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Effects of schooling examined through medium of instruction on cognitive, behavioural, and academic achievement of students

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Abstract

This research compares the cognitive, behavioural, and academic achievements of students in Odia and English medium schools to determine the impact of schooling as examined by the medium of instruction. Thirty Grade-VII students from both institutions make up the sample. They are evaluated using the MFFT, RPM, Depression Questionnaire, and TCBC, which are provided to the instructor to determine whether any behavioural issues exist among the students. The data gathered from the tests were used to determine the mean and standard deviation, and One-way ANOVA was then used to assess for significance. The ANOVA table's findings indicate that the results are not significant. Thus, there is no significant difference between the cognitive, behavioural, and academic achievement of Odia and English medium students, demonstrating that the medium of instruction is not a strong predictor of children's competencies.

Keywords: Cognitive ability, behaviour, depression, schooling, medium of instruction, academic achievement

1. Introduction

One of the people's fundamental tasks in human communities is education. The passing of culture to the next generation is essential to society's survival. The socialization process completion is education's primary goal. The child is raised by the family, but contemporary families often neglect socialization to a great extent. The school and other institutions have taken the position of the family to finish the socialization process. The school's primary focus is on the personal competition while instilling ideals through civic and patriotic guidance. The child's grades or scores for each topic are used to compare him or her to his or her friends. The content of the schools, their extracurricular programs, and their unofficial interactions between students and instructors all convey social skills and morals.

The child can acquire new abilities and develop social skills by attending school or other educational organizations. Schools educate students to think critically about the world rather than just imparting more information. It contributes significantly to the development of children's social and cognitive skills.

Different schools have different social climates, educational philosophies, extracurricular activities, and in many other ways for example, some schools are integrated, while others are segregated, some are co-educational, while others are only for one gender, and some teach in a foreign language while others do so in the student's mother tongue or regional or local language. The emotional and social adjustment, demeanor, and personal style of children, as well as their physical, academic, and cognitive ability, are significantly impacted by these differences within and between institutions. Children's competencies are frequently arranged and molded by how schools are built up and with educational ideologies. Children's scholastic success and cognitive growth are significantly influenced by psychological factors and the educational environment. Children's success in various areas may be improved or hindered by the environment at school.

The organization and content of education are determined by the structure of a particular community. The structural elements of a community include the hierarchical framework of an institution. As a result, a society's institutional framework eventually determines what must be taught to its members and how.

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One question is whether the educational model we have received for a long time is beneficial to us in a country like India where issues like overcrowding, poverty, malnutrition, and poor health are some of the circumstances that cripple children's ability to grow normally.

The medium of teaching plays a critical role in changing education and making it easier or more difficult for students. Language is an essential component of society. It is an essential tool for facilitating the transformation of ancient and new societal ideals. An individual's identity grows in the setting of his cultural patterns, including languages; of course, learning is a significant component of the socialization process (Cuber, 1951) [5]. Academic success refers to learning in a specific context or to be decided by achievement test results, teacher-awarded marks, and percentages in academic performance (Kennedy, 1975) [7]. In general, many variables influence a student's academic achievement. Language is another factor that influences pupil success. According to Arshad (1997) [9], language has a significant impact on schooling in many nations.

