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# Effects Of Mother Tongue as Supplementary Medium of Instruction on Secondary School Students Attitude Mathematics

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**Abstract**

Students' attitude towards Mathematics seems to be an important factor essential for consideration in the teaching and learning of Mathematics. Hence, finding ways to improve students' attitudes is imperative. To this end, this study investigated the effects of mother tongue as a supplementary medium of instruction on Secondary School Students' attitude towards Mathematics in Ekiti State, Nigeria. The purpose was to examine the effectiveness of the mother tongue as a supplementary medium of instruction as it affects students' attitude towards Mathematics. The study adopted a quasi-experimental research design. The sample for the study consisted of 194 Junior Secondary School class one students selected from three secondary schools in Ekiti State through multistage sampling technique. A validated instrument tagged SAQM with a reliability coefficient of 0.85 was used for data collection. Results from the findings revealed a significant difference between the attitude of students exposed to mother tongue as a supplementary medium of instruction and those not so exposed. It was concluded that the use of the mother tongue as a supplementary medium of instruction is an effective tool through which students' attitude can be improved. It was recommended that teachers try as much as possible to incorporate the learners' mother tongue during classroom interactions to enhance productivity in the learners.

**Keywords:** Attitude, mother tongue Yoruba, mathematics.

## Introduction

Attitude, which is considered the disposition of an individual towards a concept or subject, is important in the teaching and learning of Mathematics. An individual's attitude towards Mathematics could influence considerably the extent to which the individual learns Mathematics and how well it is put to use in other subjects. Therefore, the cultivation of a favorable attitude towards Mathematics is an important attribute required of a learner of Mathematics to meet the challenging demands in our day-to-day activities.

It is a general belief that student's attitude towards a subject determines their success in such a subject. Some researchers have resonated with this belief (Ashcraft, 2002; Dalha, 2015; Popoola, 2013; Popoola & Olaniyan, 2019) at different times, and attitude has indeed been found to influence the success of students in any given subject. Therefore, it can be deduced that a favorable attitude towards Mathematics can result in good performance in the subject.

Mensah et al. (2013) opined that attitude towards Mathematics has cognitive, affective, and behavioral components. Like any other kind of attitude, a student can develop a positive attitude towards Mathematics because they learn to associate positive experiences or events

with it. Hence, positive reinforcement creates room for the formation of a positive attitude for Mathematics. Existing literature at different times (Mazana et al. 2019; Peteros et al. 2019) have listed factors such as lack of teaching and learning facilities, classroom congestion, gender issues, teachers' attitude, students' attitude, teachers' qualification as well as the inability of teachers to concretize the subject as some of the factors responsible for poor academic performance in Mathematics. However, life and society are dynamic. Thus, other factors that seem to be contributory to students' negative attitude towards Mathematics may include the medium of instruction in the classroom, among others.

The function of language in the existence of the human race cannot be undermined. In Ayodeji (2017) opinion, it is central to whatever social cohesion and cooperation we can have and determines the extent to which we can relate to our past, present and future. Oginni and Owolabi (2013) noted that human beings need language to grasp things intellectually and to get others to do so. By implication, language plays a crucial role in the teaching and learning of mathematics. Therefore, it is necessary that the medium of instruction used in Mathematics class be one that the learners can easily understand. Several studies (Bermejo et al., 2021a; Bermejo et al., 2021b; Nkonde et al., 2018; Van Rinsveld et al., 2016) have indicated that language plays an essential role when learners seek to find a solution to given problems. The possibility of solving such problems is often related to the learner's level of understanding or comprehension in the language with which the problem was presented to the learner. Similarly, the language of discussing to a large extent affects the disposition of a person to a concept.

Students' attitudes to learning have been shown to be positive when taught in a language they understand and can easily relate with. For instance, Abdu (2011) concluded that pupils were highly interested in learning when their mother tongue was used, and he noted their active participation and contribution revealed this during the lesson. Similarly, Jovem (2014) also submitted that the use of mother tongue enables the young learners to immediately construct and explain without fear of making mistakes, articulate their thoughts and add new concepts to that they have already. This was also the view of Nkonde et al. (2018) as they submitted that teachers using local language observed reduced timidity among the learners during Mathematics lessons.

