percentage (\%)} = (\text{Total Value} / \text{maximum number of values}) \times 100\%$$

Table 1. Validator Rating Scale

Percentage	Criteria
0% - 20%	Very Unworthy
20% - 40%	Unworthy
40% - 60%	Decent Enough
60% - 80%	Proper
80% - 100%	Very Worthy

Source : Riduwan (2016)

Table 2. Student Response Questionnaire Assessment Scale

Percentage	Criteria
0% - 20%	Very Unworthy
20% - 40%	Unworthy
40% - 60%	Decent Enough
60% - 80%	Proper
80% - 100%	Very Worthy

Source : Riduwan (2016)

If all components of the feasibility assessment from experts get a percentage result of > 61%, then the teaching materials can be categorized as feasible or very feasible. The following is a table of assessment scales for student response questionnaires.

If all the evaluation components in the student response questionnaire get a percentage result of >70%, then the interactive teaching material produced gets a decent or very decent predicate.

Table 3. Student Response Questionnaire Score

Criteria	Skor
Yes	1
Not	0

Source : Riduwan (2016)

The percentage of the student questionnaire will be checked and calculated using the below formula:

$$\text{Percentage (\%)} = \frac{\text{(Total Value)}}{\text{(maximum number of values)}} \times 100\%$$

A quasi-experiment design in the form of Non-Equivalent Control Group Design was used in this study, which involves experimental and control classes whose selection is not random (Sugiyono, 2019). OTKP Class XII SMKN 2 Buduran which produces two classes totaling 71 students is the target population.

The study collected two types of data: (1) qualitative data, such as expert comments and ideas for refining teaching materials; and (2) quantitative data, such as expert evaluations and learner responses, as well as pretest and posttest scores. In this study, data collection procedures include material validation, language and graphic validation, as well as learner response sheets and assessment of learners' learning outcomes.

RESULT AND DISCUSSION

Development of kodular-based interactive teaching materials using R&D (Research

and Development) methods. In this development, researchers use four stages, namely (define, design, develop, and disseminate). The following is an explanation of the four stages used by the researcher:

(1) Defining Stage (define)

This step involves assessing five actions to find learning problems: initial analysis, learner analysis, instruction analysis, design analysis, and formulation of learning objectives. Based on the findings of the initial investigation, there are problems in the field of Automation and Public Relations Governance, especially in the material of organizing meetings, especially the lack of teaching materials and student motivation that has an impact on poor learning outcomes. Next, analysis of learners. XII OTKP students at SMKN 2 Buduran want teaching materials that can be used on smartphones that have an attractive appearance and completeness of theory and practice because, during learning, students are only equipped with one handbook. Contextual flipbook teaching materials built on the android platform are feasible and effective to improve a learner's learning outcome (Fahrezi & Susanti, 2021). This is done so that learners are more involved in the learning process and have the choice to understand and practice interactive teaching materials based on coding.

Instruction analysis aims to provide content and instruction to learners related to the presentation of knowledge in relation to contextual approaches, which include linking information with real-life examples and activities. In interactive teaching materials that have been developed with the material presented contextually, the presence of videos and practices with problems relevant to real examples.

The next analysis is a design analysis based on the main material offered in teaching materials and systematically based on relevant and in line with the basic competencies of the 2013 Revised Curriculum. Meeting rooms, meeting planning, holding meetings, and creating notes are some of the main topics covered in active training materials. The formulation

of learning objectives is the next procedure. Because the problem is the lack of teaching materials and the lack of learning spirit of learners affect their learning outcomes. With the introduction of this kodular-based interactive teaching material that discusses current issues, especially in KD 3.15 and KD 3.16 materials, namely the implementation of meetings and the creation of notes recorded in order to succeed in learning goals.