Students' scholastic achievement in schools is influenced by the medium of teaching. Increased pressure to enroll young children in English medium schools is being brought on by the middle class's rapid growth, urbanization, shifting employment trends, outsourcing of IT jobs to India, privatization of higher education institutions, widespread use of the internet in daily life, the popularity of India as a travel destination, expansion of the hospitality industry, and popularity of English-language TV and movies. Due to the increased possibilities brought on by liberalization and globalization beginning in the early 1990s, what had previously been considered a language of the "elites" attracted a lot of attention. To pursue global chances, one must not only be fluent in the language studied as a topic but also possess the required aptitudes and technical knowledge in the relevant fields. A student who has received their education in a local language and has had little to no exposure to English medium instruction will find it extremely difficult to obtain work abroad and continue their education. In India, though higher education was available in English medium in the past, people were not content with it, as the opportunities are better seized by those who are competitive and well-prepared in advance. Because of their field of freedom, exploratory tendencies, assertive and positive risk-taking behaviours, high hopes and ambitions, and high parental demands, English medium students exhibit superior coping mechanisms. A dearth of optimum environmental stimulus may result in poorer perceptual, and cognitive competence, learning disabilities, and linguistic disorders. Changes in environmental stimuli, socioeconomic position, society, and technology frequently contribute to adaptive changes in family life. It might lower kids' aspirations, which would result in them feeling powerless and using poor coping mechanisms. The variables can be used to assess the impact of the medium of instruction used in schools. The students in English medium schools appear to have had more exposure to external stimuli, which allowed them to demonstrate their abilities both generally and specifically.

In this research, we compare students in English and Odia language schools in terms of their cognitive ability, behavioural issues, and academic achievement. Among the various evaluation methods, the Matching Familiar Figure Tests (MFFT 12), Ravens Progressive Matrices (RPM),

Depression questionnaire, and Teacher-Child Behaviour Checklist (TCBC) were used. The first two, that is MFFT 12 and RPM will be used for measuring the student's cognitive abilities. The MFFT-12 for subjects was developed by Kagan, Rosman, Day, Albert, and Philips (1964) [6]. This test, which consists of a complicated matching to a simple task, has been routinely used with school-age children as the fundamental indicator of the disposition for information processing. RPM will be used to evaluate students' cognitive capacity. To determine whether the students have any type of behaviour issues, the other two techniques—the Depression questionnaire and TCBC—will be used.

2. Problem

This study aims to find out how the effects of schooling examined through the medium of instruction on the cognitive, behavioural, and academic achievement of children. To determine whether any students have behavioural issues, instructors will be provided evaluation tools such as the Matching Familiar Figure Test-12, Raven's Progressive Matrices, Depression Questionnaire, and Teacher Child Behaviour Checklist.

3. Method of Study

3.1 Sample

The sample consisted of 60 Grade-VII students from the Cuttack district of Odisha having an age range of 12 to 14 years of age. Out of 60 students, 30 students were from Odia medium schools and the rest 30 were from English medium schools.

Using the Matching Familiar Figure Test and Raven's Progressive Matrices, two groups were compared in this research. These two groups were used to compare the differences in cognitive thinking between English medium students and Odia medium students with average academic achievement. Achenbach and Edelbrock's Teacher-Child Behaviour Checklist and a Depression Questionnaire were also provided to students and their class teachers to determine whether the students had any behavioural issues.

3.2 Measures

The sample was administered two tests such as MFFT and RPM to test the cognitive processing (30 Odia medium) and (30 English medium). To identify any behavioural issues, Depression questionnaire, and the Achenbach and Edelbrock's Teacher Child Behaviour Checklist were provided to the students and their individual class teachers. To evaluate the disparity between the average English and Odia medium students' academic achievement, achievement scores were also considered.

3.2.1 Matching Familiar Figure Test (MFFT)

Kagan, Rosman, Day, Albert, and Philips (1964) [6] developed the MFFT-12 test for subjects. It has two practice items and twelve test questions. Each item includes eight comparative images that are strikingly identical to one another as well as a standard image of a common object, such as a dog. Only one of the comparative images, though, matches the original image exactly. The other seven items, however, deviate from the norm in a subtle, difficult-to-identify way. Selecting a standard is the subject's job. The researcher logs the overall number of errors and the latency to the best answer for each item. For the item to be properly answered, the individual may make up to seven mistakes. The MFFT-20, created by Cairns and Cammock (1978) [4],

is a more accurate variation of this test and comprises 20 test items. The student must select an identical image from among six options. The test is used to gauge a person's mental tempo or the rate at which they make choices about challenging activities.

