Learning Toolkit Development Case Method and Team Based Project in Numbers and Algebra Courses Codural-Based

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Abstract. This research is a development research that produces online learning device products using *the Case Method* and *Codular-based Team-based project* in the Number and Algebra Course at PGSD Unimed. Learning Tools consist of: Semester Learning Plans (RPS), Lecture Event Units (SAP), Student Worksheets (MFIs), Assessment Instruments and Teaching Materials. online using *Case Method* and *Codular-based Team based* projects in Numbers and Algebra Courses. This development is carried out using a 4D model that emphasizes the needs of lecturers and students. At the initial stage, a needs analysis, concept analysis, and student analysis are carried out. Based on this analysis, an Online Learning Tool was designed using a Codular-based *Case Method* and *Team-based project* in the Numbers and Algebra Course at PGSD FIP UNIMED. This research resulted in an Online Learning Tool using a Codular-based *Case Method* and *Team-based project* in the Numbers and Algebra Course that is valid, practical, and effective.

Keywords: *Case method, team based project, Kodular*

1. Introduction

The lecture process carried out by a lecturer is a means of transforming knowledge and various skills that must be possessed by students after they complete their education at the tertiary level. In delivering the course that is effective, a lecturer should develop various innovations in order to produce quality, resilient and ready to face future challenges. Especially at this time where our nation and almost all parts of the world are being hit by an outbreak that is not necessarily certain when it will end. Every lecture conducted by a lecturer should present a *real* situation or a real problem that will later be faced by the student in his life, both in the world of work and in his life as a society. From these problems, it is hoped that students will be able to solve them both individually and as a team in community groups. This is certainly very important to do so that students have experience in solving various problems after they later finish their education in college.

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The reality that has occurred so far, in the learning process in lectures is still focused on deepening the material and solving questions based on lecture material. So what happens next is that students are not used to dealing with problems that actually occur in the real world. This condition will have an impact on the resilience of students in solving problems and competing in the world of work when they become graduates. This is a problem that requires special attention in universities

One of the courses taught in the PGSD FIP UNIMED study program is the numbers and algebra course. After students learn this course, it is hoped that students will have experience and skills in terms of designing the learning process, designing the media needed in carrying out learning and, managing a fun learning process so that it is interesting for elementary school students plus an understanding of the concepts of numbers and algebra itself. In fact, the lecture activities that have been carried out by the lecture process have not focused on solving problems in the field such as mathematics learning problems faced by teachers in elementary schools. In the lecture process, students still focus on discussing the material on numbers and algebra alone based on this reality. it is this problem that is the focus of this research.

The Case Method and *Team Based Project* learning methods are methods that apply case solving in the learning process both individually and in group groups. This *Case Method* and *Team Based Project* learning method brings the distance between students and the real world that they will encounter after graduating from college. Mulyana (2015) argues that Case-Based Reasoning is a problem-solving approach by emphasizing the role of previous experience. New problems can be solved by repurposing and perhaps making adjustments to problems that have been previously solved in common.

In line with the foregoing, the Ministry of Education and Culture has established 8 (eight) Key Performance Indicators for Higher Education. This is stipulated in the Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754 / P / 2020 concerning The Main Performance Indicators of State Universities (IKU - PTN). One of these Performance Indicators is to establish the use of case-solving learning methods (Case Method) in the learning process at universities.

As previously explained, currently the lecture process carried out in almost all regions of Indonesia, including at Medan State University (UNIMED) is carried out online (online). Students and lecturers do not meet each other, but do lectures from their respective places. Lectures like this are also a problem that must be found a solution so that the lecture process can run effectively and efficiently. The use of android is one of the choices currently carried out by most lecturers. The use of codular-based androids is the solution chosen by researchers in this study.

