

LEARNING POLYGONS USING ENGLISH LANGUAGE

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ABSTRACT

The authors conducted a study related to using English in learning mathematics, for grade 7 junior high school students in a private national plus school. The purpose of this study was for the reader to open up further insights related to the topic. This study was carried out with experimental design, by doing different treatment between classes in the same level. The subjects of the study consisted of 63 students spread into three classes; 7A, 7B, and 7C. Class 7C was a control group, using Bahasa Indonesia (mother tongue) in learning Mathematics. Class 7A and 7B were the experimental groups, where 7A was in English and 7B used bilingual (English and Indonesian). Results of the study include the following; using English is not detrimental to the students in mark achievement that is shown by the average of the final mark of Mathematics that is not significantly different. The challenges that arise from learning Mathematics need to be reviewed from the process, readiness, independence, motivation of students and needs to be followed up critically so that students can achieve better results. Short and long-term programs need to be created and observed in order to support the learning process of Mathematics for students, such as training teachers to be able to teach mathematics in English, in supporting action study by teachers, managed by the school.

Keywords: *English, bilingual, learning, mathematics*

INTRODUCTION

In the current era of globalization, using English in all aspects, especially in the world of education in Indonesia has become more popular. Indonesia is one country that has a strategic location geographically. Strevens (1977) has said,

“The native speaker of English must accept that English is no longer his possession alone: it belongs to the world, and new forms of English born in new countries with new communicative needs should be accepted into the marvelously flexible and adaptable galaxy of ‘Englishes’ which constitute the English Language.”

Using English in Indonesia almost covers all aspects, politics, economics, defenses, and others. Indonesia's education sees this phenomenon of globalization then immediately responded by developing the new educational system which presented in English. Today in Indonesia, many schools are built on the status of National Plus and International schools, which both use English for daily communication in school as well as the language of instruction in all learning. Using English as the language of instruction in learning mathematics would be a challenge for both students and teachers. This study is looking up the process of learning mathematics in English, the measurement of learning outcomes, and the evaluation related to student achievement. Obstacles and possible solutions for the achievement of learning goals also have special attention in this study.

The mathematics that arises after Philosophy always presents to whomever in the field of education. Inseparable from human life, which in fact cannot escape from life itself, is necessary and

essential to be learned by all students in the formal level of education. All educational institutions practically have a subject to be studied by students. In Indonesia, there is no exception (Willyarto, Pane, and Chairiyani, 2015). The knowledge discrepancy among students, teachers, and schools to some extent have contributed in developing the negative attitude that says 'Mathematics is hard'. Most of the students fear mathematics and are mathematics phobic. They tend to skip mathematics subject. This implies to the low quality of mathematics education and students' achievement (Willyarto, Pane, and Chairiyani, 2015). Even for those who are struggling in English and mathematics.

This study is also useful for the readers in understanding the learning process activities that are not determined by English only. Students and parents do not have to worry about getting the fewer score because of using English in everyday learning. Students can learn better without being noticed by their fear of English which is a foreign language to them. For readers who work as teachers or observers of education can benefit from this study. The paradigm of society, both parents and students should be directed to the things that are positive and support the children in learning. Teachers can use English actively without having to worry about unfavorable grades by students because of the use of foreign languages as the language of instruction in learning. This study can be the basis for teachers to develop their language skills so that learning becomes optimal.

Men continue to develop a variety of signs and symbols in developing their cognitive abilities. In a symbolic system, either when creating or using it, involves behavioral and psychological changes that lead to the development of a complex mental process (Gredler, 2001). Vygotsky's theory (Gredler, 2001) is widely applied in the United States. Thoughts on the 'next growing area' (zone of proximal development), provide additional aspects in analyzing the verbal communication skills of students. The theory also gives two implications; (1) interpret signs and symbols used in the curriculum, (2) provide inputs that each subject in the curriculum examined from the point of overall mental development.