(2) Design Stage (design)

This description is based on the 2014 BSNP assessment instrument standard that researchers are working on. According to Salma (2021) the design stage is directed at the preparation and curation of teaching resources that suit learning needs. The design of this kodular-based interactive teaching material includes a login section, main page, material menu, video view, attendance, material practice, and material evaluation. Teaching materials with initial design will be realized into the initial product.

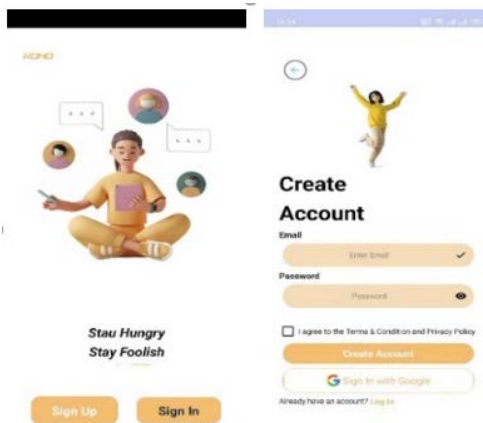


Figure 1. Sign-in View

Figure 1 shows the login of the interactive teaching material based on the kodular, namely the login menu to access this teaching material where each learner has their own account. With interesting initial illustrations, it is expected that learners often use teaching materials developed by researchers.

Figure 2 shows the main page view of this interactive teaching material consisting of material, video, practice, evaluation, attendance, and value.

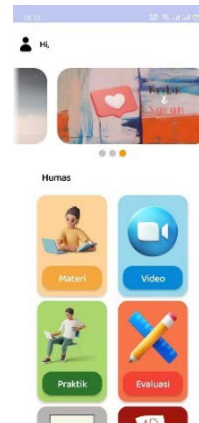


Figure 2. Main Menu

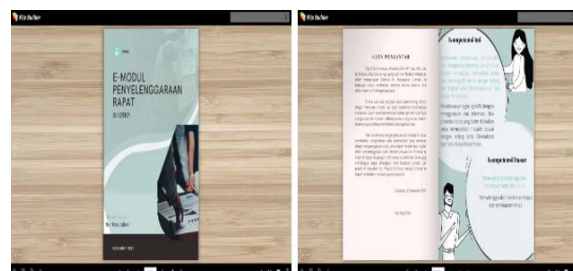


Figure 3. E-modul Start Page

Figure 3 shows the initial display of the E-module containing the cover, foreword, competence, and learning objectives. There are many illustrations of images and backgrounds so that students are not saturated in reading the E-modules that researchers develop in interactive teaching materials.

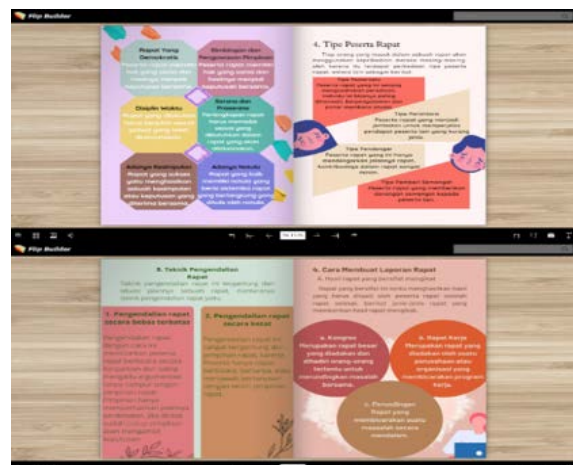


Figure 4. E-modul Content

Figure 4 displays the content of the material in the E-module of interactive teaching materials, using colors that are not monotonous, letter shapes, and shapes that each page

is different, aimed at allowing students to quickly understand the content of reading and have more reading interest than conventional package books.