The effort made to solve some of the problems above is to prepare learning tools using *the Case Method* and Codular-based *Team based projects* in the Numbers and Algebra Course. In this case, it is to design learning tools using *The Case Method* and *Codular-based Team-based projects* in the Numbers and Algebra Course which will be used for online learning. The learning tools consist of Semester Learning Plans (RPS), Lecture Event Units (SAP), Student Worksheets (MFIs) Lecture Contracts, Teaching Materials, and Assessments, all of which can be accessed by students independently in the network anytime and anywhere. Based on the

presentation above, the researcher is interested in conducting a research with the title: "Development of *Case Method* Learning Tools and *Team Based Project* in the Codular-Based Numbers and Algebra Course at PGSD FIP UNIMED"

Case Method or also called *Case Study* is one of the learning methods that can stimulate students to study real cases or cases that are written. The case study method is a form of disbursement (Inquiry) directed at solving a case or problem. This learning method is closely related and can be said to be the same as problem solving learning (problem solving teaching-learning), even the scope can be wider (Sukmadinata & Syaodih, 2012). Case-based learning provides opportunities for students to analyze content by first introducing the core knowledge domain and encouraging students to look for other knowledge domains that may be relevant to the given problem (Syarafina, et al., 2017). Thus, the Case Method-based learning method which can also be called Case Study is a learning method that provides opportunities for students to analyze a problem presented in learning and determine the solution to the problem with their knowledge and experience.

The determining factor for the success of this Case Method is the active involvement of students' mentality to explore the conditions / situations of triggering cases into reality (experiental learning). The main objectives *of the Case Method* are:

1. Sharpen analytical, problem-solving and decision-making skills.
2. Improve understanding of student value systems, perceptions, and attitudes related to situations/cases.
3. Show students the role and influence of values and perceptions on decision making.
4. Foster group synergy in solving a problem.

The main characteristics in learning that apply the *Case Method* are:

1. Learning is carried out by forming small groups totaling (4-7 people) which provides an opportunity for active participation of all group members.
2. Learning topics are directed at interesting things that can trigger problem solving.

Some of the duties and roles of lecturers in *Case Method-based* learning, namely:

a. Prepare cases to be discussed according to the instructional objectives to be achieved.
b. Determine the procedure for discussing case studies, whether they will be analyzed individually /in groups, and the time provided.
c. During the group discussion process, the lecturer is only in charge of observing, occasionally providing information if deemed necessary.
d. Pay attention so that each participant has the opportunity to actively participate.
e. After the group discussion time is up, the lecturer calls the group to report the results of the discussion (analysis and problem solving).
f. Summarize and conclude learning outcomes.

Likewise, in the application of learning methods there are always advantages and disadvantages. The advantages of applying the *Case Method* in learning are:

1. Train students to learn contextually.
2. Train students to think critically.
3. Introduce problem-solving and decision-making procedures.
4. Provide opportunities for students to integrate prior knowledge with problems in the case in order to learn to make decisions professionally.
5. Provide opportunities for students to explore their potential and develop concepts/ideas.
6. Provide opportunities for students to appreciate the value of tolerance, respect the opinions of others, and democracy.

Furthermore, there are several shortcomings in the application of the *Case Method* to learning, namely:

1. Students are required to think critically, if they have not mastered the material and cases presented, then learning will not run optimally.
2. It is fun learning for active students, but boring for passive students.
3. Requires a long time in learning and high patience for lecturers.
4. Lecturers should be more active and creative in search of relevant cases. For conventional lecturers, this learning model cannot be carried out properly.

***Team Based Project* learning methods**

Team based Project (TBP) is an active learning and learning strategy with small groups that provides opportunities for students to apply concept knowledge through the activity-activity stage, including individual work, *teamwork*, and *immediate feedback*.) (Parmele et al, 2012). Parmelee (2012) further states that TBL is used for large classes (>100 students) or smaller classes. The concept of Team Learning originated from the basic idea that student groups of 5 to 7 people can become effective learning teams because the relationship between them is the main force that can support each other in the learning process

According to Michaelsen & Parmalee (2009) there are four main elements in *Team-Based Learning* consisting of: (1) groups, (2) responsibilities, (3) feedback, and (4) setting task designs.

Codular

Codular is defined as one of the open source IDE applications or tools like App Inventor. This code has most of the widget functionality of similar IDE tools. This Kodular site not only allows you to create Android applications, but also allows you to upload the results of creating these applications to the Kodular store, and even create your own extensions to create widgets that don't exist by default yet. increase. Before the Kodular name change, the site was called Makeroid. Now, on this Kodular site of his, he continues to develop application tools to make it easier for developers to create Android applications (type programs) without coding. When building an Android application, rely solely on drop-and-drop and put your rung puzzles in place to ensure your application program runs properly. You can add some advertisements to your Android application for money income. This Kodular site is experiencing frequent Android application build errors due to exceeding the hosting quota limit. App projects exported from

Kodular are often seen due to different Android standards when importing or migrating projects into IDE tools like Thunkable, AppyBuilder, or even App Inventor. minSdkVersion of any IDE tool.