In class, even for excellent non-native teachers, is not guaranteed for the excellent result of the students whatsoever. In many cases, students just need more time to comprehend. Non-native speakers in classes, which have been out of the ESL program, in most cases, still have problems in the process of communicating with their peers (Cummins, 2000). Cummins (2000) has said, "The concept of knowledge developed in one language helps a lot to make entries in other languages." If a child has already understood the concept of 'fairness' or 'honesty' in his/her own language, all he/she has to do is get a label to the terms in English. It is challenging, but students can earn a good label and concept in a second language.

Motivation is the reason why individuals behave, think, and have feelings in a way that they do with the emphasis on the activation and direction of behavior (Santrock, 2009). When children are motivated, they will do something and demonstrate the active behavior, for example, when they are hungry, they will open the refrigerator for food. When the students are motivated to get good marks, they will study diligently and independently. Students will strive to achieve what they aspire when properly motivated. Motivation focuses on how students behave or in other words, chose behavior for certain situations but no other situations.

Some students have a desire achieving very high, and they spend a lot of time in trying to be successful, others are not motivated to succeed and do not work hard to be successful. Both types of students are different in terms of achievement motivation (Santrock, 2003). Achievement motivation is the desire to accomplish goals and to achieve a standard of success and to make an effort in order to achieve success. Bernardo (2002) in his study at Asia, which is associated with the use of a second language in learning mathematics, finds that there is no strong correlation between the uses of a second language as a language of instruction in the learning of mathematics. This study is conducted to determine whether the mathematics problem solving by Philippine-British influenced by the model

of the structure of language problems. Modeling learned about the story uses the paradigm of problem-solving, which involves the presentation without question.

Oviedo (2005) in her study finds that the learning process at school in a language that is not the first language (L1) has become a reality in many parts of the world due to socio-political reasons and the advances in technology are better and faster in communication systems. Understanding the psychological dimensions of bilingualism in the context of the class is very important for educational policymakers who make decisions about curriculum development, instructional practices, and evaluation. From a cognitive perspective, examine the process of understanding of subjects in the second language (L2) is important to address learning issues. The impact of bilingual education in the teaching and learning process is complex, especially since one of its goals is to make the process of teaching and learning in a second language as the first language, without sacrificing the knowledge, competence, and performance.

Whang (1996) has conducted the study in Korea about learning mathematics in English. He also finds that the students' difficulties in learning mathematics lay not in the language, but the thinking skills of students who are less well-honed. Language problems in mathematics education appear today, although many scholars have been struggling to understand the relationship between languages, thought and discussed the important role of language as a medium in Mathematics Education. When learning mathematics in school, students are faced with a formulation that is written by textbooks or teachers, as well as oral discourse of teachers in the classroom, and with discussions with their classmates. The function of language in classroom mathematics is a mindset development. Language serves both as a means of representation and as a means of communication. Therefore, its role in mathematics education cannot be ignored.

Lessons are conducted by human beings since childhood related to three conditions that support each other to produce a good performance in the form of skills. Students will learn well when there is sufficient prior knowledge according to their mental development and then continued to a higher level. Excessive education/teaching provided rather than readiness in terms of mental development will lead to an imbalance of mental development and cognition. Having regard to the three factors mentioned, academic values will appear satisfactorily. In this study, the focus is the cognitive abilities of students in English for learning mathematics. Therefore, it needs sufficient English skills to understand mathematics. Some students have high achievement desires, and they spend a lot of time trying to be successful, others are not motivated to succeed and do not work hard to succeed. These two types of students differ in achievement motivation (Santrock, 2003). Achievement motivation is the desire to accomplish something, to achieve a standard of success and make a business with the aim of achieving success.

McClelland in Santrock (2003) has measured achievement motivation by showing an ambiguous picture that encourages a person to provide a winning answer to achievement. The person will be asked to tell the story, and his/her comments are judged according to the extent to which the story reflects the achievement motivation of the person. Researchers find that people with stories that reflect the motivation of high achievers have hopes for greater success than fear of failure, preferring a job with moderate risk, and diligence in their efforts when faced with increasingly difficult tasks. Preliminary studies have also shown that parenting exercises that parents provide early on improved performance, but the recent study shows that parents need of high demand on achieving standards, modeling with achievement-oriented behaviors, and rewarding children for their achievements to be oriented on achievement. The prediction is made possible both by network analysis based on information such as learners, knowledge, place and time and by learners' self-analysis using time-map. By predicting what they tend to learn next in their learning paths, it provides them with more learning opportunities (Mouri & Ogata, 2015).

