

COMPARING 21ST CENTURY ACADEMIC PERFORMANCE IN ENGLISH AND MATH: A STUDY AT THE HIGHER SECONDARY LEVEL¹

COMPARANDO O DESEMPENHO ACADÊMICO DO SÉCULO 21 EM INGLÊS E MATEMÁTICA: UM ESTUDO NO NÍVEL SECUNDÁRIO SUPERIOR

EUSOB ALI AHMED

Department of Mathematics, Sapatgram
College, Assam, India
euson1974@gmail.com

ATIKUR RAHMAN

Department of English, Bilasipara
College, Assam, India
atikurrahman.bc@gmail.com

MOHAMMED REZAUL KARIM

Department of English, College of
Science and Humanities, Prince Sattam
Bin Abdulaziz University, Al Kharj,
Saudi Arabia
karimrezaul318@gmail.com

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Corresponding author:

karimrezaul318@gmail.com



Abstract: This investigative study has been undertaken to observe a comparison of the scholastic performance between English and Mathematics of 21st century relating to 12th grade students belonging to Bodoland Territorial Region (BTR) of Assam, India. For in-depth study, a descriptive survey method was employed to find out the nature of the investigation. Two thousand two hundred fifty mathematics and English student completers of twelfth grader in BTR are randomly selected in this investigation. Statistical techniques like descriptive statistics, t-tests, correlation are applied to determine the nature of the problem of scholastic performance between English and Mathematics. After analysis, it is found that there is a negative trend towards learning mathematics compare to English. Revelation from the study it is given to understand that a remarkable difference has been found in respect of the scholastic performance between English and Mathematics of the said region. Further, the study adequately reveals that a significant difference has been found among the boys, girls, tribal, non-tribal as well as rural and urban students regarding their scholastic performance in between the two subjects as mentioned.

Keywords: Academic Performance, English and Mathematics, T-test, Correlation and Assam.

Resumo: Este estudo investigativo foi realizado para observar uma comparação do desempenho escolar entre inglês e matemática do século 21 em relação aos alunos do 12^o ano pertencentes à Região Territorial de Bodoland (BTR) de Assam, na Índia. Para um estudo aprofundado, um método de levantamento descritivo foi empregado para descobrir a natureza da investigação. Dois mil duzentos e cinquenta alunos de matemática e inglês que concluíram a décima segunda série no BTR são selecionados aleatoriamente nesta investigação. Técnicas estatísticas como estatísticas descritivas, testes t, correlação são aplicadas para determinar a natureza do problema de desempenho escolar entre inglês e matemática. Após análise, verifica-se que existe uma tendência negativa em relação à aprendizagem da matemática em relação ao inglês. Revelação do estudo é

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dada a entender que uma diferença notável foi encontrada a respeito do desempenho escolar entre Inglês e Matemática da referida região. Além disso, o estudo revela adequadamente que uma diferença significativa foi encontrada entre meninos, meninas, estudantes tribais, não tribais, bem como rurais e urbanos em relação ao seu desempenho escolar entre as duas disciplinas mencionadas.

Palavras-chave: Desempenho Acadêmico, Inglês e Matemática, Teste T, Correlação e Assam.

1. Introduction

Scholastic performance in education suggests one's information, thoughtful and abilities in a definite subject or collection of subjects. It may also be seen as the improvement made by pupils after a period of training conveyed by teachers. Factors such as aptitude, behaviour, inspiration, inheritance, home atmosphere, learning experiences, location of schools and class have a direct bearing on child's psychology and its scholastic improvement.

Mathematics is regarded as a very important subject and it plays a crucial role in day to day operation and transaction in the lives of mankind. However, the manner mathematics is sought to be taught often creates confusion and doubts to some individuals about its pivotal role and in some cases a complete negative attitude is sought to be created in the minds of the students learners and as a consequence the whole concept of its paramount importance of the subject comes to a futile exercise in some cases. According to UNESCO (2012), people believe that mathematics is omnipotent in today's society, as evidenced by its use in everyday business and communication activities. There have been competing perspectives on how to teach and learn English and mathematics.

