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Development of Learning Devices Blended Learning Model Flipped Classroom Type Material Data Centering Size

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Abstract: ***This study aims to produce learning tools that meet the valid, practical and effective criteria by using the Flipped Classroom type Blended Learning model in the Data Centering Size material. Learning tools that include Learning Implementation Plans (RPP), Student Worksheets (LKPD) and Learning Outcomes Tests (THB) were developed with the Research Develop Model ADDIE (Analyze, Design, Develop, Implement and Evaluate) research design. The criteria for valid, practical and effective development results refer to the assessment of the results of educational product development by Nieveen (1999).Through the Analyze and Design stages, the initial draft of the learning device has been obtained. Furthermore, through the Develop, Implement and Evaluate stages, learning tools were obtained which were developed using the Flipped Classroom type Blended Learning model that met the valid, practical and effective criteria. The researcher took the research location at SMK Negeri 1 Tondano with the trial subject of class XII Hospitality Accommodation for the 2021/2022 Academic Year***

Keywords: Problem Based Learning models, learning tools, development procedures, valid, practical and effective criteria

1. Preliminary

The COVID-19 (Coronavirus Disease 2019) pandemic was again a hot topic of discussion in early 2022 because positive cases in Indonesia increased sharply. The impact of Covid that is felt by people around the world, especially in Indonesia, is not only on health but in the scope of our lives, namely in the economic, social, cultural fields including education. Based on the Circular of the Minister of Education and Culture of the Republic of Indonesia No. 4 of 2020 dated March 24, 2020 regarding the Implementation of Educational Policies in the Emergency Period for the Spread of Corona Virus Diseases, it is determined that the National Examination for the 2019/2020 Academic Year will be abolished and face-to-face learning activities will be replaced with learning that utilizes learning media online and offline as well as assignments at home that are coordinated, directed and monitored by the relevant Education Units.But in reality the practice of online learning has a bad impact especially for students. During this New Normal period in Minahasa Regency, Limited Face-to-face Learning (PTMT) is an alternative that is widely used by several educational units from the even semester of the 2020/2021 Academic Year to date. This PTMT requires that the number of students in one class is 50% of the capacity of the classroom building to carry out face-to-face learning. The Face-to-Face Group will take part in learning at school and the other group will take part in online learning from home. Teachers must ensure that teaching and learning activities continue, even though students are at home by providing direction and guidance using the Google classroom application, Whatsapp, Zoom or other applications to using social media to communicate. This kind of learning combines face-to-face learning in class and online learning to increase active independent learning and reduce the amount of face-to-face time in class known as Blended Learning. Blended Learning is a special case of Classroom Instruction and Online Learning (Bernard, 2014). With the same current conditions, the Blended Learning learning model is deemed appropriate which can be used as an alternative learning model that is able to combine the synchronous and asynchronous learning process because it can be implemented in all subjects (Mufidah, 2021). Based on research conducted by Mufidah (2021) in class XI IPS SMAN 1 Puri Mojokerto, the application of the Blended Learning model which was carried out with a percentage of 95.83% was effective in increasing student learning outcomes by 73.84% and student independence. One type of Blended Learning model that is widely used in Indonesia is the Flipped Classroom type. The advantage of the Flipped Classroom type compared to other types is that it only requires one classroom in the face-to-face learning process and provides flexibility and increases the independence of students in accessing information and bridging their learning styles, especially when learning online.Walidah (2020) through research conducted on class XI students at MA Raudhotul Ulum Klampis concluded that the Flipped Classroom learning model can significantly affect student learning outcomes, this is indicated by the data obtained in the completion of the learning outcomes test questions which have the percentage of students who complete is 90%. With the results of the same discussion, research conducted by Rukiyahtul (Hasanah Hsb, 2021) at SMP Negeri 1 Barumun, Padang Lawas Regency, with experimental research and the Pretest Posttest Control Group Design design, the average posttest value of the experimental class was 83.67 and the average score was 83.67. The control class average is 68.67, indicating that the experimental class learning outcomes using the Flipped Classroom type learning model are higher than the control class on opportunity material. The significant influence on the use of the Flipped Classroom learning model in this study is shown