In a recent study, the combination of parenting (both demanding and sensitive) and involvement are closely related to student performance. The habit of using English at home and school is the motivation of students in learning. Motivation makes students more active in learning and achieving the goal to get good grades in learning.

METHODS

This study is an experimental study, which is performed in the classroom, where different treatment in terms of the language of instruction is given. The experiment is selected and used in the classroom setting. The experimental study is an objective study, systematic, and controlled to predict or control the phenomenon. Sulipan (2011) explains that experimental research is a research activity that aims to assess the effect of an educational treatment on the behavior of a student or to test the hypothesis of the presence or absence of the effect of the action when compared to other measures. Based on this, the general objective of the experimental study is to examine the effect of a particular treatment on the symptoms of a particular group compared with other groups using different treatments. For example, an experiment is intended to assess or prove the effect of educational treatment (learning by the method of solving the problem) to the achievement of learning mathematics in high school students or to test the hypothesis about the presence or absence of treatment effects when compared with the method of conceptual understanding. Action in the experiment is called by treatment and interpreted as all actions, all variations or conditions that will be assessed.

In the process caused by one kind of action/treatment, people can never claim that the actions and processes result in something better or worse and it can be only stated that it is compared to the others. From an action, it can be only stated that this process is better or not, based on the symptoms. The symptoms can only be said to be better while another treatment is not. Therefore, in a scientific experiment, it is required at least two groups, one is assigned as a control group, while the other as an experimental group. To implement this type of experimental research in carrying out a good experiment, people need to understand everything that is related to the experimental components. Whether related to experimental patterns, as well as the determination of experimental and control groups, how the conditions of the two groups before the experiment is carried out, the way they are implemented, the errors that can affect the experimental results, the method of data collection, and the appropriate statistical analysis techniques used. Teachers can study, prepare, and carry out the research activities without abandoning everyday tasks in the classroom (Sulipan, 2011).

The Wilcoxon test is a nonparametric test that compares two groups paired (Geyer, 2006). This test basically calculates the differences between each set of pairs and analyzes these differences. The Rank-Sum Wilcoxon test can be used to test the null hypothesis that two populations have the same continuous distribution. Giving instructions in both mother tongue and the second language is as simple as possible and easy to understand. The learning objective regardless of the type of field of study, language, and the teacher is to teach students to think (Gagne, 1985).

The study is conducted in the learning of Polygon, and the same methodology is applied directly to the learning process in the class. Learning activities include the beginning (examples of the application), the main activities, concerning explanations of topics, discussions, discussion examples of questions, exercises, and discussion. The ending activities are involving tests, quizzes, homework, and school assignments that are given continuously with the instructional design that has been designed previously. With a structured and comprehensive learning, students are expected to absorb the learning material well that can be seen the effect of the use of the language of instruction in the classroom with student achievement.

The time in this study is 8x45 minutes, face-to-face with students. In addition to face to face meetings in the classroom, the questionnaire is given to each class for supporting qualitative data and will be done at the next meeting and will take a maximum of 10 minutes. The learning process is performed as follows; 7A is given in English, grade 7B is given in English and Bahasa Indonesia (bilingual), while the 7C is given in Bahasa Indonesia. The evaluation in grade 7A is provided in English, grade 7B in English and Bahasa Indonesia, as well as the 7C in Bahasa Indonesia. The data are collected using the instrument in the form of pretest and posttest, questions in the forms of drawings in which students calculate the angle of the unknown in the picture. The application of the concept of angles in polygons needs to be properly applied in calculating the unknown angle.