A study designed by Kaptan and Timurlenk (2012) that there are two competing issues surrounding the teaching and learning of science and mathematics. While mathematics as a science seeks to demonstrate its laboratory power through a combination of thrill and excitement that comes with learning new mathematical concepts. The teaching methods used to achieve this goal frequently appear to rely on dogmatic and authoritarian approaches. A change from traditional didactic teacher-centered techniques to an approach that is active and learner-centered is required to engage students to learn mathematics better. Rudhumbu (2014) and Posamentier (2017) contend that one of the most essential components of a successful implementation of the mathematics curriculum is inspiring pupils to desire to learn mathematics.

2. Literature Review

According to Stoffelsma and Spooren (2019), various subjects, including mathematics, are traditionally associated with logical-deductive skills. Furthermore, Mol and Bus (2011) pointed out that regular readers tend to be more successful academically. Moreover, Mol and Bus (2011) observed that habitual readers are more academically successful. Similarly, Pretorius (2000) demonstrated that the better pupils are at constructing judgments when reading (for example, associating several topics in a book), the greater their academic attainment. Likewise, Lyengar (in Stoffelsma & Spooren, 2019) claims that if a student improves the practise of regular evaluation, there should be optimistic association amongst enhanced literary ability and higher academic attainment.

Linguistic attainment, according to Henry et al. (2014), is the conclusion of rational procedures that all work together to enter evidence into a student's consciousness through spoken exchanges. According to him learners' mind during spoken encounters largely influenced by one's mental process that greatly work together to govern information in the minds of the learners. Intellectual advancements largely due to linguistic competency. Sooner the competency is achieved better it is for intellectual advancements. The work of Krashen and Brown (2005) revealed that the faster a person achieves linguistic competency, the sooner they may advance intellectually. Theory of mind can be used to conceptualise language competency in a variety of ways, including the theoretical distinction between daily language usage and academic, school language. Prediger et al. (2018) discovers a clear link between a learner's familial history and their language competency in relation to their spoken language.

Kilfoil et al. (2008) visualises that English termed as a second or supplementary language directly help the learners in matters of their conversational fluency or interpersonal skills. It is a foundation on which learners get enough scope to build their cognitive academic language fluency or proficiency whereby the learners get additional scope to understand the subject in the class room. Lastly, Kilfoil et al. (2008) conclude that creating CALP in the LoLT requires at least five to seven years, and learners frequently require a considerable lot of help to become equal and skilled in contrast to their classmates whose native language is English. However, Radford and Barwell (2016) emphasise the importance of language which poses window or impediment. There is no denying the fact that language, discourse, writing is crucial to the construction of learning, teaching and

evaluation so far as Mathematics is concerned. Students' academic approach appears to be inappropriate when expression of language stands as a barrier in successful communication between learners and instructors.

According to Setati (2001), in his study, a substantial number of students studying mathematics primarily focus on how to achieve mechanism over the language of mathematics in order to communicate, read, and write like a mathematician. Words, symbols, expressions, and ways of speaking, writing, and reading are all part of mathematical ethics. According Language plays a vital role in thinking and learning and it is instrumental in moulding the concept or way of thinking between learners and instructors (Setati, 2005). What Setati says (2001) even if mathematics is deemed to be not language like Xhosa and French language in the principal dictator as to how best mathematics can be taught and learnt?

The work of Mullis et al. (2007) established that second linguistic pupils lag behind their first linguistic counterparts in terms of literary reading ability. They go on to describe reading as an interactive task in which information is processed by establishing interactions between multiple constituents at a lower and higher level. Low-level English linguistic skills, such as reading comprehension and vocabulary, can be difficult to learn in a second linguistic, because they are explicitly linguistic-specific and must be learned distinctly for each language. Lems et al. (2017) argue that this is particularly true for people who are learning English from a foreign language.

It is discussed by Pretorius (2015) that language is not always utilised as a tool of gauging overall academic accomplishment; nonetheless, literary skills, along with mathematical ability, are employed as indicators to gauge the performance of a country's education system on a global scale. Furthermore, in the 21st century, where technical innovation has progressed rapidly, literature continues to contribute to high intellectual capital. According to Pretorius (2015)'s barometer, South Africa's education system is failing, especially given that many national and international reading literary evaluations show that South African children are slipping behind (Fleisch, 2008; Howie et al., 2012, 2017a, 2017b; NEEDU, 2012).