Excess

- Lots of media features
- Dashboard view is more to *Design UI/UX*.
- The widget features more.
- There is no need to install additional software.
- Just use a web browser only,
- Just type the contents of the parameters of the program blocks without typing coding from scratch.
- Can create Android applications more effectively and efficiently.
- Creating a program, just "*drag and drop*" the existing program blocks.
- Can custom version value from *android:minSdkVersion* as desired.
- Can create a local database with SQLite or TinyDB.
- Can publish your application or extension to kodular store.

Deficiency

- The maximum size limit in the creation of an Android application is 10 MB. If it is oversized, an error occurs when compiling.
- Can't design Android apps 100% to your liking.
- The more projects, the longer the loading when starting the project opens.
- Currently, the web browser that fully supports Thunkable is Google Chrome (it is possible that other web browsers will follow).

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Learning Tools

Learning tools are tools or equipment to carry out processes that allow educators and students to carry out learning activities (Zuhdan, et al., 2011). Learning tools become the handle of teachers / lecturers in carrying out learning both in the classroom, laboratory, or outside the classroom.

Learning tools consist of:

Semester Learning Plan (RPS)

Semester Learning Plan (RPS) is a learning planning document prepared as a guide for students in carrying out lecture activities for one semester to achieve the learning objectives that have been set. In higher education, the learning tools used by teachers or lecturers are known as Semester Learning Plans or RPS for short.

Lecture Event Unit (SAP)

The Lecture Event Unit (SAP) is a teaching subject that includes one or several subjects to be taught during one or several meetings. SAP contains componentscomponents of teaching and

learning activities, media and teaching and evaluation tools. SAP explains more about the stages in one lecture meeting.

Student Activity Sheet (MFI)

Student Worksheets (MFIs) are a printed teaching material in the form of sheets of paper containing material, summaries and instructions for the implementation of learning tasks that must be done by students, both theoretical and / or practical which refers to the competencies that must be achieved by students, and their use depends on other teaching materials (Prastowo, 2013).

Textbooks.

A textbook is a handbook for courses compiled and written by experts in their fields by fulfilling textbooks and officially published and disseminated. To produce quality teaching, complete reading materials are needed to support the learning process.

Learning Outcomes Assessment Instrument.

Learning outcomes assessment instruments are assessment tools or evaluation tools used to collect data or information on learning outcomes

Online Learning

Online Learning stands for online learning, or a substitute for the term online learning that we often use in internet technology. According to Mulyati, et al (2020) online learning means learning that is carried out online, using learning applications that are carried out without face-to-face, but through available platforms. All forms of subject matter are distributed online, communication is also carried out online, and tests are also carried out online.

The term online learning began to be used frequently since the Covid-19 pandemic which began in March 2020. In order to prevent the spread of the Covid-19 virus, the government imposed Large Social Restrictions (PSBB) in Indonesia, including in schools and universities. Learning, which is usually done face-to-face, is replaced by online learning. In responding to this, UNIMED itself as one of the universities towards World Class University, immediately responded to the conditions for the implementation of online learning. To support the online learning process, UNIMED has launched an online learning platform called SIPDA-UNIMED (Online Learning Information System, Medan State University. This platform then became an e-learning facility that all lecturers at UNIMED use in carrying out online learning. In this study, researchers will also develop online learning tools using SIPDA as a learning platform.

Numbers and Algebra course

The Numbers and algebra course is one of the courses charged to PGSD Study Program students. This course discusses the process of learning numbers and algebra in elementary school. In the learning process, students are equipped with knowledge of models, methods, strategies, and approaches to learning mathematics, especially in number and algebraic materials.

