

# Android-Based Google Translate Training for Mathematics Subject Teachers' Deliberations in Understanding High-Level Reasoning Test Item in Soppeng Regency, South Sulawesi

Rukli Rukli<sup>1</sup> and Syamsiarna Nappu<sup>2</sup>

<sup>1</sup>Mathematics Education, University of Muhammadiyah Makassar

<sup>2</sup>English Education, University of Muhammadiyah Makassar

E.mail: [rukli@unismuh.ac.id](mailto:rukli@unismuh.ac.id)

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**Abstrak:** Bahasa Inggris adalah bahasa sosial dunia, namun guru masih memiliki keterbatasan, terutama dalam menerjemahkan teks bahasa Inggris. Tujuan pengabdian ini adalah untuk memberikan penyuluhan, pelatihan dan pendampingan bagi kelompok guru yang terlibat dalam konsultasi guru matematika. Kegiatan tersebut melibatkan 28 guru matematika sebagai utusan dari masing-masing sekolah atau madrasah di Kabupaten Soppeng. Setiap tahap dilakukan pre-test dan post-test. Analisis data menggunakan persentase dan uji t berpasangan dengan taraf signifikansi 0,05. Hasil pengabdian menunjukkan 1) gerak tubuh peserta sebelum dan sesudah kegiatan meningkat ke arah yang lebih baik, 2) pemahaman peserta dalam menerjemahkan teks berupa kata, suku kata, kalimat dan paragraf meningkat, 3) keterampilan peserta dalam menerjemahkan teks bahasa Inggris meningkat rata-rata 80%, 4) terdapat perbedaan peningkatan yang signifikan sebelum dan sesudah penyuluhan, pelatihan, dan pendampingan guru dalam menerjemahkan sumber teks bahasa Inggris penalaran tingkat tinggi. Oleh karena itu, peningkatan kemampuan dan keterampilan menerjemahkan teks bahasa Inggris dapat menggunakan tiga tahap, yaitu penyuluhan, pelatihan dan kemudian pendampingan dengan menggunakan sumber teks dari jurnal internasional atau soal matematika berstandar internasional.

**Abstract:** English is the social language of the world, but teachers still have limitations, especially in translating English texts. This service aims to provide counselling, training and mentoring for groups of teachers involved in consulting mathematics teachers. The activity involved 28 mathematics teachers as delegates from each school or madrasa in Soppeng Regency. Each stage is carried out pre-test and post-test. Data analysis used percentages and paired t-tests with a significance level of 0.05. The results of the service showed that 1) participants' body movements before and after the activity increased in a better direction, 2) participants' understanding of translating texts in the form of words, syllables, sentences and paragraphs increased, 3) participants' skills in translating English texts increased by an average of 80%, 4) there was a significant difference in improvement before and after counselling, training, and teacher assistance in translating high-level reasoning English text sources. Therefore, improving the ability and skills to translate English texts can use three stages: counselling, training and mentoring using text sources from international journals or international standard math problems.

## Introduction

The Mathematics Subject Teachers' Deliberations (MSTD) for *SMP/MTs* in Soppeng Regency, South Sulawesi Province has a secretariat at Jalan Kayangan No. 1 or SMPN 3 Watansoppeng then moved to the Hall of SMP Muhammadiyah Watansoppeng. MSTD conducts monthly activities to discuss themes around learning mathematics education in schools. Each activity is carried out by and for members for each theme. One of the mathematics MSTD activities related to lesson plans and assessment of mathematics learning is documented in Figure 1.



Figure 1. MSTD Routine Activities

The number of members is 67 teachers from all junior high school (*SMP*) mathematics teachers with a proportion of 61% while *Madrasah Tsanawiah (MTs)* with a proportion of 39%. The teacher has a master's level education. 7% of the rest are teachers who graduate from S1 mathematics education (93%). Age above 50 years (60%), the rest (40%) below or equal to 50 years. So, some members of the mathematics MSTD are senior teachers and are almost retiring. However, teachers still exist in the current era of disruption that is now engulfing the world of education.