from the t-test calculation on the test instrument, the results of $t_{count} > t_{table}$ are 5,622 > 2,042. The findings in this study are in accordance with the findings of other researchers (Sanjaya, 2019) at SMA Muhammadiyah 1 Karanganyar class XI which uses quantitative research with a quasi-experimental design, showing that the use of Flipped Classroom is better than Discovery learning in mathematics learning outcomes. seen from the calculation of the marginal average for students' creative thinking skills with Flipped Classroom 74.4375 and the marginal average with Discovery Learning 68.8275.

Based on the references above, the Flipped Classroom type of Blended Learning learning model can be used as an alternative for current Blended Learning. In learning Mathematics subjects, through the Mathematics MGMP of SMK Negeri 1 Tondano, it was found that many teachers did not fully understand the Blended Learning learning process, especially the learning model that was in accordance with current conditions so that the manufacture of learning tools to achieve learning objectives was not optimal. Based on the results of interviews with mathematics teachers at SMK Negeri 1 Tondano, the learning model that is often used by teachers is only limited to Problem Based Learning and Inquiry models and often does not use Student Worksheets (LKPD). The response of students in learning both in online learning or face-to-face learning is less than optimal and less motivated which has an impact on learning outcomes that are not optimal.It can be seen from the learning objectives in the online learning process that have not been achieved by students, such as in the Mathematics subject, statistical material, the size of data concentration. With ordinary face-to-face learning, many students experience difficulties, especially if it is carried out online then Face-to-face considering the psychological conditions of students who are often bored with studying, especially studying at home which is not monitored and guided directly by the teacher. As a result, it is difficult for students to distinguish the material on the size of the data concentration, between the median and the mean material. Especially for Median material which is theoretical in nature which contains abstract objects because it requires understanding concepts and calculation operations using symbols in determining the Median value. Taking into account the descriptions above, the researcher wants to focus research on "Development of Learning Devices for Blended Learning Model Types of Flipped Classroom Materials Size of Data Centering".

2. Research Procedure

The focus of the research is the development of mathematics learning products which consist of Learning Implementation Plans (RPP), Student Worksheets (LKS), and Learning Outcomes Tests (THB) to teach Data Concentration Measures material to class XII SMK students. The development of learning tools is based on the Flipped Classroom Type Blended Learning model. This type of research is development research using the ADDIE model (Branch, 2009) which includes 5 stages, namely Analyze, Design, Develop, Implement, and Evaluate. Each stage of activity in the development model consists of several sub-activities that are cyclical in nature. The number of cycles carried out depends on the achievement of the decision criteria (Nieveen, 1999) at each stage, with the direction of development shown in **Figure-1**.

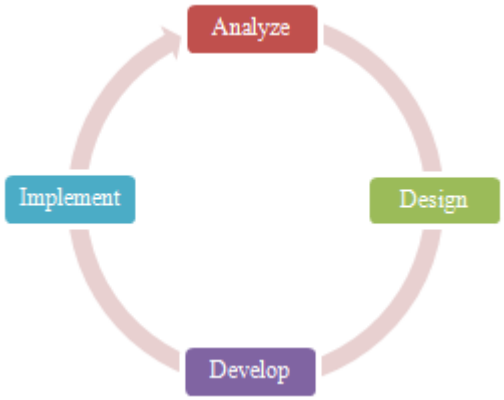

Figure 1: ADDIE development model stage (Branch,2009)

Validity data was obtained through the assessment of experts and practitioners of mathematics education. The assessment is carried out in cycles on the learning devices that are being developed. Field trials were carried out at SMK Negeri 1 Tondano to obtain data on the practicality and effectiveness of learning tools. Practical data obtained from observations on the skills of teachers in carrying out learning using learning tools that are being developed. Effectiveness data was obtained through student learning outcomes tests, observations of student activities and questionnaires on student responses to learning and its devices..