The insistence of policymakers on the use of the English language as the sole medium of instruction in Mathematics classes in the secondary schools seems not to have better the lot of the Nigerian learners of Mathematics as most of these learners tend to develop an unfavorable attitude towards the subject. To this end, it is important in this study to ascertain if the medium of instruction will have any influence on the attitude of students towards Mathematics.

***Purpose of the Study***

The purpose of this study was to investigate the effects of using the mother tongue as a supplementary medium of instruction on students' attitude towards Mathematics. It examined the effect of mother tongue as a supplementary medium of instruction on students'

attitude towards Mathematics and also compared the attitude of students towards Mathematics when exposed to different media of instructions.

***Research Question***

Will there be any improvement in students' attitude towards Mathematics when the mother tongue is used as a supplementary medium of instruction?

***Research Hypotheses***

1. There is no significant difference in the attitudinal mean scores of students in the experimental and control groups before treatment.
2. There is no significant difference in the attitudinal mean scores of students in the experimental and control groups before and after the treatment.
3. There is no significant difference in the attitudinal mean scores of students exposed to mother tongue as supplementary medium of instruction and those exposed to mother tongue only medium of instruction after the treatment.

## Method

The study adopted a three-group pre-test – post-test quasi-experimental design. The population for this study consisted of 16,741 Junior Secondary School Class I (JSS 1) students in all the 187 public secondary schools in the Ekiti State of Nigeria (Source: Ekiti State Ministry of Education, Science, and Technology).

The sample for the study consisted of 194 Junior Secondary School One (JSS1) students selected from three schools in Ekiti State through a multistage sampling technique. The first stage was the use of a simple random sampling technique to select three local government areas (LGA) from the 16 LGAs in Ekiti State. The second stage was the use of the purposive sampling technique to select one secondary school from each of the selected local government areas. The last stage was the selection of one intact class from each of the schools selected for the study.

***Research Instrument***

A self-constructed research instrument tagged Students' Attitudinal Questionnaire in Mathematics (SAQM) was used for the study. SAQM consisted of two sections, A and B. Section A contained demographic information, while section B contained 40 items to which each respondent was to make a choice that reveals their disposition towards Mathematics.

**Validity of the Instrument**

The instrument was screened for face and content validity by experts in the relevant fields. Based on their criticisms and suggestions, some items were removed, and some items were modified. The corrected versions of the instruments were used for data collection.

***Reliability of the Instrument***

The reliability of each of the instruments was ascertained using the test-retest method of reliability. The instrument was administered to 20 Junior Secondary School Class One Students from a secondary school different from the selected schools used for the study. The

instruments were administered at an interval of two weeks. The set of scores obtained for each of the instruments were subjected to Pearson's Product Moment Correlation analysis. Their instrument yielded a reliability coefficient of 0.85. This coefficient was considered relatively high enough to be used for the study

***Experimental Procedure***

The students were randomly assigned to three groups. Two of the groups were the experimental groups, while the third group served as the control group. Experimental group 1(EG1) was exposed to the mother tongue only as of the medium of instruction, while Experimental Group 2 (EG2) was exposed to the mother tongue as a supplementary medium of instruction. The control group was exposed to the conventional medium of instruction which was the English language. The experiment covered a period of ten weeks.

***Data Analysis***

Data collected were analyzed using descriptive statistics such as mean and standard deviation and inferential statistics such as Analysis of Variance (ANOVA) Analysis of Covariance and t-test and MCA.

## Results

***Research Question:*** Will there be any improvement in students' attitudes towards Mathematics when the mother tongue is used as a supplementary medium of instruction?

In order to answer the question, the attitudinal mean scores of students in the experimental and control groups were obtained and compared before and after the experiment, as presented in table 1.