## Abstract

A strong demand currently exists for testing instruments that are capable of providing more informative and diagnostic results than typical tests offer. This paper reviews approaches that have been proposed for educational diagnostic assessment. Two major approaches are identified: (a) deficit assessment, which focuses on weaknesses of the student, and (b) error analysis, which focuses on the kinds of errors the student commits. This paper also reviews recent work related to diagnostic assessment that is based on the integration of methods from cognitive psychology and artificial intelligence. It is concluded that the development of powerful diagnostic instruments may require a reexamination of existing psychometric models and possibly the development of alternative ones. It is also pointed out that the traditional approach to the specification of content in terms of static taxonomies may not be appropriate given the dynamic and sequential nature of diagnostic assessment. Finally, it is noted that the psychometric and content demands of diagnostic assessment all but require test administration by computer.

## Figure 2. Discourse on Diagnostic Assessment

Current increase era disruption digital technology requires the absorption of innovation so quickly that English plays a strategic role as an international language in text and communication in the global era (Kirkpatrick, 2012; Cohen, 2017; Panero & Yu, 2014). English is an indispensable tool in global competition and cooperation through science, technology, trade, and other human interaction activities (Sung & Zhang, 2013). Data from MSTD members shows that the experience of participating in training is very varied, but 98% have never participated in English training, while 2% have attended BI training because the school happens to be an International Standard School Pioneer. However, the activities have been around long, so they have forgotten how to translate even a few words. They have started running away. Likewise, the ability to translate test items from international competitions such as TIMSS and PISA is very limited (5%), so it is difficult to absorb and apply these international standard test items. The same thing is related to the scientific study of mathematics learning assessment. Theme study diagnostic assessments taken from journal Q1 with SQR 1.92 on discourse diagnostic assessments are shown in Figure 2.



Figure 3. The teacher does the TIMSS Test Item

The teacher can only understand 5% of words in one sentence. Likewise, in the abstract of Figure 2, the teacher can understand 3% of the words. When making sentences related to the theme, no teacher can make sentences. During in-depth interviews, 91% of teachers denied that English is not taught in schools enough mathematics, but 99% said they needed English to find learning innovations. Generally, these teachers have below-average English proficiency (97%). During the socialization of the 2011 TIMSS test item, several SMP and MTs teachers are shown in Figure 3, showing that 97% do not understand the 2011 TIMSS mathematics test item in Figure 4 because they cannot understand BI.

A workman cut off  $\frac{1}{5}$  of a pipe. The piece he cut off was 3 meters long.

How many meters long was the original pipe?

- A. 8 m
- B. 12 m
- C. 15 m
- D. 18 m

Figure 4. TIMSS 2011 Test Item

Besides the limitations of the BI field, the mathematics MSTD group, as a mathematics teacher and according to the demands of the era of disruption, must be creative and innovative in making learning assessments. These demands have been accommodated in the work program. MSTD mathematics works from and for members. The program is arranged in turns according to the theme so that there is sharing of experience but a lack of depth and innovation so that there are several obstacles. Teachers have problems in making High-Level Reasoning (HLR) test items adapted from TIMSS test items because the source uses English (95%). The HLR test item that was studied in 2011 shows that the teacher has not been able to make these test items from the TIMSS test items. Therefore, the MSTD group participated in training related to the existing problems.

## Method

The service method consists of three types: counselling, training, and assistance. Counselling to explore the theoretical understanding of partners, training to apply methods or methods or applications according to theory, and assistance in the form of follow-up assistance from counselling or training. Participant gestures. The training was carried out at the MSTD Secretariat of SMP/MTs Mathematics in the Muhammadiyah Junior High School Hall, Soppeng Regency, South Sulawesi Province.

The implementation of the service is carried out by the head of the service team, namely the Chairperson, Dr Drs. Rukli, M.Pd., M.Cs as an expert in mathematics education assessment and one member of the TIM, namely Dr Syamsiarna Nappu, S.Pd., M.Pd. as an English expert. Service activities are assisted by one student from the mathematics education study program, one English education study program in semester 6, and one independent volunteer.

The instrument of service activities uses tests and observation sheets. The test consists of three: pre-test, post-test, and practice. The practice test is equipped with an observation sheet to describe the gesture of each

participant. The pre-test and post-test were made in the form of a description with seven test items. The first and second test items are in the form of word text, the third and fourth test items are in the form of syllable text, the fifth and sixth test items are in the form of sentence text, and the seventh test item is in the form of paragraph text. The three tests and observation sheets were validated by three experts qualitatively before being used to describe or measure participants' gestures, abilities, and skills.

