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Comparing Results of a Study on Mathematics Instruction in English at Diploma College in Solapur District

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Abstract

Study programmes at the Diploma College in Solapur include mathematics courses, which are instructed in English. Comparing the educational outcomes in the Mathematics study course with the English language of instruction is the primary objective of the paper. We concentrated on the students' proficiency in solving specific linear algebra and mathematical analysis problems. The first-year students in the Diploma study programme in Diploma College, Solapur made up the research sample. In the academic years 2020–21 to 2022–23, partial tests, exam tests, and final grades in the mathematics exam provided empirical data. We discovered that students in the English-taught group outperform those in the Diploma College group on maths exams. The significance of variations in the points earned for each individual task in the examined study group has not been demonstrated by the results of hypothesis testing. While no single, universally applicable study compares the results of mathematics instruction in English at all *diploma colleges, several research findings reveal consistent trends on the impact of English-medium instruction (EMI) on math performance. The comparison depends heavily on the students' language proficiency, the instructional methods used, and specific institutional contexts.*

Keywords: English, mathematics, exam grad, maths test

INTRODUCTION

Every person's professional path is determined by their educational background and level of specialised competence. Students' employment and work in businesses, trade companies, services, etc. depend on their training in economics studies. Graduates will carry out tasks in a variety of capacities, including control, decision-making, leading, organising, and planning. These tasks are critical to the company's performance and competitiveness in the job market. Programmes in economic studies also cover mathematics, which offers precise methods and instruments for resolving theoretical and practical issues[1,2,2].

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The interaction of numerous elements (the subjects, the means, and the conditions of education) results in the educational process, and their analysis yields new insights. Technical Institutes are crucial institutions for the ongoing dissemination and pursuit of knowledge, .Knowledge resources are transformed and transferred by universities and faculties through operations, publications, research, teaching, and assessment[3,4].

The importance of mathematics in students' education cannot be overstated. Mathematics is an essential tool for problem-solving and is used in

almost every field of study. Unfortunately, many students struggle to learn and understand mathematics due to language barriers. This is especially true for students who are learning mathematics in English[5,6].

Many students who are learning mathematics in English have difficulty understanding the language used in the subject. Mathematics has its own language, with terms such as 'variable', 'function' and 'coefficient' that can be difficult for non-native English speakers to understand. This can lead to frustration and confusion, which can impede a student's ability to understand and apply the concepts in mathematics[7,8].

In order to help students learn mathematics in English, educators should focus on teaching students the English language first, and then the mathematics. This should include teaching the terminology and concepts of mathematics in English, as well as helping students learn the language of mathematics. Educators can also provide students with visual aids, such as diagrams and pictures, which can help them better understand the concepts being taught[9,10,11].

Furthermore, educators should strive to create an environment in which students feel comfortable and confident to ask questions. This can help them better understand the concepts, and also give them the opportunity to practice speaking and understanding English[12].

Finally, it is important to have patience. Learning mathematics in English can be challenging, and it may take some time for students to understand and apply the concepts. Educators should be patient and supportive, and provide students with the resources and guidance they need to succeed.

Overall, teaching mathematics in English can be difficult for both educators and students. However, with patience and the right resources, students can learn mathematics in English and develop a solid foundation for future success[13].

A student's proficiency in English is the most significant factor affecting comparative outcomes.

- *Vocabulary*: Difficulties with mathematical vocabulary are a widespread issue for non-native English speakers. Even basic terms can be misunderstood or misinterpreted, hindering the learning of concepts.
- *Word problems*: Text-based math problems require strong receptive and analytical language skills. Students with lower English proficiency consistently perform worse on word problems compared to calculations, which is compounded in a foreign language.
- *Syntactic knowledge*: Studies show that a student's grasp of grammatical structures is a strong predictor of mathematical performance. Language instruction that improves a student's ability to process complex sentence structures can lead to better mathematical outcomes.

Research indicates that for Marathi-medium students, being taught mathematics in English can create an unnecessary cognitive burden, potentially hindering learning, particularly for those with lower proficiency in English. However, studies suggest that performance can improve significantly over time as English proficiency develops[14].

Performance comparison: marathi versus english medium

- A comparative study of students in Kolhapur showed that the average marks of Marathi medium students were better than their English medium counterparts in mathematics.
- Another study, also in Kolhapur, examined students' interest in Physics, noting that Marathi medium students showed an interest level between that of Semi-English and English medium students.

Language barriers and cognitive load

- *Cognitive load theory*: Studies on bilingual students show that switching between languages imposes a high cognitive cost, reducing a student's capacity to absorb new learning. When

Marathi-medium students are instructed in English for a complex subject like mathematics, they face an extraneous cognitive load from processing a second language in addition to the intrinsic cognitive load of the math concepts.