**Table 1.** Students' Attitudinal Mean Score based on the Medium of Instruction

| Medium of Instruction | N | Pre- Test | | Post-test | | Mean difference |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Mother Tongue only | 50 | 67.22 | 6.17 | 69.82 | 5.87 | 2.20 |
| Mother Tongue as supplementary | 61 | 68.41 | 8.95 | 74.00 | 6.87 | 5.59 |
| Conventional method | 83 | 67.06 | 10.66 | 67.15 | 10.71 | 0.09 |

Table 1 shows the attitudinal mean score of students based on the medium of instruction. It shows that students exposed to mother tongue only medium of instruction had a pre-test attitudinal mean score of 67.22 with a standard deviation of 6.17 and a post-test attitudinal mean score of 69.82 with a standard deviation of 5.8. The mean score difference for the group was found to be 2.20. Also, students taught with mother tongue as supplementary medium of instruction had a pre-test attitudinal mean score of 68.41 with a standard deviation of 8.95 and a post-test attitudinal mean score of 74.18 with a standard deviation of 6.87, with a mean difference of 5.59. Again, students exposed to the conventional medium of teaching had a pre-test attitudinal mean score of 67.06 and a post-test attitudinal mean score of 67.15 with a slight mean difference of 0.09. This implies that using different media of instructions had a positive effect on students' attitudes in Mathematics. However, the group exposed to mother tongue as supplementary medium of instruction had the best attitudinal mean score.

***Hypothesis 1:*** There is no significant difference in the attitudinal mean scores of students in the experimental and control groups before the treatment.

To ascertain the homogeneity of the groups, the attitudinal mean scores of students in the pre-test of the three groups were compared using Analysis of Variance at 0.05 level of significance. The result is as presented in Table 2.

**Table 2.** Analysis of Variance of pre-test attitudinal mean score of students in the experimental and control group before the treatment

| Source of Variation | Sum of Squares | df | Mean Square | F | P |
|---|---|---|---|---|---|
| Between Groups | 70.461 | 2 | 35.231 | .420 | .657 |
| Within Groups | 16002.685 | 191 | 83.784 | | |
| Total | 16073.146 | 193 | | | |

Table 2 shows the Analysis of Variance (ANOVA) of the pre-test attitudinal mean score of students in the experimental and control group. $F_{cal}(0.420)$ was found to be less than $F_{tab}(3.84)$ at 0.05 level of significance. Hence, the null hypothesis was not rejected. This implies that there was no significant difference in the attitude of students in the experimental and control groups before the treatment. The groups were homogeneous.

***Hypothesis 2:*** There is no significant difference in the attitudinal mean scores of students in the experimental and control groups before and after the treatment.

Attitudinal mean scores of students in the three groups were compared using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is presented in Table 3.

**Table 3**. Analysis of Covariance of the attitudinal mean scores of students by treatment

| Source | Sum of Squares | df | Mean Square | F | P |
|---|---|---|---|---|---|
| Corrected Model | 12575.599 | 3 | 4191.866 | 265.907 | .000 |
| Pre-test (Covariate) | 10925.458 | 1 | 10925.458 | 693.047 | .000 |
| Group | 1150.770 | 2 | 575.385 | 36.499 | .000 |
| Error | 2995.233 | 190 | 15.764 | | |
| Total | 965967.843 | 194 | | | |
| Corrected Total | 15570.832 | 193 | | | |

*p<0.05

Table 3. revealed that $F_{2,190} = 36.499$; $p < 0.05$. Hence the null hypothesis is rejected. This implies that there was a significant difference in the attitudinal mean scores of students in the experimental and control group. Multiple Classification Analysis was therefore used to determine the effect of the treatment on students' attitude towards Mathematics in the groups. The result is presented in Table 4.

**Table 4.** Multiple Classification Analysis (MCA) of Students' Attitudinal Mean Scores by treatment.

| Grand Mean = 69.99 | | | | | |
|---|---|---|---|---|---|
| Variable + Category | N | Unadjusted Deviation | $Eta^2$ | Adjusted Deviation | Beta |
| Control | 83 | -2.839 | .326 | -2.46 | .27 |
| Mother Tongue as | 61 | 4.007 | | 3.28 | |

| | | | | |
|---|---|---|---|---|
| supplementary medium | | | | |
| Mother Tongue Only | 50 | -0.177 | 0.79 | |
| R | | | | 0.899 |
| $R^2$ | | | | 0.808 |

Table 4 shows the Multiple Classification Analysis (MCA) of students' attitudinal mean Scores by treatment. The table reveals that students exposed to mother tongue as supplementary medium of instruction had the highest adjusted attitudinal mean score of 73.27 (69.99 +3.28). This is followed closely by those exposed to mother tongue only medium of instruction with an adjusted attitudinal mean score of 70.78 (69.99 + 0.79), while those in the control group had the least adjusted mean score of 67.53(69.99 + (-2.46)). It was shown that $Eta^2 = 0.326$. This means that the treatment accounted for only 32.6% of the observed variance in students' attitudinal mean scores.