Stages of implementation of service

1. Preparation

Preparation for the service implementation includes analyzing the needs of the mathematics MSTD group in Soppeng Regency. The results of the analysis are focused on urgent needs to be addressed. Subsequently designed, manufactured, validated, and standardized the instrument. Likewise, looking for English text literature from mathematics education journals, mathematics education assessments and mathematics education test items from TIMSS or PISA to match high-level reasoning texts.

2. Activity Implementation

The activity implementation involved three observers, two students and one volunteer, in monitoring, recording, and conducting pre-test, post-test, and practice tests. With the second observation sheet, students assess according to the indicator. Likewise, documenting activities in the form of videos and photos.

Pre-test to participants before conducting counselling. Then the post-test was carried out after the counselling activity ended. The pre-test activity was carried out for 25 minutes involving English text in words, syllables, sentences, and paragraphs. While the counselling material for 2 hours is related to the translation of the English text, the main description of the material is as follows: (1) Use the correct language structure; (2) Do not translate literally but translate according to the context of the sentence; (3) Using translator tools; and (4) Ask the expert

The flow diagram for installing the adroid-based translate application is in Figure 3.

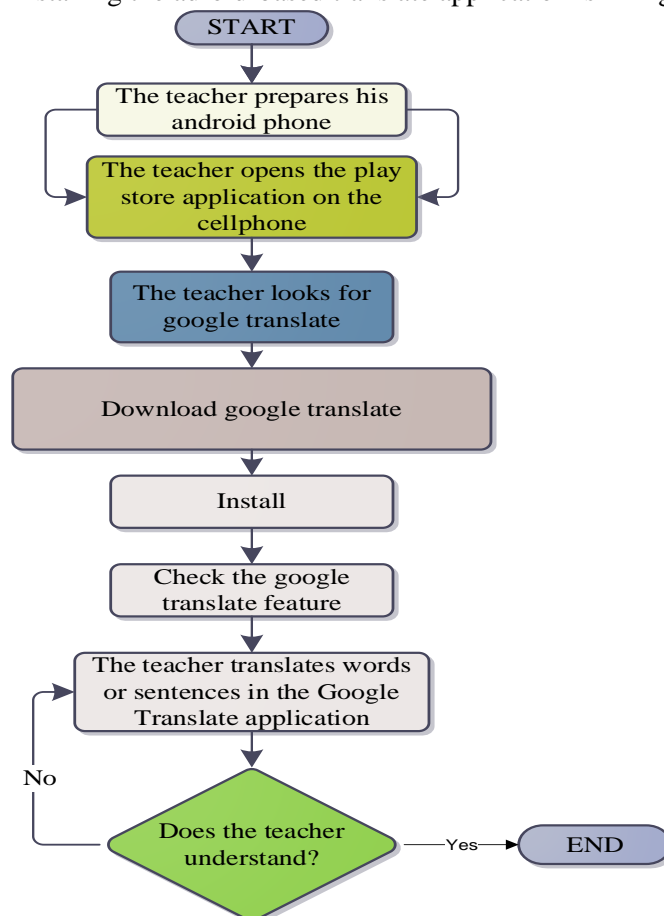


Figure 3. Flow chart Install and Use the App

After the counselling, a post-test for 25 minutes and participants' response data were collected after the pre-test and post-test for each form of text. After that, the observer monitored the training activity in which the

participants translated the English text for a few minutes. Assistance activities are carried out for participants who have difficulty translating each text form. Practice tests using observation sheets. The results of the observations consisted of participant gestures and understanding data of each participant. Gestures were recorded directly by the observer during the training, while the participants filled in data on participants' understanding after translating each text.

There are four choices, namely very easy, easy, difficult and very difficult, with a score for each category of 1, 2, 3, and 4. If participants choose difficult and very difficult, then participants mention three factors or reasons in sentences. Data were analyzed by descriptive and paired t-test with a significance level of 0.05 with the SPSS program.