The work of Lawson (2017) agrees with work of Pretorius (2015) that all contemporary exams use language to gauge student achievement. According to Lawson (2017), learners require the appropriate reading skill to properly read examinations and, as a result, react successfully to questions. As a result, learners' test scores vary due to their

varying degrees of literary abilities. Lawson (2017) in his study also revealed that consistent mathematical scores in examination are considerably lower among non-English speaking pupils than among English-speaking pupils.

Bohlmann and Pretorius (2008) make a pervasive claim on learners' interpretive, strategic and reasoning skill when those activities are about to complete in a language that is not their prevailing language. In a multi lingual class room, students are predictable in their ability to communicate "ordinary English and mathematical English, formal and informal mathematics language, procedural and conceptual discourses, learners' main language and the LOLT" (Setati, 2001).

In an investigative study it reveals according to Tachie and Otto (2021) a clear correlation appears to have found between English, reading, abilities and Mathematics. Students' academic achievement and advancement. According to the studies, it is found that essential literary abilities outmanoeuvred academically in Mathematics to a larger degree corresponding to the breadth of their reading abilities. Therefore, it is suggestive to give some importance on imparting literary abilities in schools and if at all it comes to happen it will result improved academic achievement and advancement in Mathematics.

According to Karim et al. (2020) who conducted study on proficiency of English amongst students belonging to tribal and non-tribal communities of 12th grade level in BTR of Assam and found statistically significant differences in most of the variable under consideration. Similar types of outcomes were also seen regarding sex, demography and types of school of the same grade (Ahmed et al. 2022a).

Ahmed et al. (2022b) studied on achievement of group of subjects of 10th grade pupils by using Mahalanobis distance of the said region, and they established insignificant dissimilarity for the variable under consideration. Parallel types of outcomes were also found of the 12th grade level (Ahmed et al. 2021).

The main thrust of the assessment centred on students' literary instincts and abilities as to how best they perform in their scholastic spectrum. The study reveals from the aforementioned considerations is that BTR students comparatively lack literary abilities which are pre-requisite for the improvement of their academic performance in Mathematics. Here, the study's goal is to ascertain the comparison between students' academic achievement in Mathematics and English.

Need of the study

Adler (2001), Setati & Barwell (2006), and Webb & Webb (2008), among other research on mathematics education, all presented a number of possible explanations for the low mathematical attainment seen among English second language pupils. There have been a number of researches conducted earlier as to why students normally fare poor in mathematics in comparison with English Paper. The study clearly envisages the poor performance directly attributable to students' inability to read, write and understand English language comprehensively which resulted dismal performance in Mathematics. The directives given in the Mathematics Question Paper hardly reaches out to the average students' folk of the region particularly in the BTR. The remedy lies in the fact that attention ought to have been given with greater degree of emphasis on English language and its grammar beginning in the earlier stages of adolescence. But exactly that was not happening which resulted dismal performance among the students so far as Mathematics is concerned with particular reference to the BTR.

According to Stoffelsma and Spooren (2019) in-depth study of the English language and its mastery and proficiency are pre-requisite for learners to understand Mathematics dictations. Learners' English ability is unquestionable predictor of success in Mathematics in an examination conducted by a study by Howie (2009) with special reference to the students of South Africa in the third International Mathematics and Science Study (TIMSS) of 1995. However, surprisingly, a different study's findings recommend that the poor mathematical performance done by students cannot be directly accredited to their limited knowledge of English because other factors such as general, cultural, social, and political aspects also have a direct impact on education, regardless of whether the subject is Mathematics or English.

According to Bohlmann and Pretorius (2008), two factors such as language of learning and teaching as well as teachers' credentials have a substantial impact on how well learners succeed in their respective disciplines, particularly mathematics. But ultimately the synopsis is that learners' well developed reading and language skills have pervading impacts in students' observing, inferring, creating, refuting and predicting skills.