3. Results and Discussion

In the Analysis Stage, performance analysis, needs analysis, material analysis, identification of learning objectives have been carried out, then the following results are obtained. The results of the performance analyst obtained data that (1) the learning tools used in online learning are the same as those used in face-to-face learning; (2) The response of students in the implementation of online learning is less than optimal and less motivated; (3) The material that is difficult to teach with this limited face-to-face learning is specifically for class XII, namely the Size of Data Concentration, especially the Median, then continues on the material for the Size of Data Location, namely Quartile, Decile and Percentile; (3) The causal factors that allow students to experience difficulties in the learning process: (a) Implementation of Curriculum 13 which requires the student-centered learning process to change to teacher-centered due to the changing learning activities due to the Covid-19 pandemic;(b) Teaching materials or Student Worksheets are often not used and their use is less than optimal/unattractive; (c) The learning models and methods used by teachers are less varied, only limited to Problem Based Learning and Inquiry models; (d) The application of distance learning takes too long so that students have less motivation in the learning process, especially mathematics; (e) The saturation of students in online learning which has an impact on the lack of interest in learning in further learning, both face-to-face learning and then online learning. To minimize and overcome the problems above, it is necessary to renew and develop teacher performance in making learning tools. One of them is by developing valid, practical and effective learning tools. Researchers developed learning tools with the

Flipped Classroom Blended Learning model in the form of lesson plans, LKPD and Learning Outcomes Tests on the Mean, Median and Mode data concentration measures in the hope that they can be alternative choices that can be used and applied in limited face-to-face learning or in learning face to face.

In the needs analysis stage, student analysis, material analysis, and identification of learning objectives have been carried out, the following results have been obtained. The result of student analysis is that class XII students in the 2021/2022 academic year have ages between 17-19 years, according to Piaget's cognitive learning theory, children are already in the last formal operational stage. At this stage, children already have the ability to reason and think abstractly and then can draw conclusions in the learning process. The role of the teacher in this stage of child development is to motivate, guide and then direct the child to be able to recognize the abilities in himself so that the child can increase the potential that exists and can be used in every aspect of life. Using varied learning models can be an alternative solution to increase children's learning motivation and overcome child's boredom in learning so that children can use reasoning and thinking skills in drawing conclusions that help them in the learning process to the fullest.The results of the material analysis are the materials used in the Design stage to develop learning tools, namely the Material of Data Concentration Measures, namely Mean, Median, and Mode. The Material of Data Concentration Measures is based on the Regulation of the Director General of Primary and Secondary Education of the Ministry of Education and Culture Number: 464/D.D5/KR/2018 contained in Basic Competence number 3.28, namely Analyzing the size of single data concentration and group data and number 4.28 Solving problems related to single data centering measure and group data. The learning objectives that have been described in accordance with predetermined learning indicators consist of 15 (fifteen) goal items according to the realm of knowledge and 15 (fifteen) goal items according to the realm of skills. Based on the performance analysis above, the identification of the problems that have been described, the researchers provide alternative solutions based on the needs analysis that has been described to minimize and overcome the problems mentioned above is the need for renewal and development of teacher performance in making learning tools.One of them is by developing learning tools with good quality, namely meeting the values of validity, practicality and effectiveness. Learning devices use learning models that should be varied so that students are not bored and bored in learning activities that do not vary causing learning motivation to be less and result in less than optimal learning outcomes. Therefore, the learning model used by the researcher is a model that has not been used by teachers at SMK Negeri 1 Tondano which is the research location, namely the Flipped Classroom Type Blended Learning model. The learning tools that will be developed are limited to the Learning Implementation Plan (RPP), student worksheets (LKPD) and learning outcomes tests (THB) on the Size of Data Concentration material according to the needs analysis above. So, at the design stage, the researcher will develop learning device products with the Flipped Classroom Blended Learning model in the form of RPP, LKPD and Learning Outcomes Tests on the Mean, Median and Mode data centering size material in the hope that it can be an alternative choice that can be used and applied in learning. limited face-to-face or face-to-face learning which can minimize the performance gap that occurs.