## **Result and Discussion**

### **Result**

#### **A. Service Results**

The service lasted two days, 8-9 June 2022, starting at 08.-16 WITA. Thirty participants were invited to represent other teachers in the activity, but to coincide with the independent learning activity, only 28 people attended. The head of the Mathematics MSTD SMP/MTs Hj opened the first day. Arjuna, S.Pd., M.Pd. as in Figure 5.



Figure 5. Event Opening

After the opening, it was followed by a pre-test for the participants. A pre-test is carried out on each text form in words, syllables, sentences, and paragraphs. It is also done in post-test activities.

#### **1. Gesture change**



Figure 6. Participant Gesture

Figure 6 shows the participant's gesture. Gesture concerns the style and behaviour of participants when translating English text into Indonesian. Several variations of the participant's gestures carried out activities by sitting back until they were tense. 95% of participants had a tense gestures during the pre-test activity. However, after being given counselling, post-test, training, and tension assistance decreased by 70%. It shows a fairly significant change in gestures from more relaxed participants in translating text.

#### **2. Description of word text translation**

Figure 7 shows 28 participants when taking the pre-test. There are 93% who do not answer test items related to word translation because they are difficult to translate. The difficulty is partly because they often

hear but do not understand. Some participants said they were not familiar with words in scientific articles or test items of international standards. Some participants said that English was not their competence, so they did not know the meaning of the word improve or multiplication. After counselling and training on translating English texts, the percentage decreased by 5% not filling in even though 20% were still wrong but had tried to write the meaning.

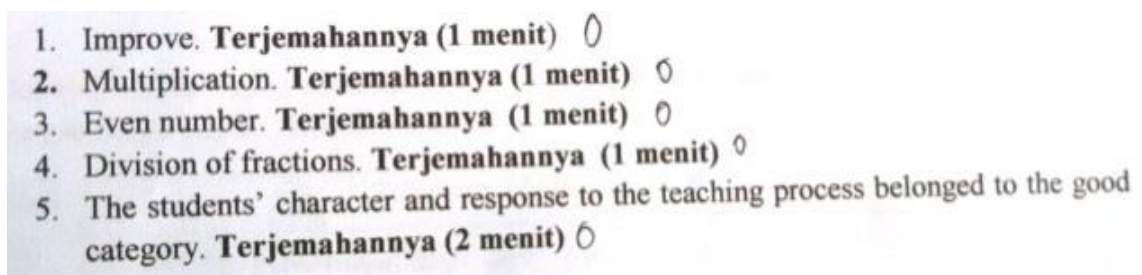


**Figure 7. Presentation of material**

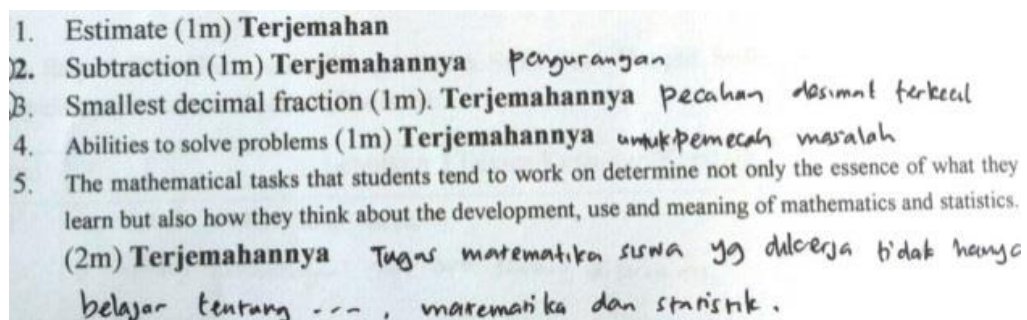
### 3. Description of translation in the word

Of the 28 participants during the pre-test, 97% did not answer test items related to syllable translation. Some answer one word of the two but are wrong, especially if it becomes a syllable. For example, in the word even number, some can number but cannot even. The number is translated number/numbers are not numbers. There were 30% of participants who translated the even number as a sequence of numbers even though they translated it correctly, namely an even number. There were several reasons for the participants who experienced errors, namely, 55% said vocabulary was lacking or rarely used in class, and some wrote, forgot the meaning or had difficulty translating it. 5% of participants answered all syllables, namely even number, which means an even number and division of practices, namely the division of fractions. The participants came from favourite schools, and the participants were young.

