Skills in Preparing Mathematics Teaching Modules and Their Correlation with Skills in Providing Learning Variations for Prospective Elementary School Teachers

Sigit Wibowo[1]*, Yuniawatika[2], Rahayu Condro Murti[3], Wuri Wuryandani[4], Yoppy Wahyu Purnomo[5] (iD)

[1,3,4,5] Pendidikan Dasar, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[2] Pendidikan Guru Sekolah Dasar, Universitas Negeri Malang, Malang, Indonesia

A R T I C L E   I N F O

A B S T R A K

Banyaknya tuntutan dalam merancang pembelajaran matematika, membuat sebagian guru dan calon guru matematika tidak dapat melaksanakannya dengan baik. Penelitian ini bertujuan untuk menganalisis hubungan keterampilan mahasiswa dalam menyusun modul ajar matematika dengan keterampilan mengadakan variasi pembelajaran. Penelitian ini menggunakan metode kuantitatif. Sebanyak 3 kelas dengan jumlah mahasiswa sebanyak 106 mahasiswa menjadi subjek penelitian ini yaitu mahasiswa. Peneliti menggunakan teknik purposive sampling. Adapun teknik pengumpulan data yang digunakan yaitu observasi, wawancara, dan dokumentasi. Teknik analisis data kuantitatif menggunakan uji korelasi Pearson Product Moment. Berdasarkan hasil penelitian didapatkan temuan bahwa sebanyak 23% mahasiswa telah mampu menyusun modul ajar secara keseluruhan dengan baik. Keterampilan penyusunan modul ajar memiliki korelasi positif dengan keterampilan mengadakan variasi pembelajaran. Berdasarkan pengujian korelasi Pearson Product Moment, nilai Signifikansi (2-tailed) sebesar 0,000 < 0,05, dengan nilai Pearson Correlation yaitu sebesar 0,840. Hal tersebut menunjukkan danya korelasi yang sangat kuat antara keterampilan penyusunan modul ajar dengan keterampilan mengadakan variasi. Mahasiswa yang menyusun modul ajar terutama pada bagian komponen inti pembelajaran yang baik, mereka memiliki pembawaan yang cukup tenang ketika melakukan simulasi pembelajaran. Ketika performanya tenang, maka variasi dalam pembelajaranpun dapat nampak. Mahasiswa praktikan akan dapat membawa pembelajaran menjadi lebih interaktif.

A B S T R A C T

The many demands in designing mathematics learning mean that some teachers and prospective mathematics teachers are unable to carry it out well. This research aims to analyze the relationship between students' skills in compiling mathematics teaching modules and their skills in carrying out learning variations. This research uses quantitative methods. A total of 3 classes with a total of 106 students were the subjects of this research, namely students. Researchers used purposive sampling technique. The data collection techniques used were observation, interviews and documentation. The quantitative data analysis technique uses the Pearson Product Moment correlation test. Based on the research results, it was found that as many as 23% of students were able to compose the teaching module as a whole well. The skill of preparing teaching modules has a positive correlation with the skill of carrying out learning variations. Based on the Pearson Product Moment correlation test, the significance value (2-tailed) is 0.000 < 0.05, with a Pearson Correlation value of 0.840. This shows that there is a very strong correlation between the skills in preparing teaching modules and the skills in creating variations. Students who prepare teaching modules, especially the core components of good learning, have a fairly calm demeanor when carrying out learning simulations. When performance is calm, variations in learning can be seen. Practicing students will be able to make learning more interactive.