The current study was aimed to be an analytical analysis and comparison of scholastic performance in English and Mathematics. The study now focuses specifically on students residing in BTR. The study aims to provide a picture of higher secondary students' academic performance in the HSSLC examination by taking into consideration their grades in English and Mathematics. There has been qualitative comparison of performance by the

entire students without any gender discrimination irrespective of Tribal and non-Tribal folk and irrespective of whether rural or urban region. The present study seeks to investigate definite degree of difference in respect of scholastic performance between English and Mathematics of the students of twelfth grade with special reference to the region of BTR, Assam.

Hypothesis

According to the objectives we may consider the following null hypotheses:

i. There is no substantial mean disparity regarding scholastic performance between English and Mathematics among 12th grade students.

ii. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade boys' students.

iii. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade girls' students.

iv. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade tribal students.

v. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade non-tribal students.

vi. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade rural students.

vii. There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade urban students.

3. Methodology

Method

Descriptive survey technique is followed for data collection. This study has been delimited of only one State Board i.e. AHSEC, Assam. For evaluation of scholastic performance of the students in English and Mathematics at upper secondary level in comparative perspective, the result of the students of English and Mathematics in upper secondary schools and colleges of BTR were obtained.

Population

In this investigation, population consists of all those students who studying in class XII of higher secondary schools and colleges that are run by of Public and Private Management of BTR of Assam.

Sample

A sample of 2250 students who have passed higher secondary examination in the year 2019 and 2020 are selected at random and 34 (14 rural and 20 urban) schools and colleges are selected using stratified random sampling technique. For this study the investigator selected the schools and colleges and collected the marks obtained in English and Mathematics by the students in the State Board Examination which was conducted by Assam Higher Secondary Education Council (AHSEC) during the academic year 2018-19 and 2019-20.

4. Results and Discussion

Descriptive statistics such as mean, standard deviation and inferential statistics like t-test as well as correlation are used to analyse the data in this investigation. The results are reflected in the following tables on the basis of hypotheses.

Objective: 1. To find out the difference regarding scholastic performance between English and Mathematics in higher secondary examination.

Hypothesis: 1. No substantial mean disparity regarding scholastic performance between English and Mathematics among 12th grade students.

Table 1: Performance in the achievement between English and Mathematics among 12th grader

Subjects	N	Mean	SD	SE	t-value
English	2250	55.63	15.39	.353	57.64
Mathematics	2250	35.30	12.79		

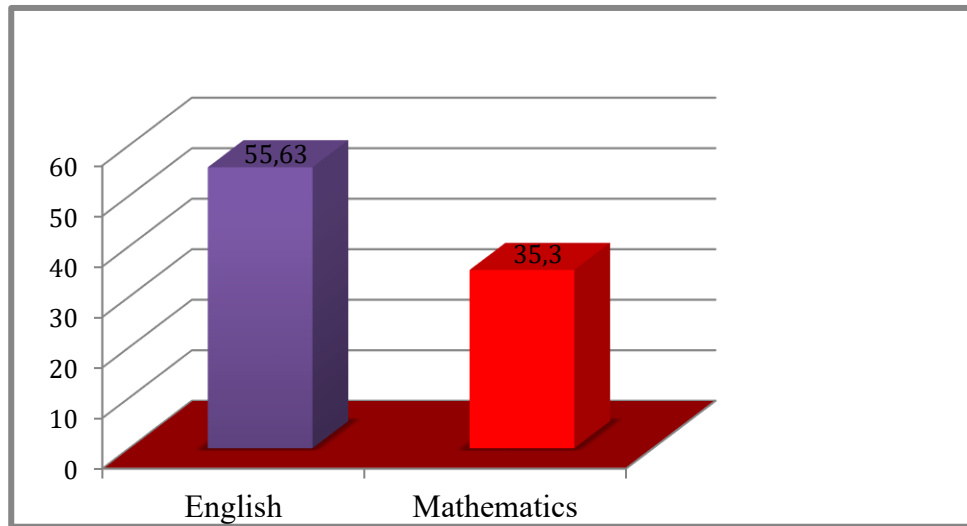


Figure 1: Representing differences in achievement in English and Mathematics among 12th grader

Table 2: Coefficient of correlation for score made by the students of 12th grader