At the Design Stage, the researcher has compiled a learning device product for the Blended Learning model of the Flipped Classroom type material for Data Concentration Size; Mean, Median and Mode. The learning tools compiled consist of 3 (three) units of Learning Implementation Plans (RPP), 3 (three) units of Student Worksheets (LKPD), and 1 (one) unit of Learning Outcomes Test (THB). The preparation of these documents is based on literature studies from various sources and the results of the analysis described above. Instruments to collect validation data, practicality data and effectiveness data for researchers using existing instruments by making necessary adaptations.

In the Development Stage, several validations have been carried out by experts & practitioners. The final results of the validation documents are declared valid. The following provides an overview of the display of validation and analysis data for each document. Based on the results of the validation of each aspect of the assessment, the average value given by the 5 validators is calculated in Table 1.

Table 1: Results of Validation of Learning Implementation Plans

Assessment Aspect	The average value of 5 validators	Information
Part I. RPP Format	4,95	Very Valid
Part II. Contents served	4,95	Very Valid
Part III. Language and Writing	4,87	Very Valid
Part IV. Time Allocation	4,9	Very Valid
Percentage (%)	0,98	Very high

Based on the validation category of Aiken's formula (Susanti, 2021), the result of the average percentage of the total value of the RPP Validation is obtained V = 0.98 in the range of 0.80 < V 1.00 with a very high predicate. So it can be concluded that the RPP that has been prepared by the researcher is valid and can be used in the Implement Phase. Based on the LKPD validation, the results of the validation of each aspect of the assessment by 5 validators are obtained in **Table 2**.

Table 2: Student Worksheet Validation Results

Assessment Aspect	The average value of 5 validators	Information
Part I. Format	4,80	Very Valid
Part II. Contents	5,00	Very Valid
Part III. Language	4,75	Very Valid
Part IV. Concept Accuracy	4,80	Very Valid
Total Average	4,84	Very Valid
Percentage (%)	0,97	Very high

Based on the validation category of Aiken's formula (Susanti, 2021), the result of the average percentage of the total value of the LKPD Validation is obtained V = 0.97 in the range of 0.80 < V 1.00 with a very high predicate. So it can be concluded that the LKPD compiled by the researcher

is valid and can be used with revisions at the Implement stage. Construct validity and content validation use experts as validators who will assess every aspect of the Learning Outcomes Test in the validation sheet. The results of the validation carried out by experts can be seen in **Table 3**.

Table 3: Learning Outcome Test Validation Results.

Assessment Aspect	The average value of 5 validators	Information
Part I. Content	4.67	Very Valid
Part II. Construction	4.83	Very Valid
Part III. Language	4.80	Very Valid
Total Average	4.77	Very Valid
Percentage (%)	0.95	Very high

Based on the validation category of Aiken's formula (Susanti, 2021), the results of the average percentage of the total THB Validation value obtained V = 0.95 in the range 0.80 < V 1.00 ; with a very high predicate. So it is concluded that the THB compiled by the researcher is valid and can be used with revisions at the Implement stage.

The student response questionnaire sheet was used to analyze the effectiveness of the learning tools developed, validated by 5 validators producing the data shown in **Table 4**.

Table 4: Results of Validation of Student Response Questionnaire Sheets

Aspek Penilaian	Rata-ratanilai 5 validator	Keterangan
Bagian I. Format	4,80	Sangat Valid
Bagian II. Isi	4,90	Sangat Valid
Bagian III. Bahasa	4,60	Sangat Valid
Rataan Total	4,77	Sangat Valid
Persentase (%)	0,95	Sangat Tinggi

The results of the average percentage of the total value of Student Response Questionnaire Validation obtained V = 0.95 in the range 0.80 < V 1.00 with a very high predicate. So it can be concluded that the Student Response Questionnaire that has been prepared by the researcher is valid and can be used.

The practicality of learning tools can be measured by looking at the level of teacher ability in managing learning through Observation of Learning Implementation. The results of the validation of the observation sheet can be seen in **Table 5**.