 Corresponding author
*E-mail addresses: sigitwibowo.2022@student.uny.ac.id (Sigit Wibowo)

1. INTRODUCTION

Education is fundamental for developing the quality of human resources. Education is a conscious effort to develop the potential that exists within a person with the aim of preparing a qualified next generation to build a nation (Dewi et al., 2021; Intania, 2020). The implementation of education is a complex matter, where one of the most important dimensions is learning. Education and learning are two interconnected things. Education can come from various environments, including family, school and community, while learning is a design of learning activities carried out between teachers and students. Learning is closely related to achieving educational goals, where learning is carried out on certain subjects, one of which is mathematics. Mathematics is a part of science that is very necessary to support human life activities (Ariandi, 2016; Wahyuni et al., 2013). Based on this, mathematics is a mandatory subject studied at every level of education (Fathani, 2016; Murti et al., 2023; Utami et al., 2018). Mathematics has a longer study time than other subjects(Sili et al., 2018). However, in teaching mathematics, teachers often use methods that do not activate students so that students are less enthusiastic about participating in mathematics learning. This makes it difficult for students to understand learning so that the material studied and its use in life cannot be connected (Mahmudah et al., 2021; Rusyda & Sari, 2017). Most students still think that mathematics contains a lot of memorization so that they are only able to memorize the material they receive (Faelasofi et al., 2015; Nurdianti et al., 2022). Therefore, mathematics learning needs to be designed well so that it can be effective in understanding concepts to students.

Designing mathematics learning is a job that is familiar to teachers, especially elementary school teachers. However, it must be acknowledged that the job of designing learning plans is not an easy job, because it requires adequate skills to carry out in-depth and comprehensive studies of the applicable curriculum, issues developing in the field of education, problems that arise in the field, interests and student abilities, as well as developments in science and technology (Patriani & Kusumaningrum, 2020; Sudarsana et al., 2019). The many demands in designing mathematics learning mean that some mathematics teachers cannot carry it out well. In fact, a number of facts show that some mathematics teachers only use finished products for mathematics lesson plans to meet administrative demands (Khikmiyah, 2021; Suci & Taufina, 2020).

The results of previous research revealed that as many as 71.43% of teachers at SMP Negeri 2 Punggelan had not been able to prepare learning plans well (Sulistiyono, 2022). Apart from that, research conducted by other researchers stated that teachers at SD Negeri 1 Petandakan only used lesson plans resulting from the KKG (Sriastiti, 2022). In fact, learning tools are prepared by each educational unit, so that they are appropriate to the situation and conditions in that educational unit. If the RPP is prepared in the sub-district, the learning process cannot be carried out optimally. This is of course very concerning because in principle designing mathematics learning is one of the important activities for mathematics teachers in implementing an effective learning process. In designing learning, teachers must determine the goals or competencies that students must master, materials related to the competencies that students must master, the logical explanation and sequence of these materials by considering the media, presentation method, and how to evaluate them. However, the preparation of the plan must follow current curriculum developments (Fitriyah & Hayati, 2020; Martinez, 2022).

Learning planning in the independent curriculum implemented in Indonesia is currently known as teaching modules. Teaching modules are learning tools or learning designs that are based on a curriculum that is applied with the aim of achieving predetermined competencies. Teaching modules have a main role in supporting teachers in designing learning (Ardianti & Amalia, 2022; Nesri & Kristanto, 2020). In preparing learning tools, the teacher plays an important role. Teachers hone their thinking skills to be able to innovate in teaching modules. This curriculum does not limit the concept of learning that takes place at school or outside school and also demands creativity from teachers and students.

Therefore, learning planning needs to be studied from an early age, even when you are a prospective educator or still a student who will later become an educator. Problems experienced by prospective educators in developing learning tools include not being able to read CP (learning outcomes) well, not being able to compile TP (learning objectives) from existing CP, not being able to compile ATP (learning objective flow) from TP, having difficulty developing teaching modules , and the independent curriculum allows for thematic forms (Arjihan et al., 2022; Masjaya & Wardono, 2018).

Based on the results of initial observations on Elementary School Teacher Education (PGSD) students at the State University of Malang, more than 90% of students do not understand the preparation of teaching modules and the components contained in them in mathematics learning courses. This is because the implementation of the teaching modules is still relatively recent so the students have not received socialization or training in making teaching modules. This results in their minimal insight into the teaching module. However, the students admitted that they were familiar with the term Learning

Implementation Plan (RPP), which is the term for learning planning in the previous curriculum. This shows that students actually understand that before learning, a learning plan must first be carried out. In fact, lesson planning makes it very easy for teachers to implement learning.