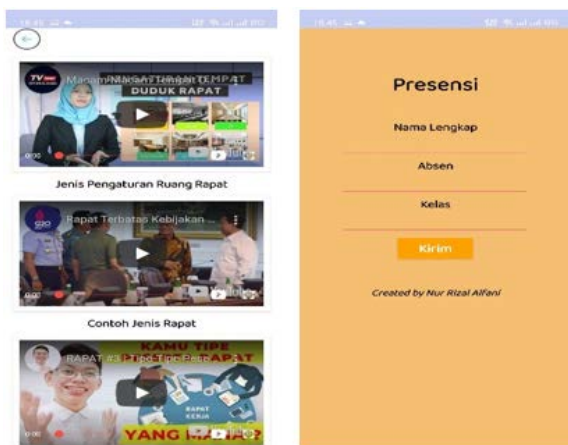


Figure 5. Video and Attendance Menu

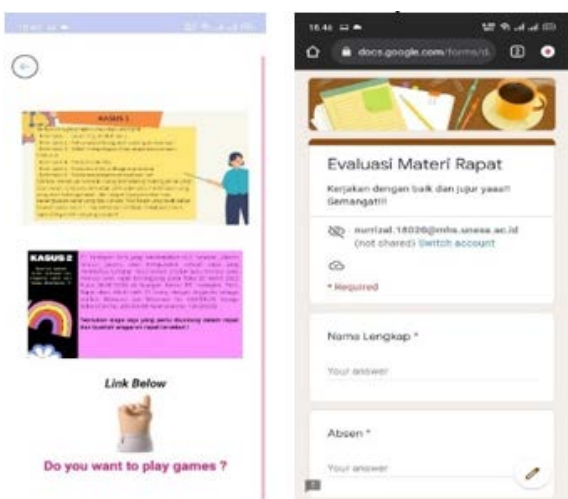


Figure 6. Practice and Evaluation Menu

Figure 5 shows a video containing material input from YouTube videos and student attendance accessed every hour of learning. Figure 6 shows the practice of a case related to activities directly on the meeting implementation material and also the evaluation of meeting materials connected to the google form used to assess.

(3) Development Stage (develop)

The interactive teaching materials in this study were created and developed using the Kodular Website and Flip PDF Professional to make interactive teaching materials

accessible using android smartphones. Furthermore, the kodular-based interactive teaching materials in the material for organizing this meeting were tested by experts, namely material, language, and graphics experts, to find out the feasibility of their use. After the validity test, the researcher will study the validity results obtained from the experts, which will be interpreted proportionally, then modify the interactive teaching sources that have been assessed and given comments and ideas by the experts. The teaching materials were also tested on SMKN 2 Buduran students in class XII OTKP. The results of the trial are then evaluated and interpreted using standards developed based on the percentage of results received.

The results of validation assessments conducted by validators, namely material, language, and graphics experts, have been used to evaluate the feasibility of coding-based interactive teaching materials in this study. Overall the results of expert validation of interactive teaching materials that have been developed are outlined in Table 4.

Table 4. Expert Assessment Results Table

No	Aspects	%	Interpretation
1	Materialist	87.6%	Very Worthy
2	Linguist	90.6%	Very Worthy
3	Graphic Expert	94.2%	Very Worthy
Average eligibility earned		90.8%	Very Worthy

Source: Processed data (2022)

Material expert test results of 87.6% with a decent probability of interpretation on the table. According to the material results conducted thoroughly by (Jazuli, Azizah, & Meita, 2018) using the prepared teaching materials, the result was 92.4 percent with a very decent interpretation. Another study (Aprilia et al., 2022) found that 90% of the teaching materials developed with a very decent interpretation.

Furthermore, the linguist's evaluation result averaged 90.6 percent with excellent interpretation. This finding is in accordance with the study (Fahrezi & Susanti, 2021), which showed that the feasibility of language in the resulting teaching material was 94.3%, with a very feasible interpretation. Research (Denisa & Hakim, 2021) found that linguists in the resulting teaching materials can be practiced with a result of 97%, with excellent predicates.