Coefficient of correlation	English	Mathematics
English	1	0.307**
Mathematics	0.307**	1
N	2250	2250

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: Table 1 and figure 1 shows that there is a massive change in the achievement level in English and Mathematics among 12th grader. It is actually decreased remarkably and difference is quiet significant at 0.01 level according to t-test conducted between marks obtained in higher secondary examination in English and Mathematics. Hence, the hypothesis which states that “There is no substantial mean disparity regarding scholastic performance between English and Mathematics among 12th grade students” is completely rejected. Table 3 represent the degree of relationship between the scholastic performances of English and Mathematics. There is a mediocre relationship (vide Table 2) between the scholastic performances of English and Mathematics (value is 0.307) among

the students of 12th grader. As it is positive, we can say values increases or decreases together i.e. direct relationship.

Objective: 2. To find out the difference regarding scholastic performance between English and Mathematics of boy students in higher secondary examination.

Hypothesis: 2. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade boys' students.

Table 3. Performance in the achievement between English and Mathematics among male students of BTR

Subjects	N	Mean	SD	SE	t-value
English	1409	53.83	14.94	.437	40.80
Mathematics	1409	36.01	13.24		

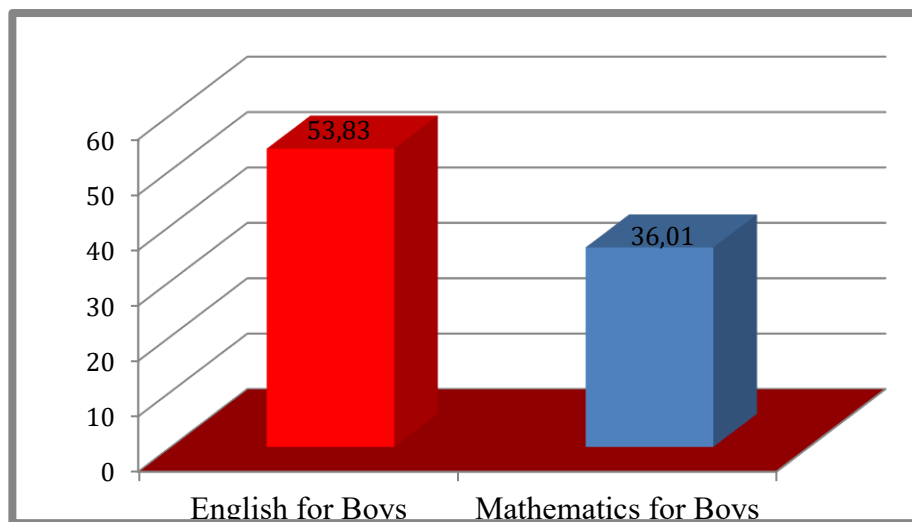


Figure 2: Representing differences in achievement in English and Mathematics according to male students

Table 4: Coefficient of correlation for score made by the male students

Coefficient of correlation	English	Mathematics
English	1	0.328**
Mathematics	0.328**	1
N	1409	1409

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: Table 3 and figure 2 indicate that the mean scores of achievement in English and Mathematics of male pupils are 53.83 and 36.01 respectively. Since the value of ‘t’ in the above table (Table 2) is 40.80, the distance is strongly significant at 0.01 level.

Hence, the hypothesis which predicts that “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade boys’ students” is completely rejected. The result of the analyses as indicated in Table 4 revealed that scholastic performance is significantly correlated pairwise in relation to English and Mathematics (value is 0.328) among male students of 12th grader.

Objective: 3. To find out the difference regarding scholastic performance between English and Mathematics of girl students in higher secondary examination.

Hypothesis: 3. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade girls’ students.