RESULTS AND DISCUSSIONS

Table 1 The Average of Students' Achievement of Pretest and Posttest

Class	Avr Pre	AvrPost	% increment	Class Analysis
7A	25	61	144 %	Using English in learning mathematics is showing a significant students' mark improvement.
7B	17	63	270 %	Using of bilingual language in learning mathematics is increasing the average of students' mark.
7C	16	64	300 %	The students seem to be able to understand easily so giving a significant improvement.

Based on the achievement of the final test (posttest) of those three classes that are shown in Table 1, it is concluded that using English in teaching has no significant effect on student achievement. It is shown in all three classes, which are treated differently in terms of the language of instruction, and the student achievement is good enough. There is a slight difference. Data from the English entrance test from the school, which shows the student's readiness to learn, does not guarantee for students to understand mathematics well.

The English-speaking ability of students from various elementary schools is a challenge for teachers to implement the learning process. For students who are lacking in English, it is necessary to apply appropriate and more vigorous and passionate learning strategies in developing their English proficiency in order to understand teacher explanations more easily. The challenges that emerged are observed from the beginning of the study in this study to the end of the lesson, also by observing student behavior and student opinions obtained from open question questionnaires.

There five common challenges that occur in all three classes. The first is the difficulties of some students to apply the concept of mathematics to problem-solving applications that are marked by the inability of students to solve the application problems in the posttest. There are still some students whose value is not complete. The second is lack of student motivation in learning mathematics that is characterized by the laziness of some students in training themselves through problem-solving application problems, lack of concentration in classroom learning, and other external factors such as problems in families that are less supportive of students in learning. The third is the perception of some students that mathematics is difficult. At the beginning of the school year, teachers always ask students about this. Apparently, there are still many students who consider that mathematics is difficult. This brings in a suggestion in students who confirm that mathematics is difficult and proven to be difficult as the score becomes lesser. The fourth is lack of prior knowledge is also bringing negative influence in the process of learning in the classroom. Topics on the basics of Polygon have been studied in elementary school. But, a lot of students have already forgotten what they have learned before. And the fifth is the fast learners need to wait for others to catch up, so they have limited time to develop their skills to their ZPD.

The common challenges that appear in all three classes indicate that there is generally no language problem on learning Polygon. This supported the results of the study that it is no significant difference from using English on mathematics learning outcomes. Problems are largely technical, willingness, and enthusiasm for learning mathematics in general. Particular challenges appear in each class and are different from others. This particular challenge is more related to English as the language of instruction in mathematics learning. Departing from the above challenges, teachers and schools need to take concrete steps to overcome the problems that arise as mentioned. The researcher suggests the solutions to these challenges as teachers, who know how school management processes are carried out. While some suggestions are more general in terms of learning processes, the suggested solutions are more focused on the learning process of mathematics by using English, i.e., communication in English and how the learning process of mathematics is better and more effective. The solution in addressing the common challenges that arise with regard to using English in mathematics learning, as mentioned, is divided into two, short and long-term solutions.

Short-term solutions include the wisdom and decisions of teachers and students in the classroom, such as; (1) improve student's learning motivation by making reward and punishment deal. A good student mark will get rewards, and the less good will get punishment. Punishment is meant here is the corrective punishment example of giving additional exercise tasks both mathematics and English. For example, awarding or rewarding to students who are always English speakers in the mathematics class, and other fields of study. (2) Conduct models of varied learning approaches, such as discussions, peer to peer teaching, tutoring, projects, and study groups in English. This can be directly applied in the classroom in the learning process. However, teachers need to master the varied learning methods through the training. (3) Foster more comfortable communication between students and teachers, especially for students who have difficulty, as far as possible communication in English. Teachers need to assist and nurture students who have difficulty communicating in English. In general, students are reluctant to ask the teacher, then the teacher who should be proactive in approaching students so that students are more confident to communicate in English. (4) School, in this case, the teacher needs to maintain a continuous relationship with parents of students to always support their children in communicating using English for children more fluent and easy to understand the explanation of teachers in English.