The average percentage of results from graphic expert validation gets 94.2%, with a very decent interpretation. Research conducted by (Yulaika, 2020) obtained 76% results that teaching materials developed in terms of graphics received a decent predicate. In line with the research conducted by (Oktaviana & Susilowibowo, 2017) obtained 92.32% with a very decent category. The overall validation results by experts get a value of 90.8%, so it is concluded that code-based interactive teaching materials are very suitable for use in the learning process.

Interactive teaching materials that researchers have designed by including meeting materials received a positive response from students, with a result of 90.26% indicating that students are interested in the teaching and learning process using this researcher's teaching and learning materials.

(4) Disseminate Stage

After the interactive teaching materials are said to be worth using by experts, the next phase that is carried out is the deployment. In this level of dissemination, researchers disseminate interactive teaching materials based on kodular in class XII SMKN 2 Buduran as practitioners. The dissemination of interactive teaching materials provides application files developed by researchers that will later be installed on each learner's smartphone.

During learning activities, the evaluation of learning outcomes is carried out to determine learners' capacity, especially cognitive abilities. The following is the data management method used to identify student learning

outcomes: Validity, reliability, difficulty level, and question differentiating power tests are part of the question item analysis. The N-Gain test is used to determine if learners' learning outcomes have improved. The last method is hypothesis testing (independent sample t-test). The data obtained must be normal and homogeneous, so it must be tested normally and homogeneity concerning hypothesis analysis. Effectiveness of The Use of Kodular-Based Interactive Teaching Materials in Meeting Implementation Materials On Improving Student Learning Outcomes at SMKN 2 Buduran Sidoarjo.

Researchers tested multiple-choice questions first before deciding on the effectiveness of teaching materials. Researchers created 20 multiple-choice questions, which were then analyzed quantitatively to determine the validity, reliability, difficulty level, and strengths of the problem. The results of the validity score are obtained through the results of calculations that are then seen on the r-table using a significance level of 0.05 or equivalent to 5%, which is adjusted to the number of learners studied. A total of 20 items were tested on 71 learners, who then used an r-table distribution table with a significance level of 0.05 and a degree of freedom ($df = n-2$) of 69 to look for the value of r-table (0.05;69), which is equal to 0.235. Then I got 18 items, 18 of which were said to be valid, and 2 of them were said to be invalid. Meanwhile, because the value is greater than the r-table, the reliability value of all items is 0.586 and is declared reliable. The difficulty level is then divided into three categories: easy, medium, and difficult, with 20 medium questions. Discrimination is divided into four categories: excellent, good, good enough, and very bad. Then I got one very good distinguishing power question, one good category question, eight category questions are pretty good, and ten category questions are very bad. The 18 valid questions come from the analysis of the items mentioned above, and these valid questions are then included in the pretest-posttest and given to control classes and experiments.

Table 5. Experimental Class and Control Class

Learning Outcomes	Experimental Class			Control Class		
	Pretest	Posttest	N-Gain	Pretest	Posttest	N-Gain
Sum	17,35	2,722.23	18.3	1,915	1,916.67	5.9
Average	49.5	77.78	0.52	53.19	53.24	0.16
Completeness	7	29	-	7	9	-
Percentage of Completeness	20%	83%	-	19%	25%	-

Source : Processed Data (2022)

Researchers' efficiency of teaching materials is tested for control and experimental classes, with class XII-OTKP 1 as the experimental class and class XII-OTKP 2 as the control class, carried out after the question items are analyzed. Experimental classes use teaching materials created by researchers, while control classes use a lecture approach after studying both subjects. After learning in both courses obtained the results of recapitulation of the learning outcomes of both classes, as seen in the Table 5.