- *Mathematical language comprehension*: Poor understanding of the English language used in mathematical instruction is a significant contributor to student struggles in math. This is especially true for word problems, where a lack of familiarity with terms like "yield" or "vendor" can prevent students from understanding the problem, even if they know the underlying mathematical procedures.
- *Term translation*: Difficulties often arise when teachers must translate technical mathematical terms, as there may not be a precise equivalent in Marathi. This can lead to confusion and is reflected in weak results on standardized English-language tests[15].

Benefits of teaching math in marathi

- *Improved comprehension*: For many students, grasping mathematical concepts can be more effective when the instruction is in their native language. Teachers in Mumbai noted in a 2022 article that teaching math in Marathi could help students "enjoy the subject" more.
- *Stronger foundation*: By using Marathi for math, the Maharashtra government aims to strengthen students' foundational understanding of mathematical concepts.
- *Enhanced learning outcomes*: Research from India shows that instruction in a student's mother tongue significantly improves academic performance in both reading and math, with the benefits being more pronounced in younger children.

Inclusive pedagogical strategies

To bridge the gap for Marathi-medium students learning math in English, researchers and educators propose several strategies:

- *Translanguaging*: This approach encourages the use of a student's entire linguistic repertoire—both Marathi and English—to make sense of mathematical concepts. It views the student's native language as a valuable resource rather than a barrier to be overcome.
- *Teacher training*: Teachers should be equipped with specific training on how to best teach math to students whose first language is not English. This includes guiding students in understanding mathematical vocabulary and ensuring language proficiency is not a hindrance to learning math.
- *Bilingual resources*: Providing flexible learning materials like bilingual worksheets or glossaries can help students connect concepts more intuitively across both languages.
- *Contextualization*: Teachers can relate abstract mathematical concepts to students' everyday life and cultural backgrounds, making the content more relatable and easier to understand.

RESOURCES AND TECHNIQUES

A comparative study found that students in a university's English-taught mathematics program achieved better final grades than those in the Slovak-taught program, though the difference was not statistically significant across all individual tasks. Research comparing international student performance shows Maharashtrian students consistently outperform English-medium students in math, while a scoping review found that effective instruction should combine conceptual understanding with problem-solving and active learning. Other studies compare teaching methods, like web-based vs. traditional instruction, and the impact of factors such as technology or teacher expertise.

- A specific study compared students in an English-taught math program with those in a Marathi-taught program at the same college.
- The Marathi-taught group achieved better final exam grades, but there was no significant difference in performance on individual problem-solving tasks.

The comparison of mathematics final exams, student knowledge, and problem-solving skills in this required study area were the main topics of this essay. Students from Diploma College, Solapur's Faculty of Diploma Engineering made up the research sample. Our sources for this paper came from reading scholarly publications and books about educational research. The subsequent research material came from the process of instruction.

The Diploma programme in the Diploma College includes Mathematics as a subject. It is taught for two hours per week, two of which are in lecture and two of which are in practical. The course is offered during the winter semester. Students turned in assignments, completed tutorials, took one partial test, and one final exam during the semester. Because there were few students in each study group during the 2020–2021 and 2022–2023 academic years, we collectively examined 20 partial and exam tests[14].

We employed descriptive statistics for data evaluation, and we conducted one-sample tests to determine the significance of the variations in points earned from successfully completed math problems. The alternative hypothesis contends that the distributions of the analysed characters A and B differ from the null hypothesis, which holds that the distributions of characters A and B are the same. It is assumed that the distribution functions of the quantitative characters A and B are continuous. After that, we calculate the differences and exclude the zero differences before arranging them in a non-decreasing order. The total of the positive difference orders and the total of the negative difference order sums are found.

RESULTS AND DISCUSSION

Exam grades in the study subject of Mathematics can be an important and influential factor in a student's academic success. Mathematics is an important subject for many students and can be an indicator of their aptitude for future academic and professional success. Mathematics is a subject that can be difficult for some students to understand and can take a long time to master. It is essential for students to have a solid grasp of the concepts and principles in mathematics in order to achieve good grades on their exams.