The implementation of learning will run well if a teacher also has basic teaching skills. A skill that every teacher must have regardless of grade level and field of study taught is called basic skills (Herwin et al., 2021; Musyrifah et al., 2022). Teaching skills are important for teachers to deliver material and support the achievement of learning objectives. A teacher must master 8 teaching skills, namely questioning skills, reinforcement skills, variation skills, explanation skills, opening and closing lesson skills, guiding small group discussion skills, class management skills, and teaching skills (Anjarani et al., 2020; Prasita, 2022). One of the basic teaching skills that is important to implement when learning in class is the skill of providing variation.

The skill of providing variety is a basic skill possessed by teachers to maintain a learning climate that attracts attention so that students are active and participate in every step of learning. A teacher makes variations by making changes to learning activities aimed at reducing students' boredom and saturation in the learning process (Setiyaningsih, 2020; Wiguna et al., 2022). The varied learning carried out by teachers aims to reduce boredom and boredom and attract students' interest. If students have interest, the learning process will certainly be fun. Students who have an interest in certain learning will of course give full attention to the learning process and this is of course inversely proportional to students who are not interested will feel uncomfortable in participating in the learning process. Especially when learning mathematics, students often feel bored. Mathematics subjects require students to be skilled at calculating, reasoning and thinking logically in solving problems. Studying mathematics must be sustainable, persistent and disciplined and requires the strength to understand concepts that can be applied in the next lesson (Kurnia Putri et al., 2019; Thanheiser, 2023).

A teacher needs skills in preparing good learning plans and the ability to provide variations in the mathematics learning process so that it can attract students' interest and students are actively involved in the mathematics learning process and can have an impact on student learning outcomes. Previous research conducted stated that learning planning will have a positive effect on teacher performance, in this case the quality of learning implementation (Yuniati & Prayoga, 2019). This is confirmed by research which states that a fully prepared learning plan helps teachers master teaching skills, including the skill of providing variations (Sufiati & Afifah, 2019). Teachers who understand the learning plans they make display confident performance and develop teaching skills when learning in class. This research is specific to the skill of providing variations in mathematics learning because the skill of providing variation is a skill that emerges while learning is taking place, meaning that the skill is adapted to the situation and conditions that exist at that time, so that in learning planning the skills are not clearly described. make variations in use. However, learning planning is considered to have an important role in the teacher's success in implementing variations, so that when the teacher is ready to carry out learning, the teacher is also ready to face all situations and conditions that occur at that time and improvise in learning without leaving the learning plan that he has made.

Based on the description of the problem, research was conducted regarding the relationship between the skills in preparing teaching modules for PGSD students and the skills in carrying out learning variations. This research aims to determine the relationship between prospective teacher students' skills in compiling mathematics teaching modules as a form of learning planning and their skills in conducting varied learning. This research can provide insightful information for teachers and prospective teachers to be able to plan their learning well.

2. METHOD

This research uses quantitative research methods. The quantitative approach is research based on the philosophy of positivism to examine certain populations or samples and random sampling by collecting data using instruments, statistical data analysis (Sugiyono, 2019). This research uses a type of descriptive quantitative research that describes the skills in preparing teaching modules for PGSD students and determines the relationship between the skills in preparing teaching modules and the skills in carrying out learning variations. The basis for decision making in statistical analysis tests is that H_0 is rejected and H_a is accepted if $t_{count} > t_{table}$ and the significance probability <0.05. H_0 is accepted and H_a is rejected if $t_{count} < t_{table}$ and significance probability > 0.05. The hypotheses used in this research include the null hypothesis (H_0), namely that there is no significant relationship between the skills in preparing teaching modules and the skills in making variations in mathematics learning, and the alternative hypothesis (H_a), namely that there is a significant relationship between the skills in preparing teaching modules and the skills in making variations. mathematics learning.

