



The Effect of the Problem-Based Learning Model on Students' Learning Motivation in Social Arithmetic Materials

Erpina Ulva ¹, Atma Murni ²

¹ Universitas Riau, INDONESIA

² Universitas Riau, INDONESIA

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ABSTRACT

This study aimed to determine the effect of the Problem Based Learning (PBL) model on students' learning motivation on Social Arithmetic material. This study was conducted to see the effect of the application of the PBL model on students' learning motivation in terms of the overall high-level students in the research sample. This study uses an experimental method with a pretest-posttest control group design. The population in this study were seventh-grade students of State Junior High Schools in Kuantan Regency. The population comes from high-level schools. The sample in this study was SMP Negeri 1 Taluk Kuantan (high level). There was one experimental class and one control class in the schools that became the research sample. The results showed that it was significant $0.000 < 0.05$, which means that there is an effect of the application of PBL on students' learning motivation in terms of all students in which students' learning motivation using the PBL model is better than students using conventional learning.

Corresponding address:

Erpina Ulva,

E-mail: erpina.u@gmail.com

INTRODUCTION

Mathematics is a very important science in everyday life and is the basis of other science. Mathematics is one of the important components in certain science based on the origin of Mathematics [1]. Mathematics is obtained by students through learning activities both formally and informally. Mathematics learning is a help that the teacher gives students to carry out learning activities to obtain a science, have intelligence, and form behavior and confidence, especially in social arithmetic material. Based on the acquisition of tests that test the ability to solve, students can be known through international studies: The program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). According to a report of Pisa in 2015, Indonesian student math scores are in the position of 63 of the 70 participating countries. In the TIMSS report in 2011, Indonesian students were in position 38 of 42 participating countries [2]

Based on PISA and TIMSS, this is also in line with observations at high-level schools, moderate, low in Kuantan Singingi Regency, where only 19.44% of students can present data provided in the form of graphics and tables and difficulties to identify. The problem starts from the known stage, was asked, and to the stage of answering, while 80.56% of students have not been able to resolve the issue shared by the teacher. Therefore, in mathematical problem-solving capabilities, students must be able to identify the problems given and use their initial knowledge of students in solving problems. This agrees with [3], saying that education is centered on developing the expertise for logical thinking, which takes place in a fun and cultural stimulates students to foster their understanding and

knowledge in the community scope and learning beginning from basic knowledge and cultural prospects.

Every activity carried out requires motivation to be able to do well. Learning motivation will be directly proportional to learning independence [4]. This shows that students' motivation is needed to learn to get satisfactory results. Data on the results of the National Examination (UN) in Mathematics Studies of State Middle School students throughout Kuantan Kuantan Singingi can be seen in Table 1 below.

Table 1. Results of the National Examination in Mathematics for Junior High School Students in Kuantan Singingi Regency

UN Mean Interval	Number of Schools
23,02 - 27,02	7
28,02 - 31,02	45
32,02 - 36,02	14
37,02 - 41,02	4
42,02 - 46,02	3
47,02 - 51,02	0
52,02 - 56,02	1

Based on the results of the National Examination above, it can be seen that the results of the National Examination of students in the Kuantan Singingi Regency are still low. This is caused by many things, including learning strategies, materials, approaches, and the learning media used. The low result of the National Examination is also influenced by students' low motivation in learning. Motivation is also influenced by self-regulation to continue learning and setting goals [5]. Students should have good learning motivation in learning activities to create reciprocal relationships between teachers and students. For example, teachers and students have a question and answer session. This will be realized if students are highly curious about learning materials.

Problem Based Learning (PBL) by Tim Kemdikbud is a learning model that challenges students to learn and discuss with group members to find ways to solve definite problems [6]. According to [7] the Problem Based Learning (PBL) model, the focus of learning is on the chosen problem so that students not only learn the concepts related to the problem but also the scientific method to solve the problem. PBL by [8] is a learning process that is the starting point of learning based on real-life problems. (et al., 2016) Also, PBL is a learning model involving students in solving real problems. Sahyar & Fitri also said that PBL is a learning model that involves students solving problems through the steps of the scientific method so that students can learn science related to the problems given while making students have intelligence in solving problems [9]. Problems should be solved using designs and foundations that encourage students to learn and are included in the curriculum. The problem is used to provide a stimulus to students related to students' curiosity about solving a problem. PBL often uses problem-solving for learning activities and provides opportunities for students to think skillfully, express their critical opinions and discuss the results obtained with their friends.