Table 5. Performance in the achievement between English and Mathematics among female students of BTR

Subjects	N	Mean	SD	SE	t-value
English	841	58.54	15.68	.567	43.18
Mathematics	841	34.14	11.88		

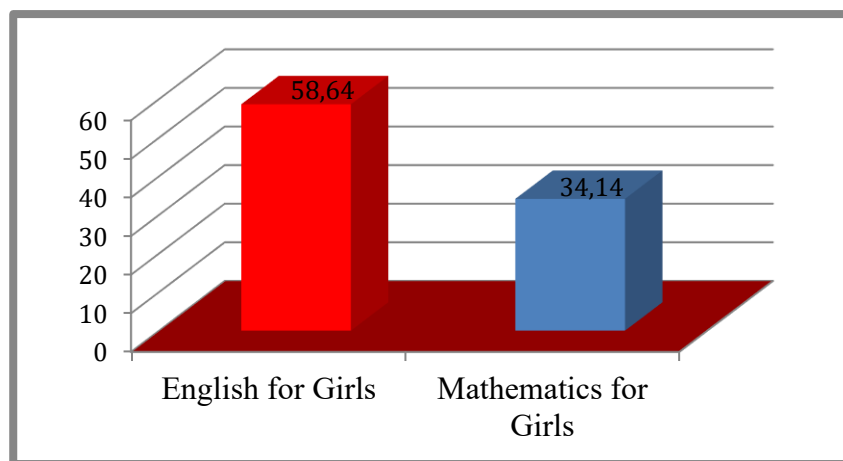


Figure 3: Representing differences in achievement in English and Mathematics according to female students

Table 6: Coefficient of correlation for score made by the female students

Coefficient of correlation	English	Mathematics
English	1	0.312**
Mathematics	0.312**	1
N	841	841

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: From table 5 and figure 3, it is evident that achievement level in Mathematics decreases gradually and the mean achievement scores of English and Mathematics of female pupils are found to be 58.64 and 34.14 respectively. There is a drastic fall in the achievement in Mathematics in comparison to English, which is quiet significant according to t-value at 0.01 levels. So, the hypothesis which predicts that “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade girls’ students” is completely rejected. In this case also, the result of the analyses in terms of female students as shown in Table 6 indicated that the scholastic performance is significantly correlated pairwise in relation to English and Mathematics (value is 0.312).

Objective: 4. To find out the difference regarding scholastic performance between English and Mathematics of tribal students in higher secondary examination.

Hypothesis: 4. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade tribal students.

Table 7. Performance in the achievement between English and Mathematics among tribal students of BTR

Subjects	N	Mean	SD	SE	t-value
English	1500	54.74	14.74	.409	48.72
Mathematics	1500	34.81	12.35		

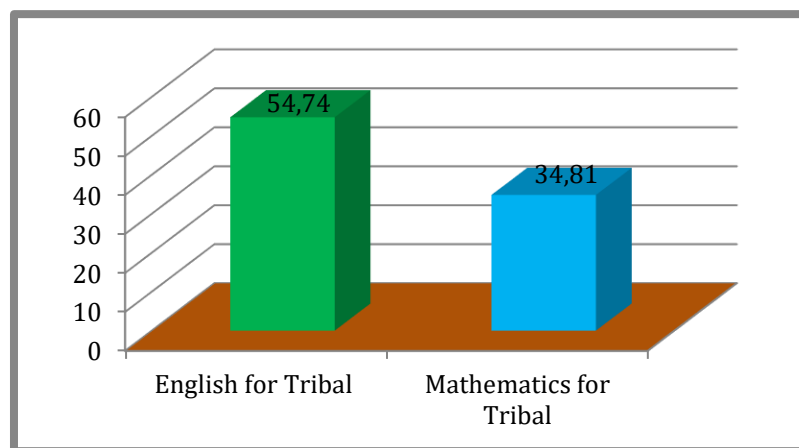


Figure 4: Representing differences in achievement in English and Mathematics according to tribal students

Table 8: Coefficient of correlation for score made by the tribal students

Coefficient of correlation	English	Mathematics
English	1	0.326**
Mathematics	0.326**	1
N	1500	1500

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: Another interesting result is found when the performance in the achievement between English and Mathematics in the 12th grade for tribal pupils is considered (vide table 7 and figure 4). This is also found significant at the 0.01 level according to the reported t-value 48.72. Hence, the hypothesis that predicts that “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade tribal students” is completely rejected. Interesting to note that the scholastic performance among tribal students is significantly correlated pairwise (vide Table 8) in relation to English and Mathematics (value is 0.326).