The subjects of this research were 3 classes of PGSD State University of Malang students with a total of 106 students. The population in this study were all PGSD students at the State University of Malang. Researchers used a purposive sampling technique, namely taking samples by providing special characteristics that suit the research objectives. The special characteristics of the sample in this research are PGSD students at the State University of Malang who are currently taking their 4th semester taking elementary mathematics courses. The samples taken were 106 students. The data collection techniques used were observation, interviews and documentation. Observation is used to determine the skills in carrying out variations carried out by students when carrying out learning simulations. Interviews are used to find out initial data as a research reference. Documentation is used to determine students' skills in preparing learning plans from the teaching modules that have been prepared.

Data was collected using assignment techniques, namely creating mathematics teaching modules that refer to independent curriculum standards. The results of the teaching modules that students have created are then analyzed regarding their suitability to the components of the teaching module. The research instrument used was the teaching module assessment sheet. After that, observations were made regarding the skills of making variations during mathematics learning simulations carried out by students. The research instruments used were planning assessment sheets and learning simulations.There are three components in the teaching module, namely general information, core components, and additional components or attachments.The following is a grid of research instruments used as shown in Table 1, and Table 2.

Table1. Teaching Module Assessment Grid

Indicator	Assessment Item Number
General information	1,2,3,4,5,6,7,8
Core components	9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
Additional components	25,26,27,28,29,30,31,32

Table 2. The Skills Assessment Grid Provides Variations

Indicator	Assessment Item Number
Voice variety	1,2,3
Variation of body movements	4,5,6,7,8,9,10
Variation of strategies and methods	11,12,13
Improvisation in teaching	14,15

All instruments utilize a Likert scale with a maximum value of 4. The final percentage results for preparing teaching modules and skills in implementing variations can be classified according to Table 3.

Table 3. Final Assessment Criteria

| Percentage (%)	Criteria
$80 \leq x \geq 100$	Good
$60 \leq x \geq 79$	Enough
$40 \leq x \geq 59$	Not enough
$x < 40$	Very less

(Fitriyah & Hayati, 2020)

Quantitative data analysis techniques use descriptive statistics and inferential statistics. The data analysis technique in this research uses prerequisite tests, namely the Kolmogorov Smirnov normality test and homogeneity test. If the data is normally distributed and homogeneous then a parametric statistical test is carried out using the Pearson correlation test to prove the hypothesis that has been formulated. If the data obtained is not normally distributed, then a nonparametric statistical test is carried out. Statistical analysis test using SPSS 16.0 software.

3. RESULT AND DISCUSSION

Result

Teaching modules are a form of learning planning that is currently used with the implementation of the independent curriculum. Teaching modules are a number of tools or media facilities, methods, instructions and guidelines that are designed systematically and interestingly. In learning mathematics,

there is a need for careful learning planning to anticipate student boredom in learning. The results of the assessment of skills in preparing teaching modules for PGSD State University of Malang students can be presented at Figure 1.
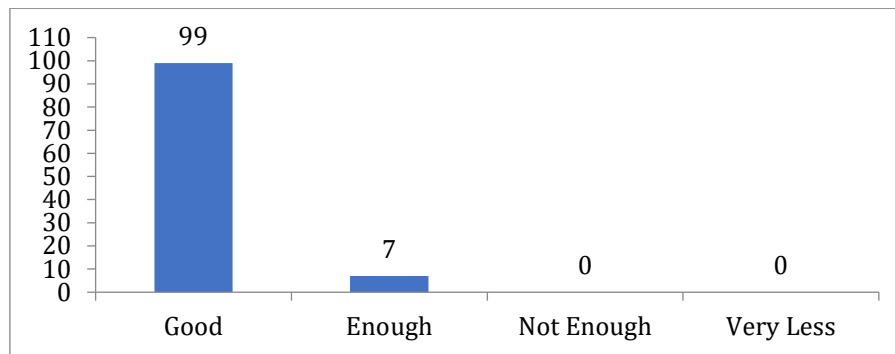

Figure 1. Results of the Skills Assessment for Preparing Mathematics Teaching Modules for the General Information Section