With the initial knowledge of students, students will be invited to be able to apply the initial knowledge to be able to help students in solving the problems given. A learning process in which a person's behavior will change through an exercise or experience by applying students' initial abilities to solve a problem [10]. In the PBL situation, students combine their knowledge and abilities simultaneously and apply them in the same situation. Besides, PBL can increase higher-order thinking

skills, develop students' ideas for work, encourage students from within to learn and strengthen student cohesiveness in group learning [11]. In implementing PBL, the teacher will participate in creating meaningful learning for students. According to Piaget, constructivism theory says that the teacher acts as a facilitator or moderator. In this learning theory, Piaget says about the intellectual development of students and the cognitive development of students. Piaget, famous for cognitive theory, initially reinforces the knowledge formed in a child's mind through assimilation and accommodation. Assimilation is a process of accepting new knowledge into a thought. Meanwhile, accommodation is reassembling the arrangement of thoughts because of new knowledge so that knowledge has a place in one's mind [12].

The PBL model is that the problems given to students should be contextual and are often found by students in the community. Problems should be solved using designs and foundations that encourage students to learn and are contained in the curriculum. In applying PBL, students must cultivate higher-order thinking related to the learning experience and centered on problems that align with the concept of learning. Understanding the relevant concept of a problem is a learning process as proposed by [13]. Learning is an activity that connects students and teachers as well as learning resources such as learning media.

The first step that must be done in this learning activity is to encourage or motivate students to be directly involved in problem-solving activities so that students can be more active in forming their knowledge. Solving a problem requires analysis and a way to identify a problem from students' knowledge. The first step that students must take after being given a problem is as follows.

1. Recognizing the problem;
2. Analysis of the problem;
3. Expanding ideas in problem-solving, this step can fulfill the formulation of temporary answers or hypotheses;
4. Recognize learning news.

Using the PBL model can develop students' thinking activities, including the following.

1. They are thinking about making a problem-solving plan. The ability to make plans to solve problems is needed and will increase if students are trained to understand a complex problem and try to find a solution. Students who are not creative will have difficulty making good plans, so they need direction or facilitation from the teacher.
2. Generative thinking. It is finding as many ways to solve a problem as possible so that it can be further developed to make fact-based inferences and think about what knowledge should be used to solve problems.
3. I was thinking systematically. After selecting the steps to solve the problem, students must collect data/information through systematically organized investigations. Efforts to collect, organize, and analyze data/information will improve students' ability to think systematically.
4. I was thinking analogically. An ability to conclude by paying attention to the arrangement of known problems with the problem to be solved, for example, grouping the same information, recognizing the form of information, and examining information related to the problem.
5. Systemic thinking. An attempt is made to understand a problem based on a theory in accordance with the problem to be solved.

Learning activities using the PBL model require students to be directly involved in the following matters.

1. Contextual issues.

2. The ability to think critically.
3. Ability to solve problems.
4. Interdisciplinary learning.
5. Self-study.
6. It is finding information.
7. Get used to discussing with group members.
8. Practice being able to speak well in class.

The learning objectives using the PBL model are related to mastery of the material, the ability to solve problems, practice for more discipline, and the ability to learn independently.

Motivation comes from the word "motive," meaning an attempt to encourage someone to do something. A motive is a driving tool from within a person to carry out activities to achieve goals [10]. Starting from the word "motive," motivation means a driving tool ready to be used. Motives become very useful at certain times, especially when you want to achieve a goal that feels very important. Related to the meaning of the above motive, which comes from motivation. Motivation (motivation) is all encouragement, will, and something needed to move one's behavior [14].

Meanwhile, motivation is a situation within a person to encourage them to carry out an activity to achieve specific goals [15]. In terminology, motivation is expressed as needed, desired, impulse, instinct, and drive that makes humans forced to do something—however, Mc. Donald said that motivation is a change in energy from within humans which is seen by the emergence of a 'feeling' and begins with a response to a goal to be achieved [10]. Motivation is divided into two, namely intrinsic motivation is the motivation that will function by itself without having to have encouragement from outside, while extrinsic motivation is a motive that will function properly if there is encouragement from outside one's self or from others.