After counselling and training on translating English text, the percentage of not filling in the answers is only 2%, even though there are 30% that are still wrong but have tried to write down the meaning. The print screen result of one of the test takers depicts the translation results between the pre and post-tests in Figures 8 and 9.



**Figure 8. Pre-test text translation**



**Figure 9. Translation of post-test text**

#### 4. Description of the translation in the sentence

Of the 28 participants during the pre-test, 98% did not answer test items related to the translation of the sentence text. Some answer in just a few syllables of these words but not more than 30%. For example, the sentence in Figure 8 means a better learning process or student attitude in following the learning process of various characters. Several participants gave reasons because it was difficult or very difficult. For example, they are not familiar with English in the learning process, have not been taught since high school, or have not updated themselves.

The translation of the sentence 'The students' character and response to the teaching process belongs to the good category' was interpreted by some participants as the character of students, and the response to the learning process affects the good category. Some translations have a similarity of 1%.

After counselling and training on translating English sentence text, the percentage of not filling in the answers is only 10%, even though 25% are still wrong but have tried to write the meaning.

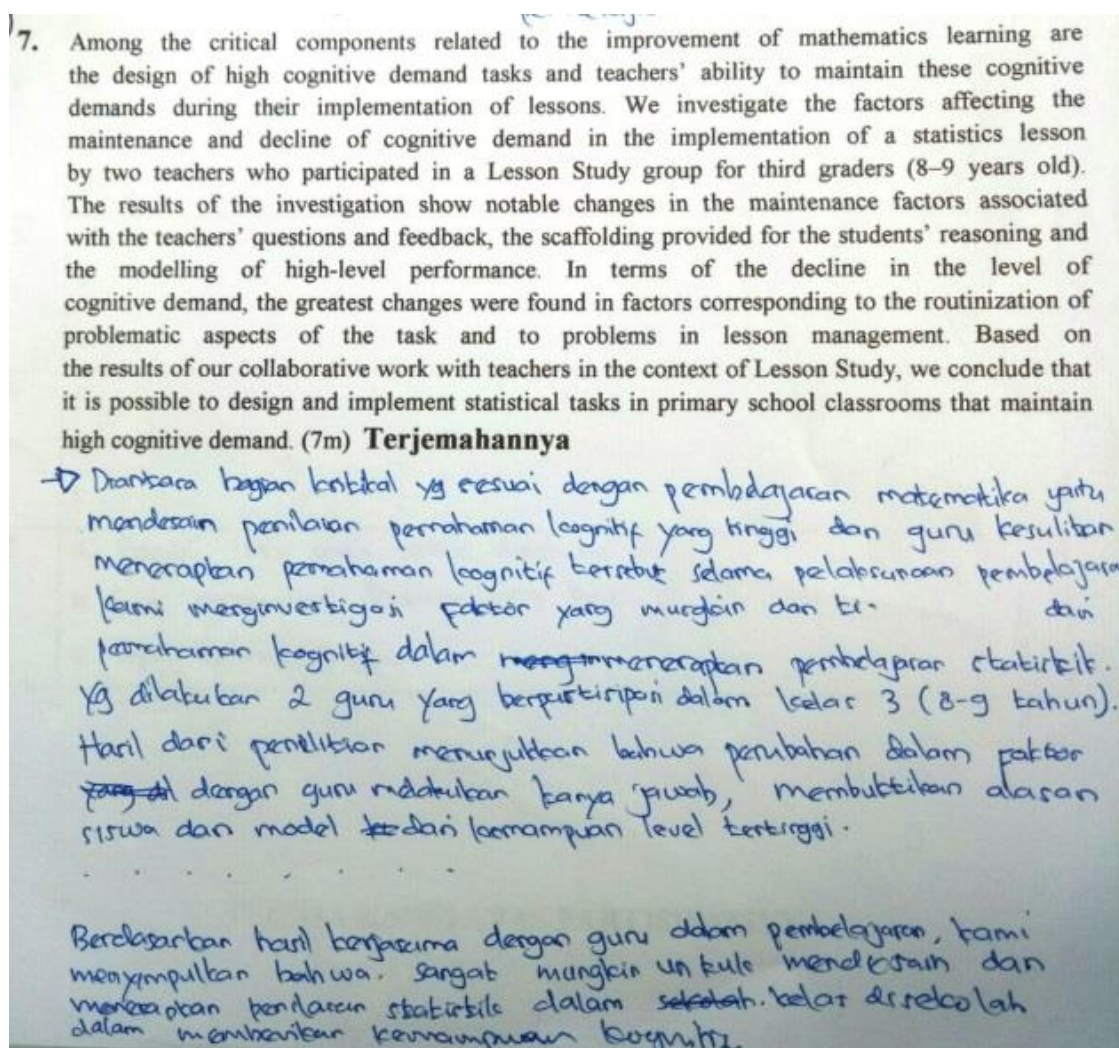


Figure 10. Translation of post-test paragraphs

## **5. Description of the translation in paragraphs**

Of the 28 participants during the pre-test, 100% did not answer test items related to syllable translation. Some answer one of the two words, but some are correct 30%, for example, the words but, he, saw, and students. Participants gave various reasons for the difficulty of translating. For example, only knows a few words, does not understand tenses, finds it difficult to interpret one sentence, has never learned English again, and has a long reading.

After attending counselling and training on translating English text into paragraphs, the percentage of translating reached 95%, even though it was still limited to words, syllables, or sentences. There were no participants who could translate the text in the paragraph as a whole correctly, but 80% of the participants had grasped the text up to 90%. A snippet of the post-test results for test item seven is in Figure 9.

## **6. Improved understanding**

### **a. Translate words**

The word improvement from the pre-test results shows a score of 28 but the translation of the word estimate from the post-test results is 108. The increase has increased more than three times. Table 1 shows the first pair, pre-test and post-test, where the sig value is less than 0.05. It means that the increase in scores from pre-test to post-test significantly increases the teacher's understanding of translating English text in the form of words.