There are many factors that can influence a student's performance in mathematics, including the amount of time dedicated to studying for the exam, the quality of the teaching, and the student's ability to comprehend and apply the material. It is important for students to have a strong foundation in mathematics in order to be successful on the exam. Additionally, students should be familiar with the types of questions that will be asked and the time allowed for each question. In order to achieve good grades in mathematics, it is important to have a thorough understanding of the subject matter. Students should be able to identify and explain the concepts and principles of mathematics in order to answer questions correctly. Additionally, it is important for students to know how to apply the concepts and principles of mathematics to real-world problems. It is also important for students to practice solving problems in order to prepare for the exam. This will help students become comfortable with the types of questions that will be asked on the exam. Additionally, it is important for students to take practice exams in order to be familiar with the format of the exam and ensure that they understand the material.

Finally, it is important for students to manage their time wisely and stay organized during the exam. Time is a precious commodity during the exam and students should make sure that they are using their time wisely and efficiently. Additionally, it is important for students to remain calm and focused during the exam.

The average mathematics grades for study groups taught in English (EG) and Marathi (Mt) (Math's Grade) over a Three-year period are shown in Table 1. We also included the total number of students in each group in the last column. According to the data, students in the group receiving instruction in English make up about 10% of the total. When comparing the study averages for all years combined, the values indicate that the EG group's study average outperformed the Mt group's study average each year.

Table 1. The average grades and student population.

Academic year	English maths avg. grade (10)	Marathi maths. avg. grade (10)	Total number of students examined per group	
2020-21	5.6	6.7	2	3
2021-22	5.9	6.9	2	3
2022-23	6.2	7.8	2	3

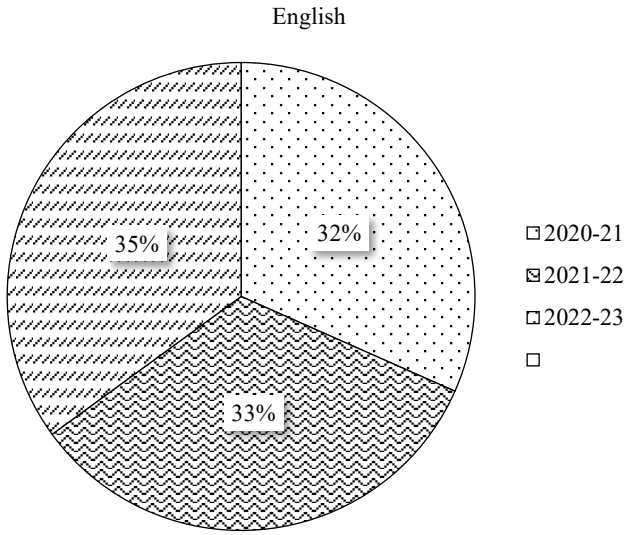

Figure 1. Math's teaching in english.

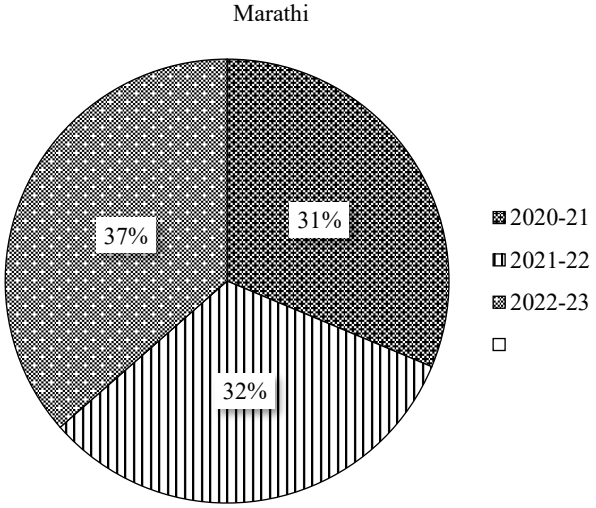

Figure 2. Math's teaching in marathi.

A graphical representation of the computed average grades for the English groups is provided in Figure 1 and 2. It is evident that the average exam score increased over the course of the individual years before declining once more in the final year. The study average in mathematics (6.7) was only lower than the overall average for all years during the 2020–21 academic year.

These students typically have outstanding study habits and a strong desire to do well on exams in order to receive a special certificate. These particular students enhance the group's final English-language study results.

CONCLUSION

Exam grades in mathematics are an important factor in a student's academic success. It is essential for students to have a strong grasp of the concepts and principles of mathematics in order to achieve good grades on their exams. Additionally, it is important for students to practice solving problems, be familiar with the exam format, and manage their time wisely. With these strategies, students can be successful on their mathematics exams. Providing students with knowledge and skills necessary for

both real life and their future careers is the primary goal of postsecondary education. The digitization of work activities and the quick changes in work processes must be mirrored in the new skills required of university graduates and in contemporary teaching approaches, which include offering English-language study programmes. In this paper, we examined the study results for the English-taught mathematics course at Diploma College at Solapur.

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