Relevant Research

Some of the researches relevant to this research plan are:

1. Research conducted by Endra Ari Prabawa in 2017 entitled "Analysis of the ability to solve problems from students' cognitive styles using a case-based learning model in mathematics learning has been proven to improve students' mathematical skills in cognitive aspects by using a case-based learning model

2. Research conducted by Muhammad Sobri in 2021 with the title: The use of the case method learning model in overcoming learning demotivation during the muhadatsah Lil Mubtadiin course of the Arabic Language Education Study Program at jambi University has been proven to improve students' skills in overcoming life problems and global problems faced by them.

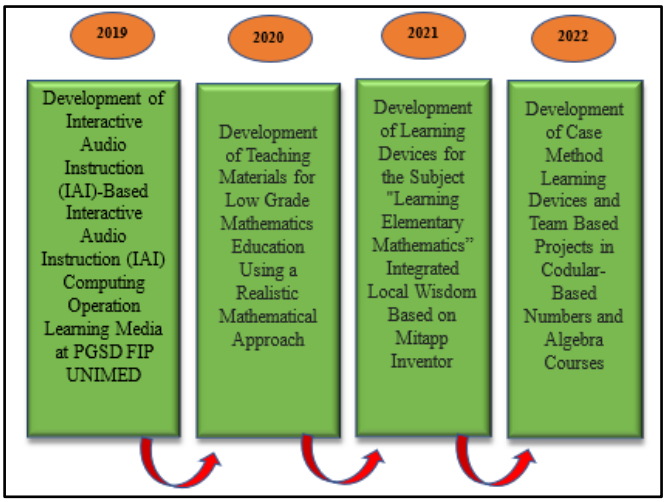

Figure 1. Research Roadmap

2. Purpose

This study aims to develop *a Case Method* learning tool and *Team Based Project* in the codular-based "Numbers and Algebra" Course at PGSD FIP Unimed for students majoring in unimed elementary school teacher education (PGSD).

Benefit

The benefits of this research are:

· Students majoring in elementary school teacher education (PGSD) faculty of unimed education, have *a case method* and *team based project* learning tool in the "Numbers and Algebra" course based on codular.

· Students can improve their problem-solving skills by using *Case Method-based* teaching materials.

· Students can duplicate and design projects related to Numbers and Algebra and are beneficial for daily life.
· Students are able to use the codular application in the lecture process as a means of online learning.

3. Methods

This research is development research (research and development). Development research is a research activity that systematically aims at commercialization through various stages and evaluations. The purpose of the evaluation is to check the validity status of the application and its effectiveness. The product produced by this development research is simply different from the intended development. Simple development is simply drafted with inputs from various experts, without modifications. This has a very large effect on the level of efficacy and the resulting efficacy of the product is less felt in its use.

Seels and Richey (in Setyosari, 2010:195) Here, "development research is the study of the design, development, and evaluation of educational programs, processes, and products that must meet criteria of internal consistency and effectiveness, as opposed to simple educational development. defined as systematic research. In other words, development research, as distinguished from simple learning development, is defined as systematic investigation into the design, development, and evaluation of programs, processes, and learning outcomes. These must meet internal consistency and validity criteria and are therefore enforced during development. Using the development model.

Development Model

This research is a type of development research (*Research and Development*) using 4D models (*four-D models*). According to Sugiyono (2015) the development of the four-D model consists of 4 main stages, namely: 1) *Define* (definition), 2) *Design* (design), 3) *Develop* (development), and 4) *Dessiminate* (deployment).

Development Procedure

The development procedure in this study is carried out through the following stages:

Defining Stage (define).

At this stage there are three stages of activity, namely curriculum analysis, concept analysis and student analysis.

a. Curriculum analysis, namely analyzing the learning outcomes of courses based on KKNI.
b. Concept analysis is carried out to find out the main concepts that must be mastered by students in the numbers and algebra course.
c. Student analysis is carried out to determine student characteristics including age, motivation, different knowledge and educational backgrounds, academic abilities, and social skills;

Design Stage (design).
This stage aims to design a Case Method-based online learning tool in the numbers and algebra course. Based on the concept analysis that has been carried out at the Definition Stage, learning tools were designed in the form of Semester Learning Plans (RPS), Lecture Event Units (SAP), Student Worksheets (MFIs), and Assessment Instruments based on *Case Method and Team Based Project.*

Development Stage (*Develop*).