### **b. Translate syllables**

The translation of syllables, for example, 'division of fractions' from the pre-test results, shows a score of 86 but the translation of the syllable abilities to solve problems from the post-test results is 144. The increase is around 100%. Table 10 shows the first pair, pre-test and post-test, where the sig value is less than 0.05. The increase in scores from the pre-test to the post-test significantly increased the teacher's understanding of translating English text in the form of syllables.

### **c. Translate sentences**

For example, the translation of the sentence 'The students' character and response to the teaching process belongs to the good category from the pre-test results showed a score of 118, but the translation of the sentence 'The mathematical tasks that students tend to work on determining not only the essence of what they learn but also how they think about the development, use and meaning of mathematics and statistics from the post-test results of 152. The increase was quite high, namely 28%. Table 10 shows the first pair, pre-test and post-test, where the sig value is less than 0.05. It means that the increase in scores from pre-test to post-test significantly increases teacher understanding to translate English text into sentence form.

### **d. Translate paragraphs**

Paragraph translations 'The work of mathematicians involves persuasively demonstrating the reasoning that leads proofs to conclusions. But this skill is not restricted to math; many professions require people to show or explain their reasoning. Goodman (2005) specifically integrated letter-writing assignments into an undergraduate calculus course to develop students' technical writing skills and ability to explain complex subject matter to a non-expert audience. He concluded that he saw a progression in writing strength in at least some students and that many students saw benefits in the assignments. Miller (1992) and Kasperek (1996) both note that writing assignments helped teachers identify students' strengths and weaknesses from the pre-test results showed a score of 54. However, the translation of paragraphs 'Among the critical components related to the improvement of mathematics learning is the design of high cognitive demand tasks and teachers' ability to maintain these cognitive demands during their implementation of lessons.

We investigated the factors affecting the maintenance and decline of cognitive demand in implementing a statistics lesson by two teachers who participated in a Lesson Study group for third graders (8–9 years old). The investigation results show notable changes in the maintenance factors associated with the teachers' test items and feedback, the scaffolding provided for the students' reasoning and the modelling of high-level performance. Regarding the decline in cognitive demand, the most significant changes were found in factors corresponding to the routinization of problematic aspects of the task and problems in lesson management. Based on the results of our collaborative work with teachers in the context of the Lesson Study, we conclude that it is possible to design and implement statistical tasks in primary school classrooms that maintain high cognitive demand' from the post-test results of 92. The increase was relatively high, namely 63%. Table 1 shows the first pair, pre-test and post-test, where the sig value is less than 0.05. It means that the increase in



scores from pre-test to post-test significantly increases the teacher's understanding of translating English text in the form of paragraphs.