Objective: 5. To find out the difference regarding scholastic performance between English and Mathematics of non-tribal students in higher secondary examination.

Hypothesis: 5. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade non-tribal students.

Table 9. Performance in the achievement between English and Mathematics among non-tribal students of BTR

Subjects	N	Mean	SD	SE	t-value
English	750	57.39	16.48	.670	31.50
Mathematics	750	36.28	13.60		

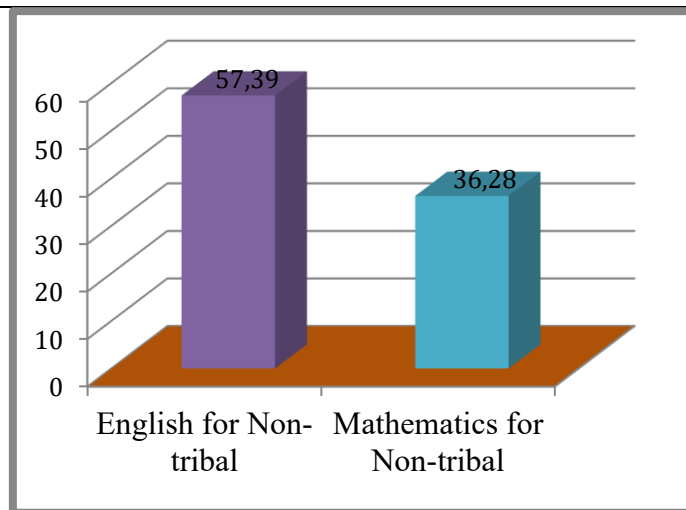


Figure 5: Representing differences in achievement in English and Mathematics according to non-tribal students

Table 10: Coefficient of correlation for score made by the non-tribal students

Coefficient of correlation	English	Mathematics
English	1	0.268**
Mathematics	0.268**	1
N	750	750

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: From table 9 and figure 5, it is established that the achievement level of Mathematics is gradually decrease. To compare the mean scores of scholastic performance of non-tribal students in both the subjects, it was observed that the value of ‘t’ is 31.50 (vide table 5), which is strongly significant at 0.01 levels. Hence, the hypothesis that stated as “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade non-tribal students” is completely rejected. Interestingly, it is found that (vide Table 10) there is a positive relationship in achievement between English and Mathematics among non-tribal student.

Objective: 6. To find out the difference regarding scholastic performance between English and Mathematics of rural students in higher secondary examination.

Hypothesis: 6. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade rural students.

Table 11. Performance in the achievement between English and Mathematics among rural students of BTR

Subjects	N	Mean	SD	SE	t-value
English	973	51.76	14.18	.466	31.84
Mathematics	973	36.92	12.16		

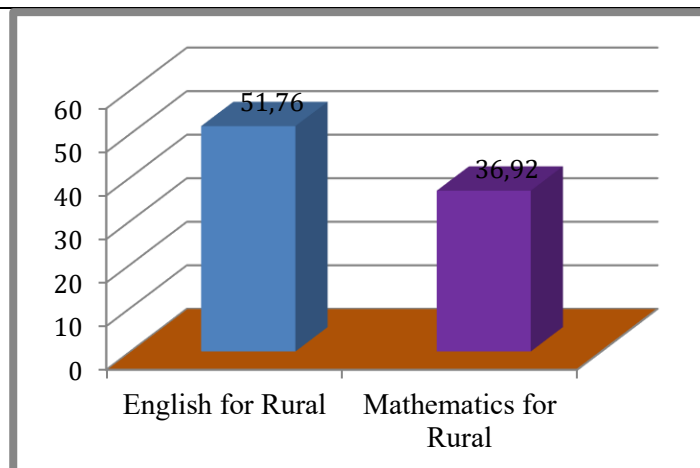


Figure 6: Representing differences in achievement in English and Mathematics according to rural students

Table 12: Coefficient of correlation for score made by rural students

Coefficient of correlation	English	Mathematics
English	1	0.398**
Mathematics	0.398**	1
N	973	973

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: It is found from table 11 and figure 6 that the mean scores of both the subjects English and Mathematics of rural students are 51.76 and 36.92 respectively. The value of t-test conducted pairwise on the scores obtained by the students in English and Mathematics is 31.84, which is quiet significant at 0.01 levels. Hence, the hypothesis that stated as “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade rural students” is completely rejected. In this also, it is found that the scholastic performance among rural students is significantly correlated pairwise (vide Table 12) in relation to English and Mathematics (value is 0.326).