This stage aims to produce online learning tools using a valid, practical, and effective Codular-based *Case Method* and *Team-based project*. This stage of development includes validity tests, practicality tests, and effectiveness tests. Validity means that online learning tools using *The Case Method* and *Team based on* Codular-based projects designed will be validated by experts according to their field of expertise. Meanwhile, practicality means that after this stage of validity test, it is then revised and then tested during lectures to find out its practicality. Practicality is the level of practicality of online learning tools using the Kodular-based *Case Method* and *Team-based project*, when used in the learning process, while effectiveness is an assessment of aspects of the effectiveness of online learning tools using the Kodular-based *Case Method* and *Team-based project*, in the form of student cognitive evaluation results.

***Disseminate* Stage)**
This Deployment Phase aims to promote the development product so that it can be accepted by users, whether individuals, a group or a system. At this stage, the distribution of products on a wider scale is carried out.
Briefly the development procedure can be seen in the following picture of the flow chart:

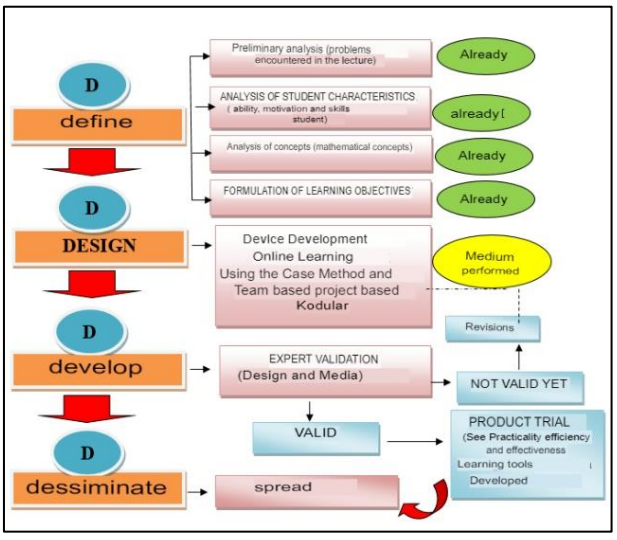

Figure 2 Device Development Procedure

Data Collection Techniques

Data and Research Instruments The data collection techniques in this study are as follows:

1. Validation

Validation is carried out on 2 aspects, namely content validation and construct validation. The data is collected by using validation sheets.

2. Observation

Observations are made to observe the implementation of the learning tools developed. Data were collected using observation sheets.

3. Questionnaire

Questionnaire sheets are used to collect information related to the responses of lecturers and students to the learning tools developed.

4. Interviews

Interviews are used for supporting data in measuring the level of practicality and effectiveness of the learning tools developed. The instrument used is the interview guidelines

Data Analysis Techniques

The data analysis techniques used in this study are quantitative and qualitative descriptive data analysis. Data from expert tests and small group tests from questionnaires are evaluated as percentages and described qualitatively. Field test data/user tests in the form of learning processes in a development environment are analyzed by qualitative data analysis of flow models applying the multi-objective principle. In this case, it is important how analytical techniques can be used to help solve the problem.

Analytical activities, including:Data reduction, data presentation, and drawing or validating conclusions. Data reduction activities include classification and coding by data type. Displaying data in a description, table, chart, diagram, or other visual format. The data presented are verified, interpreted and concluded. Data analysis goals include observation level, explanation, and explanation. At the observation level, data are selected, categorized and coded. At the descriptive level, data can be expressed per pattern, per event, per trend, or per semantic. At the descriptive level, the analysis focuses on study effectiveness.