**e. Overall improvement**

The previous four points show a significant increase in the ability to translate English texts, whether in words, syllables, sentences, or paragraphs. This increase occurred as a whole. It is also in line with the results of the paired t-test in Table 1 shows that the sig of 0.00 is smaller than 0.05, so there is a significant difference in the participants' ability to translate the text regardless of the form of the text.

**7. Skill upgrade**

The observer carries out the teacher's translating skills. The data shows that the improvement of participants' skills in translating text in word form is 95%, syllable form is 91%, sentence form is 89%, and paragraph form is 86%. The percentage increase experienced a reduction if more and more texts were translated. It means that participants' skills in translating texts are still constrained by the vocabulary of the number of words.

Table 1. Paired t-test

						t	df	Sig. (2-tailed)	
		Lower	Upper						
Pairs 1	Pre1- Post1	-2.857	1,820	0.344	-3.563	-2,151	-8,307	27	0.000
Pairs 2	Pre2- Post2	-1.143	2.050	0.387	-1.938	-0.348	-2.950	27	0.006
Pairs 3	Pre3- Post3	-0.821	3,432	0.649	-2.152	0.510	-1,266	27	0.216
Pairs 4	Pre4- Post4	-2.071	2.841	0.537	-3.173	-0.970	-3,859	27	0.001
Pairs 5	Pre5- Post5	-1.214	2,685	0.508	-2.256	-0.173	-2.393	27	0.024
Pairs 6	Pre6- Post6	-1,286	2.447	0.463	-2.235	-0.337	-2,780	27	0.010
Pairs 7	Pre7- Post7	-1,357	3.391	0.641	-2.672	-0.042	-2.118	27	0.044
Pairs 8	SumPre - SumPost	-10,750	7.255	1.371	-13,563	-7,937	-7,840	27	0.000

**Discussion**

The results of the service showed that the test participants experienced an increase in their ability to translate all patterns of English text in the form of words, syllables, sentences, and paragraphs. Figure 11 shows the increase in the ability of these participants, including an increase regardless of the form of the text. The teacher's ability to translate text in the form of words is very important, especially in understanding material related to learning mathematics. Both are important, both English and mathematics, because they are all languages. Mathematical literacy ability is also inseparable from the ability of mathematics teachers to enrich English vocabulary. Words are the basis for teachers to know and understand higher text patterns, such as syllables.

Improved ability and skills of mathematics teachers after attending counselling, training, and assistance that impacts the mathematics learning process in the classroom. It is easier for teachers to access information on teaching procedures and evaluate and conduct little research, such as classroom action research. A syllable is an arrangement of several words. The impact of increasing the ability and skills of translating English text in the form of syllables is that the teacher can understand the context of the sentence even though he does not know the meaning of the whole word in the sentence. The significant increase in translating these syllables triggered mathematics teachers to create discourse from English literature. Improving these abilities and skills increases the ability and skills to translate text in the form of sentences.

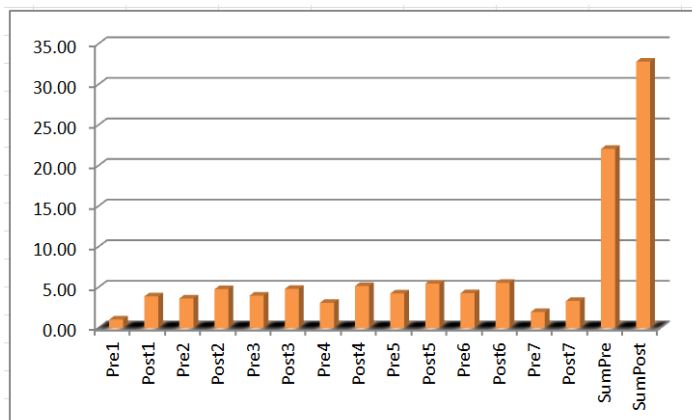


Figure 10. Average Pre-Test and Post-Tes

The sentence is an arrangement of words or syllables in the pattern of the subject of the predicate, the subject of the object of the predicate, the subject of the predicate, the object, and the description. The form varies according to the context and purpose. The improvement of mathematics teachers in translating English texts into sentences has significantly contributed to quickly and accurately absorbing information on social media, including understanding international journals rich in the latest innovations and reliable sources. Increasing the ability and skills to translate the sentence will affect the ability to translate text in the form of paragraphs.