The Table 5 shows that the average in the assessment class for pretest is 49.5, and for posttest after being given learning using teaching programs developed by researchers increased to 77.78. Then this experimental class also obtained an N-Gain score of 0.52 means that the score is in the medium category, which is to the criteria described by Hake in (Kurniawan & Rohmani, 2019). Then the percentage of learners who completed learning in the experimental class for pretest is still deficient because only seven learners are declared complete with a Percentage of 20%, this is inversely proportional to the experimental class after the provision of treatment in the form of teaching materials developed by researchers for posttest administration. The completion percentage has significantly increased dramatically by 83%, with details of 29 learners completed while seven students have not completed.

Furthermore, it can also be seen from the table above for pretesting in the average control class of 53.19 and for posttests in the control class, the average increased but not significantly, only by 53.24. Then for the control class to get an N-Gain score of 0.16 this makes the score obtained in the low category, this category corresponds to the criteria described by Hake in (Kurniawan & Rohmani, 2019) Then the percentage of learners who completed the provision of pretests in the control class is 19%, with details of 7 learners declared complete and 29 learners declared incomplete. In contrast, for the posttest control class, The percentage of student completion is also still deficient, only getting a score of 25%, with details of 9 completed learners and 27 learners declared incomplete.

In this study, the Kolmogorov-Smirnov test and Levene statistics were used to determine normality and homogeneity. With a result of 0.200 for the normality test and 0.167 for the homogeneity test, both results for normality, and homogeneity, were declared normal and homogenous.

Independent sample t-test shows that the calculated value is 3.258. Furthermore, it can also be seen that the table of 1.995 is seen using the distribution table with a significance level of 95% and with a degree of difference of 69 so that the table (0.05; 68) is 1.995. Based on the results of the t-test with the results of $t_{count} > t_{table}$, namely $3,258 > 1,995$,

it can be concluded that H1 is accepted. So it can be concluded that there is an influence on the use of kodular-based interactive teaching materials in meeting materials to improve student learning outcomes at SMKN 2 Buduran Sidoarjo.

According to the research carried out (Wirawan, Indrawati, & Rahmanto, 2017), who obtained a significance value of $0.002 < 0.005$ for the test, showing significant results in student learning outcomes. Based on the results of the N-Gain test, the kodular-assisted e-module has an N-gain score of 0.37 with a medium classification, which indicates that the e-module is feasible and attractive to use (Rismayanti & Sukirwan, 2022).

Another study (Kurniawan & Rohmani, 2019) found that android-based interactive learning can improve cognitive learning outcomes of learners. The research conducted by (Syahputra, Arwansyah, & Hasyim, 2021) using android-based interactive learning media has implications for student learning outcomes in the subject of creative products and increasing entrepreneurship.

CONCLUSION

The conclusions of this study are (1) the process of developing codedular-based interactive teaching materials on meeting materials with a 4D development model consisting of 4 stages, namely define (definition), design (design), develop (development), and dissemination (dissemination); (2) the feasibility of codular-based interactive teaching materials based on expert judgment is 94.2% getting a very decent category. Thus, interactive teaching materials based on code in meeting organizing materials are categorized as very suitable to be used as interactive teaching materials for class XII OTKP at SMK Negeri 2 Buduran; (3) the results of student responses to codular-based interactive teaching materials in meeting organizing materials obtained a percentage of 90.26% with very feasible criteria so that there is an influence of using codular-based interactive teaching materials on student learning

outcomes in material for holding OTKP meetings for class XII at SMK Negeri 2 Buduran .

This development research follows the procedures of the 4D development model but has several limitations, including (1) interactive teaching materials developed by researchers are limited to essential competencies on the subject matter of organizing public relations automation and office governance meetings for OTKP class XII; (2) the kodular-based interactive teaching materials developed by researchers can only be used if there is the internet; (3) interactive teaching materials developed by researchers only assess their effectiveness through student learning outcomes. Suggestions obtained by researchers are as follows: (1) it is expected to develop in other subjects that are useful for teachers in the learning process; (2) it is expected that the use of interactive teaching materials does not require the use of the internet.

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