Intrinsic motivation can be seen in a student who likes to read; without being asked to read, he already likes to find out what he wants to read. In terms of the goals it does, intrinsic motivation is a desire to obtain a goal contained in the learning activity itself. This is due to the interest and motivation to carry out and carry out the activities they want. While examples of extrinsic motivation can also be seen when students study, when students know that tomorrow there will be a daily test in class, these students study seriously by expecting to get good grades and get praise from their friends or even from their parents. In this situation, it is seen that students learn not because they want to study seriously but want good grades and get prizes for the results they get. Therefore, this motivation will encourage students to undergo and carry out the learning process at school.

An effort made by each student is clear evidence of the existence of a strength that students obtain through high learning motivation. According to [10], there are three functions of motivation that can be associated with learning, including:

1. It motivates someone to do something, such as a propulsion device that releases energy. This motivation serves as a tool that moves something to do an activity.
2. They are setting the goals of activity towards the goals to be achieved. This means that activities carried out in accordance with the goals that have been made can motivate someone to do it.
3. Selecting activities, namely activities that must be done that are appropriate to achieve the goal, by setting aside actions that are not useful for that goal. With the motivation to learn, students can choose every action they should do when they want to achieve good learning goals from their education.

On the other hand, [16] also revealed the function of motivation in accordance with learning.

1. Motivation encourages students to do an activity, students who are initially just silent and have no desire to learn, but because there is something that the student wants, the desire to learn arises. What students do not know becomes the underlying driving force for them to discover what they do not know. This attitude is the basis that can encourage students to carry out learning activities at school.
2. Motivation as a driver of student activities, the cognitive drive of students that shapes students' attitudes, is an unstoppable force that manifests in psychophysical movements.
3. Motivation as a guide in activities, students who have motivation within themselves can choose which activities to do and which ones to leave. The purpose of student learning is to find what students are looking for, this goal can motivate students in learning activities.

According to [17], the definition of learning motivation is encouragement from within students and encouragement from outside students who learn to make changes in attitudes with components that support it. Then, [10] states that motivation to learn is all efforts to move from within students that bring up the learning process, which ensures the ongoing process of learning activities so that the goals are non-intellectual. Meanwhile, according to [3], learning motivation is a force that encourages students to use their potential of students and potential from outside to create learning goals. The classification of motivation is divided into several types, namely learning motivation, work motivation, achievement motivation, and so on. . In this study, the researcher discusses learning motivation, where learning motivation is a motivation that can be developed in students. Students learning motivation is influenced by several elements, as said by [14], such as student expectations, student skills, student circumstances, student environmental situations, parental encouragement, and teacher efforts to make students learn.

Based on some of these understandings, it can be seen that learning motivation is something that students need during learning activities. This is because, with motivation, students will be enthusiastic and continue striving to achieve goals in the learning process. The motivation contained in a person cannot be seen or observed by others. Motivating students is the same as inviting students to be able to do something they want to do. Motivation can be seen in the behavior that a student will show. One example to find out how much student motivation each student has is when doing learning activities at school. Students who are motivated in learning will undergo teaching and learning activities with great enthusiasm and a good spirit of learning. On the other hand, students who are not motivated to learn will undergo the learning process without a passion for learning and concern for learning and the learning outcomes that will be obtained.

The classification of motivation is divided into several types: learning motivation, work motivation, achievement motivation, and so on. In this study, the researcher discusses learning motivation, where learning motivation is a motivation that can be grown and developed in students. In students, learning motivation is influenced by several elements, as stated by [14] below.

1. Student expectations.
2. Student skills.
3. Student's condition.
4. Student environment situation.
5. Parental encouragement.
6. The teacher's efforts to make students learn.

Based on some of these understandings, it can be seen that learning motivation is something

that students need during learning activities. This is because, with motivation, students will be enthusiastic and continue striving to achieve goals in the learning process. According to Mosely, quoted by Nyanyu [16], the usefulness of student learning motivation is as follows.

1. They are encouraging people to do something.
2. Determine the purpose of an activity, meaning that these goals should be achieved through the learning process.
3. Choose the activity or action to be carried out.