***Hypothesis 3:*** There is no significant difference in the attitudinal mean scores of students exposed to mother tongue as supplementary medium of instruction and those exposed to mother tongue only medium of instruction after the treatment.

To test the hypothesis, the post-test attitudinal mean scores of students in the two groups were compared using a t-test at 0.05 level of significance. The result is presented in Table 5.

**Table 5**. T-test Analysis of The Post-test Attitudinal Mean Score by Treatment

| Category | N | Mean | df | t | p |
|---|---|---|---|---|---|
| Mother Tongue as Supplementary medium | 61 | 74.00 | 109 | 3.41* | .001 |
| Mother Tongue only | 50 | 69.82 | | | |

*p<0.05

Table 5 shows the t-test analysis of the post-test attitudinal mean score by treatment. It was found that t=3.41, p< 0.05. The null hypothesis was therefore rejected. This implies that there was a significant difference in the attitude of students exposed to mother tongue as supplementary medium of instruction and those exposed to mother tongue only medium of instruction after the treatment.

## Discussion

It was shown that students exposed to mother tongue as supplementary medium of instruction had the highest attitudinal mean difference after post-test. This implies that the students in this group had an improved attitude towards mathematics after treatment. This is in line with the earlier submissions of Toquero (2010) that the use of the learners' mother tongue is an effective approach in getting the interest of students aroused during a mathematics lesson.

The findings also revealed a slight improvement in the attitude of students in the experimental groups after treatment when compared with the attitude of students in the control group. The highest change was observed in the group exposed to mother tongue as supplementary medium of instruction. The positive change could have been as a result of the freedom given to the students to express their opinions freely in the language of their choice. This finding

corroborates the submission of Jovem (2014) and Nkonde et al. (2018) that the use of mother tongue enables the young learners to immediately construct, explain without fear of making mistakes, articulate their thoughts and add new concepts to that which they have acquired already. This is also in line with the submissions of Adenegan et al. (2014) that students feel fulfilled when taught a foreign subject in their mother tongue and would also be able to link concepts taught with their primitive language. This sense of fulfillment may be one of the reasons for the observed improvement in the attitudes of the learners.

The result of this study also revealed a significant difference in the attitudinal change observed among the learners in the experimental groups in favor of students exposed to mother tongue as a supplementary medium of instruction. This implies that students taught using both mother tongue and English language during classroom interactions had a better-improved attitude than their counterparts taught using mother tongue only. Since the use of mother tongue as a supplementary medium of instruction improves the attitude of students better than the use of mother tongue only, it implies that using the mother as a medium of instruction in the mathematics classroom should be combined with the use of English to optimize the effectiveness. This submission corroborates the submission of previous researchers such as Setati et al. (2008). However, this finding negates the submission of Abdu (2011) that students taught using Hausa language improved better than those taught using Mixed Language (Hausa and English); this submission was in favor of students exposed to mother tongue only medium of instruction. Probably, the difference in the result may be due to the difference in the locations of the studies and the language of instruction. The earlier study was carried out in the northern part of the country where Hausa language is the predominant language while this recent study was carried out in the southwestern part of the country with Yoruba Language as the predominant language of the environment.

***Conclusion***

Based on the findings of the study, it was concluded that the mother tongue as a supplementary medium of instruction is an effective medium of instruction for the teaching of Mathematics. Thus, it is a valuable tool towards improving the attitude of students in the subject as it improves the attitude of students towards Mathematics to a large extent when compared with other media of instructions.

***Recommendations***

Based on the findings of the study, the following recommendations were made by the researcher:

1. Students should be encouraged to ask questions in the mathematics classroom in their mother tongue to enhance their ability to comprehend and understand the lesson as well as to improve their attitude towards the subject, which invariably will enhance their performance in Mathematics.
2. Furthermore, Mathematics teachers should be conscious of the influence and effects of the use of mother tongue on the learning of Mathematics in classroom instruction.

***Conflict of interests***

The author(s) declare no conflict of interest.

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