4. Results

Validation activities for the Development of *Case Method* and *Team Based Project* Learning Tools in the codular-based "Numbers and Algebra" Course at PGSD FIP Unimed developed by this researcher, were carried out by students, lecturers, and a team of experts from Medan State University. The validator team validates the aspects of the material and media developed by using validation sheets that have been prepared in the research on the Development of *Case Method* Learning Tools and *Team Based Project* in the Codular-based "Numbers and Algebra" Course in PGSD FIP Unimed . The results of validation carried out by the validator team in general showed that the draft *of the Case Method* learning tool and *the Team Based Project* in the "Numbers and Algebra" Course was codular-based in PGSD FIP Unimed is already in the good category. There are only a few in certain parts that should be revised and improved by the

development team. This must be done immediately, so that the use of the Development of *Case Method* Learning Tools and *Team Based Projects* in this codular-based "Numbers and Algebra" Course can be realized immediately. Some input from a team of media experts and materials as a validator team of *Case Method* and *Team Based Project* teaching materials in the codular-based "Numbers and Algebra" Course developed include: (a) the selection of problems raised in case *method* learning is more contemporary and in accordance with the real life of students, (b) There should be material that is useful as a reference or add-on for students who first complete their learning in each session (c) Add instructions on how to use the codular application in the learning process, (d) It is recommended that after the opening of the application there are instructions that direct participants directly to the learning material, and (e) Input in the application various types of quizzes so that it does not cause boredom for users of the Kodular application.

In general, the validation results of the validator team for the development of *Case Method* and *Team Based Project* teaching materials in the codular-based "Numbers and Algebra" Course can be seen below:

1. Adaptability of materials to the curriculum used. The development of case methods and team-based project materials in the Codura-based Number and Algebra course is based on the currently used Bilanagn and his CPMK in the Algebra course. In addition, the depth of the math material accommodates student growth. The presentation and all the material presented are very precise and in applying the concepts of number and algebra and all other mathematical material in a simple, clear, understandable and concise usage according to the subject. It shows accuracy. Materials are presented in standard Indonesian and follow common Indonesian spelling guidelines.

2. Adapt language use to the learner's level and personality. The sentences used represent the logical content of the text and refer to the rules of proper and correct Indonesian sentences. The language used is easy according to the student and the thinking ability of the student. Examples can clarify various concepts that are still abstract and make them more concrete. Explanations of concepts are concrete and can be found by students around their existence in both home and school settings, and abstract things can be imagined by the imagination of students. The messages are presented in attractive language, are easy to understand and communicate, and encourage learners to read carefully. The illustrations presented clarify the sketched material. The illustrations come from regions according to scientific disciplines. The phrases used to convey the message relate to the Indonesian language conventions used to describe concepts, depending on the student's development and the student's emotional maturity.

3. The material presented in the teaching materials is very interesting because it is accompanied by animations that are in accordance with the real conditions, making it easier for students to understand the material presented.

4. Clarity of the examples given. In this aspect, the example questions/ materials presented provide easy understanding for users and participants because they are described in language that is easy for users to understand.

5. The level of difficulty of the questions varies from those that train students to think at low, middle to high-level thinking. Questions are presented in the form of cases and multiple options.

6. The accuracy of background selection, the color harmony of the writing is very good so that it makes users feel comfortable and safe. This certainly greatly affects the seriousness and resilience of users in using this codular application in learning activities.

7. Ease of use of codular applications in providing an understanding of the concept of the material studied. The application displayed is very helpful for students in understanding the various concepts that are being studied. This is because the media helps students find solutions and problem solving of various concepts that are being discussed in each of these materials.

8. The illustration of images contained in the codular application is displayed attractively, clearly and easily understood. The media images and instructions displayed in the app are of great interest to students. Media images are given vividly printed and attractive colors that cause students' curiosity. In addition, the entire catalog related to the media displayed is made in a clear enough language so that students easily understand it. The steps that must be performed in the use of codular applications are made with simple, coherent and clear language.

9. Ease of application to be used both by students. The application can be installed on the android phones of students and students so that anytime and anywhere students and students can use it.

5. Conclusions

The development of *Case Method* and *Team Based Project* Learning Tools in the codular-based "Numbers and Algebra" Course can be used by students majoring in elementary school teacher education (PGSD) faculty of education, Medan State University in lectures that will be carried out, especially during a pandemic. The use of the Kodular application is very helpful for students in carrying out lectures online and lectures become more interesting. The selection of cases and projects being one of the ways in teaching mathematics learning for students is very interesting and fun for students because it involves something fun in learning. The development of Numbers and Algebra learning tools is continued by using other cases and projects, so that mathematics learning becomes one of the subjects that students like. The codular developed is more varied to make it more attractive so that it further fosters the enthusiasm of its users.

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