The research by [18], "The Influence of Student Motivation and Study Habits on Mathematics Learning Outcomes of State Junior High School Students in North Samarinda District." The results of his research show a joint influence of student's learning motivation and study habits on the mathematics learning outcomes of State Junior High School students in North Samarinda District. The research by [19], "The Influence of Contextual Teaching Learning Approach on the Topic of Opportunity on Motivation and Learning Outcomes." The results of his research show an influence between this CTL approach with increasing student motivation and learning outcomes. Furthermore, the research by [20] related to "The Influence of Problem Based Learning (PBL) Learning Models on Problem Solving Ability and Student Learning Motivation in Class VIII Middle School Circle Material." The result of this research is that the learning motivation of the experimental class students who apply the PBL model is higher than the control class (conventional class), which does not get the PBL learning model treatment. Based on the results of previous studies, it can be concluded that the PBL model has a positive effect on increasing students' learning motivation.

This study examines the application of the PBL model in learning to determine its effect on students' learning motivation. The research was conducted on a high level of seventh-grade students of State Junior High Schools in Kuantan Singingi Regency.

METHODS

This type of research is quantitative research with quasi-experimental methods. The research design used the Pretest-Posttest Control Group Design, as shown in Table 2 below.

Table 2. Relationship between Learning Model and School Level

School Level	Model	
	PBL	Conventional
High (T)	PBL (T)	KT

Pretest Group Posttest Treatment

Experiment 1 : OT1 X OT2

Control 1 : OCT1 - OCT2

Information:

KT : High level conventional class.

Q : High level experimental class.

OT1 : Pretest experimental class group 1

OT2 : Posttest conventional class 1

The population in this study were all seventh-grade students of State Junior High Schools in Kuantan Singingi Regency, which consisted of 73 public schools, which were grouped into high, medium, and low levels. Still, for this study, only high-level schools were used. A school chooses each level at random. From each school, two homogeneous sample classes were assigned. The sample in this study was SMP Negeri 1 Teluk Kuantan (high level. At the high level, the experimental and

control classes were classes VII.4 and VII.6.

The questionnaire instrument used to see students' learning motivation was based on learning motivation indicators adjusted to the indicators used in this study. The questionnaire is made in the form of statements related to everyday life. The validator validated the questionnaire instrument to analyze the feasibility of the learning motivation questionnaire before being distributed to students during the study. The data obtained consisted of 2 types of data: pretest data and posttest data. The data was then analyzed using data analysis techniques consisting of normality, homogeneity, and average similarity. The normality, homogeneity and average similarity tests are prerequisites for testing with parametric statistics because the data are normally distributed and homogeneous, and there is no difference between the experimental and control classes. Furthermore, hypothesis testing was carried out using a t-test to see the effect of the application of PBL on students' learning motivation in terms of overall students and a t-test to see the effect of the application of PBL on learning motivation in terms of high school level.

RESULTS AND DISCUSSION

The learning device in this study refers to the PBL model with Social Arithmetic material for class VII SMP. This study was conducted to see whether there is an effect of the application of the PBL model on students' learning motivation that has met the valid and effective criteria in increasing learning motivation. The implementation phase of experimental research begins with grouping one experimental class and one control class in each school that is at a high level. Furthermore, students are given a pretest to see the students' initial abilities. So that there is no bias in the treatment of the experimental class being studied, in the implementation of learning, the researcher acts as a teacher. After all, learning is complete, and the posttest is given as a test for problem-solving skills to six classes from all levels.

In this study, H_0 will be accepted if the significance value > 0.05 . On the other hand, if the significance value is < 0.05 , then H_0 is rejected, and H_a is accepted, which means that the data is not normally distributed. The results of the normality test of motivation to learn mathematics in the experimental and control class are shown in Table 3 below.

Table 3. Normality Testing Pretest and Posttest Experiment Class and Control Class

Data	Kelas	N	Sig. Kolmogorov-Smirnov	α	Keterangan
Pretest	Experiment	85	0,127	0,05	Normal
	Control	79	0,134	0,05	Normal
Posttest	Experiment	85	0,101	0,05	Normal
	Control	79	0,073	0,05	Normal

Based on the normality test, it was found that the data obtained from the pretest and posttest students' motivation to learn mathematics in the experimental and control classes were normally distributed, so the next test used parametric analysis to test the homogeneity of the data using the F-test with the help of SPSS version 23. The results obtained from the SPSS will be compared with the test criteria, namely, if the significance > 0.05 means that the experimental and control class's variance is homogeneous and if the significance < 0.05 means the variance between the experimental class and the control class are not homogeneous. The results of testing the homogeneity of pretest and posttest students' learning motivation at high levels can be seen in Table 4 below:

Table 4. Pretest and Posttest Homogeneity Test in Experiment Class and Class Control

Data	Class	N	Sig.	α	Description
Pretest	Experiment	85	0,159	0,05	Homogen
	Control	79			Normal
Posttest	Experiment	85	0,138	0,05	Homogen
	Control	79			Normal

Based on Table 4 obtained a significant of 5% or $\alpha = 0.05$ obtained sig. > 0.05 in the schools that became the research sample, namely $0.159 > 0.05$ and $0.138 > 0.05$ meaning H_0 was accepted and H_a was rejected, meaning that the variance of the pretest results in the experimental class and control class in high, medium and low level schools was homogeneous.