Based on Figure 1, it is known that as many as 93% of Malang State University PGSD students have been able to prepare general information teaching modules well. There are several components in the general information in the teaching module, including identity, description of initial competencies, profile of Pancasila students being developed, infrastructure, resources and media, target students, learning models and systems, as well as the type of assessment used. This is confirmed by the results of interviews with several students who stated that they had been introduced to the teaching module by the lecturer at the start of the lecture so that they had initial knowledge. Apart from that, students get references from various teaching modules on the internet, so that at the beginning of the teaching module or general information can be compiled in full. The results of the assessment of skills in compiling mathematics teaching modules with the core components are shown in Figure 2.
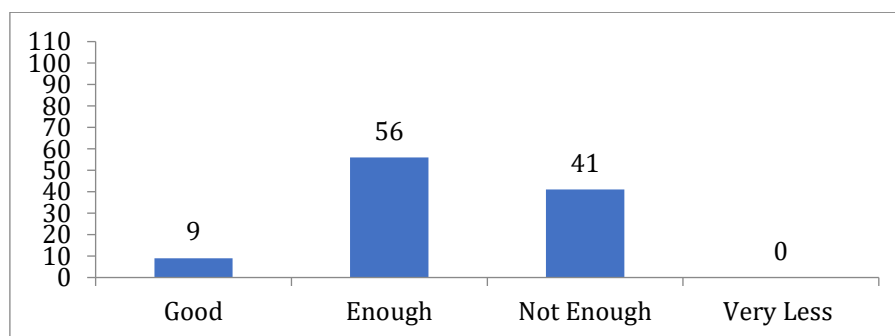
Figure 2. Results of Assessment of Skills in Preparing Mathematics Teaching Modules for Core Components

Based on Figure 2 It can be seen that there are still 8% of students who can compose teaching modules on the core components well. In the core component, there are 16 statements that are used as assessments, including opening activities, core activities and closing activities, as well as paying attention to learning principles in the independent curriculum, such as differentiated learning and diagnostic assessments. In the opening activity there are several basic components including greetings, prayers, good habits, conveying goals and benefits, apperception activities, diagnostic assessments and trigger questions. In the core activities there are several components, namely suitability of the learning model to the syntax of the core activities, suitability to the learning objectives, paying attention to student activity, paying attention to TPACK, paying attention to differentiated learning, maximizing the use of resources and media, developing 21st century skills, and containing activities that build the student's character profile. Pancasila. In closing activities there are several components including conclusions, reinforcement, evaluation as a formative and/or summative assessment, reflection of students and teachers, follow-up plans, greetings and prayers as well as the sequence of closing activities carried out. The results of the assessment of skills in compiling mathematics teaching modules with additional component parts are shown in Figure 3.
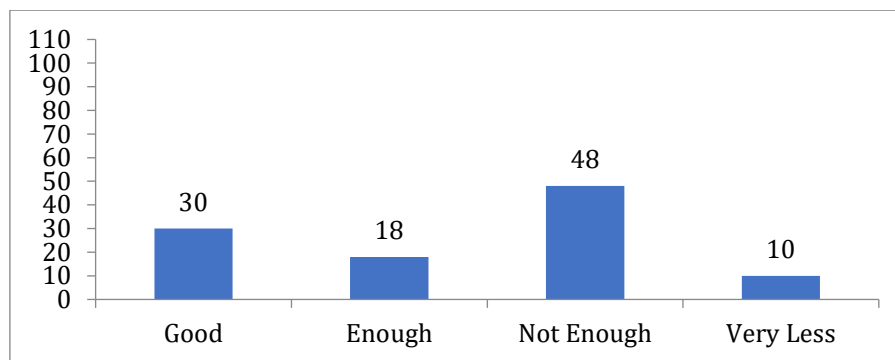
Figure 3. Results of Assessment of Skills in Preparing Mathematics Teaching Modules with Additional Component Parts

Based on Figure 3, still 28% of students can compose teaching modules on additional components well. This means that there are still few students who include additional components in the teaching module completely. Based on the results of observations made, the majority of students have not included the components of the attachment completely and some are still not in accordance with the learning objectives that were planned at the beginning. In the additional components or attachments, there are 8 statement items that are used for assessment, including a glossary, bibliography, teaching materials, learning media, student activity sheets, evaluation questions and their grids and assessment instruments and rubrics.The relationship between skills in compiling teaching modules and skills in creating variations is shown in Table 4.