Table 5: Results of Validation of Learning Implementation Observation Sheet

Assessment Aspect	The average value of 5 validators	Information
Part I. Format	4,80	Very Valid
Part II. Contents	4,73	Very Valid
Part III. Language	4,90	Very Valid
Total Average	4,81	Very Valid
Percentage (%)	0,96	Very high

The results of the average percentage of the total value of the Validation Observation Sheet for the implementation of learning obtained V = 0.96 in the range of 0.80 < V 1.00 with a very high predicate. So it can be concluded that the observation sheet on the implementation of learning that has been prepared by the researcher is valid and can be used.

In the Implementation and Evaluation Stage, several field trials have been carried out to obtain Practicality data and Effectiveness data. Practicality data is data that is captured using the Learning Device Implementation Observation Format. The analysis of the results of observing the implementation of learning for 3 meetings by the Observer is shown in **Table 6**.

Table 6: Results of Observation of Learning Implementation

Assessment Aspect	Average score of each aspect	Information
Part I. Introduction	4,87	Very good
Part II. Core activities	4,84	Very good
Part III. Closing	4,83	Very good
Total Average	4,85	Very good
Percentage (%)	0,96	Very high

Observational data obtained a total average value in 3 meetings, namely 4.85 and with the criteria quoted from Nurdin in Ilyas (2015, the results of these observations were in very high criteria. These criteria indicate that the level of teacher ability in processing learning is very high). So that it can be concluded, the learning device developed by the researcher using the Flipped Classroom Type Blended Learning model meets the practical criteria.

Effectiveness data were obtained from Learning Outcomes Tests and Student Response Questionnaires. The learning tools developed meet the effective criteria, judging from the responses of students to the learning tools, a positive percentage of 92.45% is in the very high criteria and for classical mastery the percentage is 73.33% is in very good criteria and it can be concluded that classical mastery has achieved. From the results of the above discussion, it is found that the development of learning tools using the Flipped Classroom Type Blended Learning model material for Data Concentration Measures through Learning Implementation Plans (RPP), Student Worksheets (LKPD) and Learning Outcomes Tests (THB) have good categories because they meet Criteria Valid, Practical and Effective (Nieveen, 1999).

4. Conclusions and Suggestions

Based on the research objectives and the research process for developing learning tools, the following conclusions are drawn: (1) The process of developing learning tools for the Flipped Classroom type Blended Learning model material for Data Concentration Measures for class XII SMK students by using the Research Develop Model ADDIE research design which consists of 5 (five) stages, namely Analyze, Design, Develop, Implement and Evaluate); (2) The results of the development of learning tools are Learning Implementation Plans (RPP), Student Activity Sheets (LKS), and Learning Outcomes Tests (THB). All learning tools produced have met the predetermined criteria, namely (a) Learning tools are declared valid based on the validator's assessment, (b) Learning tools meet practical criteria according to indicators of the teacher's ability to manage learning for each aspect of each lesson plan

implementation, (c) Devices learning meets the effective criteria because the student's response is positive and learning outcomes meet the criteria for classical learning completeness that are said to be complete because more than 80% of students get a minimum score of 75 in accordance with the KKM that has been set by the school.

Based on the results of the study, it is recommended: (1) to use this device in face-to-face learning activities because it can help teachers in preparing students to always be active in the learning process that has an impact on learning outcomes, (2) the learning tools that have been developed are not yet at the test stage try out the field, so that there are opportunities for other researchers to study more about the effectiveness and practicality of this learning device, (3) To deal with the problem of student activity during face-to-face learning, teachers should try to continue to motivate students to understand the teaching materials sent and do LKPD before face-to-face learning and give rewards to students or groups who are active in learning activities in class, (4) The Flipped Classroom Type Blended Learning learning model can be collaborated with other learning models to overcome student boredom in participating in the learning process. learning with a variety of learning models. When learning in class the teacher should always pay attention to the time allocation, especially when working on LKPD because working on LKPD requires a high level of focus and reasoning, (5) Mathematics teachers can try to implement PBL learning models to teach other materials.

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