The average similarity analysis for the pretest data used a t-test with SPSS version 23. The hypotheses tested were:

$H_0\mu_1 = \mu_2$: There is no difference in the mean scores of students' learning motivation in class experimental and control classes.

$H_0\mu_1 \neq \mu_2$: There is a difference in the mean scores of students' learning motivation in class experimental and control classes.

The results obtained from SPSS were compared with the criteria for testing the average similarity if sig. > 0.05 means that H_0 is accepted and H_a is rejected, it means that there is no difference between the experimental class and the control class before being given treatment and if sig. < 0.05 means that H_0 is rejected and H_a is accepted, meaning that there is a difference between the experimental class and the control class before being given treatment. The results of testing the average similarity of students' learning motivation in high-level schools using a t-test as shown in Table 5 below:

Table 5. Testing the Average Pretest Similarity Test in the Experiment Class and Class Control

Class	N	Mean	Std. Deviasi	t	Sig. (2-tailed)	Description
Experiment	85	41,72	2,998	0,167	0,100	No
Control	79	40,85	3,714			difference

Based on the average similarity test in Table 5, the sig. from high-level schools is $p = 0.100 > \alpha = 0.05$, meaning that there is no difference in the data variance between the experimental class and the control class in high, medium and low level schools. Based on the results of the homogeneity test, the posttest data obtained is homogeneous, so to test the hypothesis using the t-test. The formulation of the hypothesis for the t-test on the data of students' learning motivation scores in the experimental class and control class is.

H_0 : The application of PBL does not have a positive effect on students' learning motivation in terms of all students in State Junior High Schools in Kuantan Singingi Regency.

H_a : The application of PBL has a positive effect on students' learning motivation in terms of all students in State Junior High Schools in Kuantan Singingi Regency.

The formulation of the statistical hypothesis is:

$H_0 : \mu_1 \geq \mu_2$

$H_a : \mu_1 < \mu_2$

Information:

μ_1 is the average score of the experimental class students' learning motivation.

μ_2 is the average score of the control class students' learning motivation.

The results of hypothesis testing are described in Table 6 below.

Table 6. Overall Hypothesis Testing Results of Students

Class	N	Mean	T	Sig	H ₀	H _a	Keterangan
Experiment	85	49	117,867	0,000	Rejected	Accepted	There is influence

Based on the results in Table 6 it is found that for the decision criteria based on the significant probability value, it is $0.000 < 0.05$. Then H₀ is rejected and H_a is accepted which means that there is a positive effect of the application of PBL on the learning motivation of class VII students on Social Arithmetic material in terms of all students in State Junior High Schools in Kuantan Singingi Regency.

Based on the results of the homogeneity test, the posttest data obtained is homogeneous, so to test the hypothesis using the one way ANOVA test to see the effect of PBL on students' learning motivation when viewed from the high school level. The formulation of the hypothesis for the one way ANOVA test on student learning motivation score data in the experimental class and control class is.

H₀: The application of PBL does not have a positive effect on students' learning motivation viewed from the high school level in State Junior High Schools throughout Kuantan Singingi Regency.

H_a: The application of PBL has a positive effect on students' learning motivation viewed from the high school level in State Junior High Schools throughout Kuantan Singingi Regency.

The formulation of the statistical hypothesis is.

$$H_0 : \mu_1 > \mu_2$$

$$H_a : \mu_1 \leq \mu_2$$

Information:

μ_1 : the average score of the experimental class students' learning motivation.

μ_2 : the average score of control class students' learning motivation

The results of testing hypothesis 5 are described in Table 7 below.