Table 4. Relationship Between Skills in Preparing Teaching Modules and Skills in Providing Variations

Variables	Parameters	Skills for Preparing Teaching Modules	Skills in Procuring Variations
Skills for Preparing Teaching Modules	Pearson Correlation	1	0.840
	Sig. (2-tailed)		0.000
	N	106	106
Skills in Procuring Variations	Pearson Correlation	0.840	1
	Sig. (2-tailed)	0.000	
	N	106	106

Based on Table 2, it can be seen that the significance value (2-tailed) is 0.000 < 0.05, so it can be concluded that there is a correlation or relationship between the skills in compiling student teaching modules and the skills in providing variations. This relationship is positive. This can be seen based on the Pearson Correlation value, which is 0.840. This value can be categorized as a very strong relationship. Based on the data above, it can be concluded that the skills in preparing teaching modules have a positive correlation with the skills in carrying out learning variations.

Discussion

Teaching modules are a form of learning planning that is currently used with the implementation of the independent curriculum. Teaching modules are a number of tools or media facilities, methods, instructions and guidelines that are designed systematically and interestingly. In learning mathematics, there is a need for careful learning planning to anticipate student boredom in learning. Based on the results of the observations that have been made, there are several mistakes made by students in preparing the general information section of the teaching module, namely that there are still many students who write offline learning models in the teaching module. In reality, offline or outside the network is not a learning model but rather a learning mode. A learning model is a plan or pattern that is used as a guide in planning classroom learning or tutorial learning with one of the characteristics being steps or learning syntax (Lovisia, 2018; Septiani & Purwanto, 2020). Meanwhile, learning mode is a term that has often appeared in the world of education since the pandemic and refers to the way learning is carried out, in this case face-to-face, online or hybrid learning (Ambarita, 2021; Bali & Hasanah, 2022). From this statement it can be concluded that offline or online are included in the learning mode because there are no learning steps or syntax. The next mistake made by students is that there are still students who do not write down the

facilities and infrastructure used in their learning design such as LCDs, laptops, whiteboards, books, and so on. In designing the teaching module for the general information section, there are still only learning resources and media, so it is necessary to add facilities and infrastructure used in learning to prepare learning so that it is more mature.

The core components in the teaching module are the most substantial components in implementing learning. Each part of the core components is very important to pay attention to in planning learning, so that in its implementation there can be a link between one component and other components to achieve the learning objectives that have been designed (Husnulwati et al., 2019; Kamaluddin, 2017). Based on the results of observations that have been made, there are several student deficiencies in preparing the core component parts. When formulating learning objectives, most students do not pay attention to the level of students' cognitive development, they only try to reduce learning outcomes directly without paying attention to the level of cognitive development. This is in accordance with the statement that learning mathematics in elementary schools requires adjustments to the child's cognitive level (Ambarwati, 2016; Nuryati & Darsinah, 2021). Bruner further revealed that the stages of mathematics learning when considering a child's cognitive level are divided into three phases, namely enactive, iconic and symbolic (Unaenah et al., 2020; Zuliana et al., 2019). These three stages sequentially understand mathematical concepts to students starting from concrete to abstract. Considering that mathematics is a subject that is considered difficult by students due to the large number of abstract formulas and memorization, as much as possible mathematics learning should start with concrete objects first to make it easier for students to understand the concept.

Second, almost all students have not seen differentiated learning. The teaching modules prepared by students, especially the core components, seem to still be focused on learning with the principles of the previous curriculum, so that learning seems the same for all students. In simple terms, differentiated learning is a series of common sense decisions made by teachers that are oriented towards student needs (Adiguzel, 2021; Gray, 2020). When teachers respond to students' learning needs, this means that teachers differentiate learning by adding, expanding and adjusting time to obtain maximum learning results (Aprima & Sari, 2022; Marlina et al., 2019). If teachers implement differentiated learning, then teachers feel challenged to develop their teaching skills so that teachers become creative. With differentiated learning, mathematics learning can be carried out effectively because students are not burdened with tasks that make them difficult because in differentiated learning all student potential can be accommodated by the teacher.