Paragraphs consist of at least three sentences: the main sentence, explanation, and conclusion. Teachers have increased abilities and skills in translating paragraphs, so they can at least translate three sentences. Mathematics teachers have increased their understanding and skills in giving. Contributions for teachers to read literature such as abstracts of a journal. This ability provides business opportunities for teachers to work in class, in school, and on social media.

Mathematics teachers can give private lessons to other teachers or provide national or even international seminar materials. Teachers can innovate learning without relying on Indonesian reading materials. It opens up creative opportunities, looks for business opportunities, or provides services for small practices that are even related to the competence of 21st-century teachers.

The demand for 21st-century competence for teachers is challenging, but the main obstacle is the limited literature in Indonesian. RI 4.0 era teachers must have the following competencies, including (a) educational competence, (b) competence for technological commercialization, (c) competence in globalization, (d) competence in future strategies, and (e) counsellor competence. Mastery of these competencies is expected to positively impact the development of generations Y and Z (Priyambodo & Saputri, 2021, Lubis & Dasopang, 2020). The demands of 21st-century learning require students to use High Order Thinking Skills (HOTS) through problem-solving and critical thinking, communication and collaboration, and creativity and innovation. To implement it, the teacher must first understand the HOTS concept because the teacher is the main architect in filling students' intelligence (Rivalina, 2020). Teachers today face far greater challenges than in previous eras. Teachers face clients who are much more diverse, the subject matter is more complex and difficult, the standard of the learning process and also demands the achievement of higher students' thinking abilities. For this reason, teachers who can compete are no longer intelligent but can act hard and have soft skills (Sulistya, 2019). It requires mathematics teachers to continue to hone themselves in understanding English.

Furthermore, UNESCO proposed four pillars in the field of education, namely: learning to know (learning to know), learning to do (learning to do or doing, learning to live together) and learning to be (learning to be/develop oneself) (Nurjanah, 2019). The four pillars require the teacher to advance or endure in the face of it. Therefore, the involvement of teachers in learning English can improve their competence so that teachers can compose lesson plans in English text. In addition, feedback from teachers shows optimism that it can be improved learning (Taram & Istiandaru, 2019). Not only teachers but prospective mathematics teachers can use English to gain understanding knowledge, namely the learning process. It provides facilities and opportunities for students to develop students abilities in developing mathematical communication skills, independent learning, growing self-confidence and having responsibility in exploring concepts that must be mastered. These results indicate that the activities provided can develop skills in presenting material in the form of presentations,

forcing students to communicate mathematics in English (Nurlalah, 2015). Likewise, kindergarten and elementary school teachers are trained early to combine mathematics with English. It combines two disciplines, namely mathematics and English.

Activities involved in improving English language skills and abilities are as follows. Participants involved in mathematical reasoning activities, namely counting, are also involved in mingle activities packaged in games divided into several types. Based on the results of interviews with participants, 96% of the total participants were able to build reasoning power and motivate students in learning mathematics activities using the English-based Mingle model (Sopia et al., 2021). Furthermore, the teacher involved in translating the English text has not yet reached the listening level. The listening stage demands more skills than translating text.

Listening activities are important because listening can increase students' knowledge and master other skills in learning English, such as speaking, reading, and writing. One way is by using classroom action research media so that it can increase participants' scores (Ancient, 2020), using the Bottom-Up technique (Akbar et al., 2020), drill technique (Son, 2019) or the CONNECTED SPEECH technique (Musfirah et al., 2019)

## Conclusion

Mathematics teachers who are members of the Mathematics MSTD as participants in counselling, training, and assistance to carry out and implement translations of English texts in the form of words, syllables, sentences, and paragraphs have significantly improved understanding. Participants' skills in translating English texts increased by an average of 80% both translating words, syllables, sentences and paragraphs. Devotion has not yet reached the listening stage, where the teacher listens to the conversation via audio or video and then understands the speech in words or other forms.

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