Table 7. Hypothesis Testing Results Based on High Level Schools

School Level	Class	N	Mean	F	Sig	H ₀	H _a	Ket
High	Experiment	30	50	0,930	0,339	Accepted	Rejected	There is no influence
	Control	30	49					

Based on the results obtained in Table 7, it is stated that for the decision criteria based on the significance probability value, for high-level schools, a significance value of $0.339 > 0.05$ is obtained. So H₀ is accepted and H_a is rejected which means that there is no effect of the application of PBL on the learning motivation of class VII students on Social Arithmetic material in terms of high school level.

Motivation to learn in the process of learning mathematics is very necessary, and teachers must always motivate every learning process because it will be very useful in the success of the learning process that will be carried out (Mudjiman, 2007). Therefore, in the application of the PBL model, the teacher also motivates students. If the motivation is strong enough, students will decide to do learning activities. On the other hand, if his motivation is not strong enough, he will decide not to do learning activities. The research findings on this hypothesis are related to indicators of student learning motivation in grade VII after the use of the PBL model is seen from students' desire to succeed in learning by working on the worksheet given seriously.

The effect of the application of PBL on students' learning motivation is caused by the worksheet that is given to attract students' attention, and the stages in the worksheet are also easy to understand. PBL learning makes students discuss with each other among their group members to solve the problems given. PBL learning makes students more diligent and diligent in completing each stage in the worksheet. This is in line with Ria Anggraini's research (2017) which says that there is a significant effect on the application of the PBL model to the learning motivation of eighth-grade students of SMP Negeri 2 Kediri on the Circle material. PBL is a learning model that requires students to deal directly with authentic problems so that they can design their own knowledge, develop inquiries, higher skills and make students more independent and increase their self-confidence (Arends 2012). In increasing students' self-confidence in solving the problems given, the teacher must provide strong motivation to encourage students to carry out learning activities to achieve the desired goals.

The effect of the application of PBL on students' learning motivation is caused by the worksheet that is given to attract students' attention, and the stages in the worksheet are also easy to understand. PBL learning makes students discuss with each other among their group members to solve the problems given. PBL learning makes students more diligent and diligent in completing each stage in the worksheet. This is in line with Ria Anggraini's research (2017) which says that there is a significant influence on the application of the PBL model to the learning motivation of eighth-grade students of SMP Negeri 2 Kediri on the Circle material. This can be seen when students collect their assignments, there are still unanswered questions, and students do not ask the researchers if they do not understand. The researcher has explained to the Whatsapp group that if you don't understand, you can ask questions, and the researcher has also explained with Voicenote the problems given in the worksheet. However, in this case, the student response is still very lacking to the assignments and tests are given online. This is in line with the results of research by Beki Wulandari (2013), which says that there is no significant effect between the PBL method and the demonstration learning method with student learning motivation on student learning outcomes.

CONCLUSIONS AND SUGGESTIONS

The application of the PBL model is better used to increase students' learning motivation when viewed from the whole student, regardless of the school level. The researchers draw the following conclusions based on the data analysis of the research that has been done.

1. There is an effect of the application of Problem Based Learning (PBL) on the learning motivation of class VII students on Social Arithmetic material in terms of all students in State Junior High Schools throughout Kuantan Singingi Regency.
2. There is an effect of the application of Problem Based Learning (PBL) on the learning motivation of class VII students on Social Arithmetic material in terms of high school level. However, there is no significant effect in SMP Negeri in Kuantan Singingi Regency.

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BIOGRAPHY

Erpina Ulva

Erpina Ulva graduated from the Mathematics Education Program, Universitas Riau (Master Degree).

Email: erpina.u@gmail.com.

Atma Murni

Born in the village of Rambatan, West Sumatra, October 4, 1962. He earned a Bachelor's degree in Mathematics Education from IKIP Padang in 1985, a Master's Degree in Mathematics Education from IKIP Surabaya in 1998, and Doctoral Degree in Mathematics Education from UPI Bandung in 2013. He became a permanent lecturer in the Mathematics Education Study Program in 1986. Received additional duties as Chair of the Mathematics Education Study Program period I from 2000 to 2000. 2003 and period II from 2003 to d. 2007. Became Head of PLPG Rayon 05 the Universitas Riau in 2007 s.d. 2008. Conducted various research/services in mathematics education since 1986, some of which were funded through research/service grants from DRPM Kemendikbud, LPPM UNRI, and FKIP UNRI. The subjects taught are Curriculum Study and Mathematics Learning Planning, Mathematics Education Research, Numerical Methods, and Education Statistics.