Third, almost all students have not included a diagnostic assessment at the beginning of learning. In fact, the position of diagnostic assessment is very important in the learning process, especially mathematics learning. Diagnostic assessments are used to determine students' initial abilities so that teachers can map students according to their abilities and potential and adjust the learning materials that will be carried out (Budiono & Hatip, 2023; Suryawirawati et al., 2018). Furthermore, the results of the diagnostic assessment can be used by educators as a basis (entry point) in planning learning activities according to the characteristics and learning needs of students. Under certain conditions, information related to family background, school readiness, learning motivation, and student interests can be used as consideration in planning learning.

Fourth, the learning designed in the teaching module has not been linked to 21st century character and skills education so it still gives the impression of being teacher centered and there are minimal activities carried out by students. In fact, learning mathematics requires increasing student activities in exploring their knowledge so that they understand concepts in mathematics. This is in accordance with the opinion which states that student activities in learning mathematics can attract students' interest in learning mathematics and can increase understanding of mathematical concepts because they experience directly the discovery of concepts so that they can construct their own knowledge (Suci & Taufina, 2020). This can be realized by teachers through creative and innovative learning models and methods in mathematics learning so that students do not feel bored while learning. With activities, students can also be directly given character values, because apart from improving critical thinking skills, mathematics subjects can also be used to strengthen character values in children (Yandani & Agustika, 2022; Yuniawatika et al., 2018).

These results are reinforced by research conducted which states that learning planning plays an important role in facilitating the implementation of learning carried out by a teacher, especially in the performance of teachers when teaching, they will feel more prepared and confident and can vary learning to overcome problems that occur during the process. Learning (Sufiati & Afifah, 2019). Based on the results of observations of learning simulations that have been carried out, students who prepare teaching modules, especially the core components of good learning, have a fairly calm demeanor when carrying out learning simulations. When performance is calm, variations in learning can be seen. Practicing students will be able to make learning more interactive. This is supported by his voice which can reach all students, the use of intonation, body movements, facial expressions and expressions, eye contact with students, taking pauses

and changing positions. Apart from that, practical students also seem ready for the learning process that will be carried out. This is proven when they can use various media skillfully and interact with students and provide positive feedback on student responses. This is confirmed by research which states that the skill of providing variation will be more visible in learning if educators have prepared the learning process carefully (Permatasari, 2019). This is related to the preparation of teaching modules which are components in learning planning.

The implications of this research include that this research can help improve the quality of mathematics teaching modules used in the learning process. With a better understanding of module preparation skills, student teachers can design material that is more relevant, clear, and appropriate to the students' level of understanding as preparation for becoming a teacher. The results of research that identifies a correlation between skills in preparing teaching modules and the ability to carry out learning variations can help teachers and prospective teachers to be more courageous in trying various learning methods that are more interesting and interactive. This can help increase student interest and involvement in learning mathematics. Furthermore, the findings of this research can also influence the development of mathematics education curricula. The curriculum could pay more attention to the development of module preparation skills and learning variations as an integral part of mathematics education. This research has the limitation of only being carried out on PGSD students (prospective teachers) at the State University of Malang, so further research is needed to be able to deepen the study of the skills in preparing teaching modules and their relationship with basic teaching skills, both for prospective teacher students and teachers who have carried out learning at class.

4. CONCLUSION

Teaching modules are a number of tools or media facilities, methods, instructions, and guidelines that are designed systematically and interestingly. In learning mathematics, there is a need for careful learning planning to anticipate student boredom in learning. There are three components in the teaching module: general information, core components, and additional components or attachments. The skills needed to prepare teaching modules must be possessed by students who will later become prospective educators. The shortcomings in preparing teaching modules are caused by their lack of knowledge and insight regarding teaching modules. This is because the implementation of the independent curriculum is still relatively recent, so there are not many references that can be used.

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