Objective: 7. To find out the difference regarding scholastic performance between English and Mathematics of urban students in higher secondary examination.

Hypothesis: 7. No substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade urban students.

Table 13. Performance in the achievement between English and Mathematics among urban students of BTR

Subjects value	N	Mean	SD	SE	t-
English	1277	58.57	15.63	.478	51.26
Mathematics	1277	34.06	13.15		

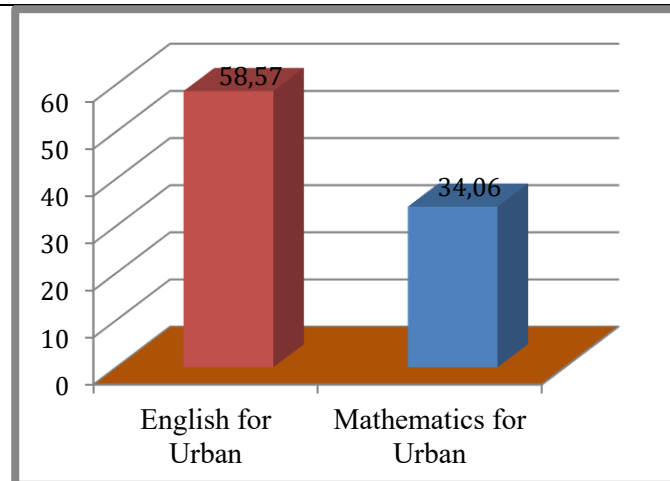


Figure 7: Representing differences in achievement in English and Mathematics according to urban students

Table 14: Coefficient of correlation for score made by urban students

Coefficient of correlation	English	Mathematics
English	1	0.305**
Mathematics	0.305**	1
N	1277	1277

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Interpretation: Another interesting result is found when the performance in the achievement between English and Mathematics among urban pupils in the 12th grade is considered (vide table 13 & figure 7). In this case also a sustainable difference between the means (vide table 7) is observed at 0.01 levels. Hence, the hypothesis that stated as “There is no substantial mean disparity regarding scholastic performance between English and Mathematics of 12th grade urban students” is completely rejected. Finally, when we consider the urban students regarding scholastic performance in relation to English and Mathematics we observed that the coefficient of correlation (value is 0.305) is significant (vide Table 14).

The major findings of this investigation are listed below:

i. From the above tables it is found that there is considerable difference of the students of higher secondary level in BTR regarding scholastic performance between English and Mathematics and students were performed better in English in comparison to Mathematics.

ii. The above tables indicate that the boy as well as girl students of BTR are found better performance in English than that of Mathematics. Similar levels of performance are also found for the tribal, non-tribal, rural as well as urban students of higher secondary level of the said region.

iii. Mediocre relationship is found regarding scholastic performance between English and Mathematics in all the variables that we have considered (vide table 2, 4, 6, 8, 10, 12, 14). As it is positive, we can say values increase or decrease together i.e. direct relationship.

5. Conclusion

The whole gamut of the study amply gives an impression that students as a whole belonging to urban and rural areas apart from BTR areas fare comparatively not better in Mathematics than in English. The reason lies in the fact that the students in BTR in

particular are taught English in a way not justified to meet their fundamental demands to reasonably master the language to cope with the demands the students ought to be. Therefore, in majority of cases, because of the deficiency of knowledge in general English fail to understand the dictates of the question paper in Mathematics leading to dismal performance in Mathematics. The only way out to bail out the students from the vicious circle of the problem partly lies with the teachers. It is the teachers to take prompt corrective measures by taking a little bit extra initiatives to create such an atmosphere that the students are given teachings in English in a more enthusiastic way to arose interest among the students folk residing in the BTR. This perennial problem could only be encountered with the humane genesis between the teachers and students whereby the role of the teachers appeared to be pivotal.

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