There are ten long-term solutions include school policies in making informed decisions to facilitate students with learning difficulties. The first is provide remediation, additional lessons, and tests of improvement in English to help students in learning mathematics. This needs to be supported by schools in the form of rules or policies that students must follow. Remediation schedules, additional lessons, and remedial tests need to be developed and approved by the school to enable students to attend the lesson. Parents need to know about this program in order to support students in learning English at school. The second is a good curriculum setting in the subject distribution is also related to optimal learning time for students in accordance with their mental development and learning readiness in terms of English proficiency. A good curriculum is tailored to the child's mental development. Curriculum development is not done solely because it aims to pass the national exam with the best score. With the aim of passing a national exam, it is necessary to review the English language use policy in the lesson, which is not used in national exams. The third is assistance to teachers who have difficulty in dealing with students who need special attention, especially when it comes to communication in English. Teachers need to be equipped with the knowledge on how to implement good learning process in English and how to face challenges in the classroom and how to approach the students who have difficulty caused by English. The school needs to create training programs for teachers so that teachers can assist students better.

The fourth is the implementation of standards operation in dealing with students who have difficulty in learning, involving subject teachers, counseling guidance, homeroom in addressing the unique situation for each student. This is generally applicable to every subject and for each language. Students need to have a comprehensive mentoring in their learning and behavioral development. The

fifth is the conversation in English lesson to support learning in the classroom. This program needs to be held by the school and is a plus point where students can learn to communicate in English so they can understand other people's conversation. In this case, the teacher explanation in English in order to be able to understand the concept of teaching that is taught. The sixth is the implementation of standard entrance exam in selecting students who will study in school, in the subject of Mathematics and English. This is one of the criteria for schools in selecting prospective students. By having potentially good students, it is expected that the learning process can take place better and more efficiently. But of course, this is a contradiction with human rights, in which every Indonesian child is entitled to a good education.

The seventh is provide matriculation class before the school year begins so that the prior knowledge of students is sufficient for the learning at the relevant level for Mathematics and English by teachers assigned to prospective students. The implementation practice of this program is the learning class that is held during the holidays before entering the school year. This class is meant to equate the level of knowledge of students that are coming from different primary schools, so as not to be surprised in the classroom learning. The eighth is provide teaching materials and tasks that can be accessed via internet so that students can access them anytime and anywhere to practice continuously in order to achieve better learning outcomes (especially Mathematics). The ninth is provide books and references in English as well as an appeal to students to read the books in order to get used to reading English text. The tenth is the use of everyday English between teacher-students and teachers in order to create a conducive atmosphere and accustomed to communicating in English, which also supports the ability of teachers, employees, students and parents in learning using English.

CONCLUSIONS

The conclusions of this study are learning Mathematics in English does not give disadvantages for students. Mathematics learning is more dependent on the learning process that provides time for students to develop critical and creative thinking skills rather than simply engaging English as the medium of instruction. The study gives results that are showing an increase in score average of the three classes with different treatments. The average value of the three classes experiences a substantial increase, 36 points, 46 points, and 48 points from the 0-100 value scale. Class 7A experiences an increase in the average value of pretest 25 to the average value of posttest 61. Class 7B experiences an increase in the average value of pretest 17 to the average value of posttest 63. Class 7C experiences an increase in the average value of pretest 16 to the average posttest 64. This indicates that the learning process has been going well where the students' understanding has increased considerably compared to before implementing the learning process. Besides that, motivation in English does not affect the achievement of student value in the process of learning Mathematics in English.

Recommendations from this study are; (1) this study can be used as a source for further study to develop on other factors that support or impede learning Mathematics in the foreign language. (2) This research can be developed in more than one school and for more subjects and involves more teachers to get more accurate results. (3) This research can be developed to measure the English proficiency of students' in learning Mathematics. (4) This research can be developed with other subject areas such as Science, Social Studies, or other skills. (5) This research can be developed over a longer period (one semester or one academic year) and can involve more students in the classroom and school. (6) In learning mathematics (especially in English or non-native language schools), English is not the only factor for students to achieve good performance. (7) The challenge in learning mathematics is unique to each and steps need to be taken to deal with it critically. And (8) using English in learning mathematics does not significantly affect the final score.

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