3.2.2 Raven's Progressive Matrices (RPM)

Standard progressive matrices is another name for the RPM for adults. But we commonly refer to it as RPM, short for Raven's Progressive Matrices. It was made by Raven (1936)^[8]. It comprises five groups of items: A, B, C, D, and E. Each group contains 12 conditions. There are therefore 60 conditions altogether. These sets are ordered from simplest to most difficult, with set A being the easiest and set E being the most difficult. The conditions in each set are denoted by (A1, A2---A12). Every set includes a pattern or some sort of figurine in a large box. There are some conditions listed below. One of the patterns on a figure in the big box has a lost piece, and under the circumstances, only one fits the missing piece. The subject must determine which is suitable. There are 6 options in sets A and B. Sets C, D, and E, however, each has eight options. These groups and options are a little trickier than sets A and B. The experimenter records the overall amount of time needed to complete the test, and from the scoring chart, determines and records the total number of right responses.

3.2.3 Teacher-Child Behaviour Checklist (TCBC)

TCBC was created by Achenbach and Edelbrock (1978)^[11] to investigate the behavioural, academic, developmental, and emotional issues that teachers of both normal and disturbed students between the ages of 12 and 14 reported. Teachers were given TCBC in their corresponding classes. A total of 113 questions were posed to the instructors, and the students were evaluated based on their answers. 14 different behavioural groups were used to classify all the statements (i.e academic disability, aggressive, anxious, delinquent, depressed, hyperactive, immature, obsessive-compulsive, schizoid, sexual problems, sleep problems, social withdrawal, somatic complaints, uncommunicative respectively).

3.2.4 Depression Questionnaire

This self-administered depression test is commonly used and has undergone extensive research. Beck (1978)^[3] first used this measure and therefore it was called Beck's Depression Inventory (BDI). The 1978 edition was a revised form of the initial BDI (Beck *et al.*, 1961)^[2]. Despite having 21 items, it had fewer answers and options per item and a clearer statement without double negatives. There are 4 options available for each item in the questionnaire. The subject was told to examine each response category for each statement and then choose the one that best conveyed how she had been feeling over the previous week. The participant must circle the number next to the sentence she chose. The researcher noted the total score that came up.

3.3 Procedure

Four tests were used in this research to evaluate the cognitive ability, behavioural issues, and academic achievement of both English and Odia medium students. Each test was given to each student individually. Depending on the medium, the necessary instructions were provided to them. In the MFFT test, subjects were administered one by one. The participants were instructed to pick one of eight

images that were the same as the reference image. The overall number of errors made by each subject and the time it took to give the first answer for each of the 12 test questions were recorded. A subject could only make up to seven mistakes before getting the question right. For the RPM, the test booklet, which contained 60 images split into 5 sets, was given to everyone. Each collection includes 12 images. The complexity of these sets was organized in ascending order. Each image has a piece that is lacking, and below that are some conditions, where one condition corresponds to that piece. Each subject's overall time and the number of accurate responses were noted and computed.

The teachers were given the TCBC test in their respective classes. The teachers were given a total of 113 questions to answer by circling one of the numbers (0, 1, 2, 3). The subjects were assessed based on the teachers' responses. Each subject was also provided with the Depression questionnaire with 21 items, each having 4 response contingencies. The subject was told to read each response category for each statement, choose the one that best fits how he had been feeling over the previous week, and then circle the corresponding number next to that response. The scores received for each of the 60 subjects were recorded in this manner. Moreover, the last academic achievement of each student both from Odia and English medium was also collected for comparison.

After collecting the scores of all four tests, their mean and standard deviation was calculated and finally, a one-way analysis of variance was applied to all the tests as well as to the academic achievement except for TCBC due to lack of statistical analysis.

4. Results

Table 1: Descriptive data representing Means and Standard Deviations of MFFT (Total error, average latency), Depression, and RPM for English medium and Odia medium students

| Variables | English medium | | Odia medium | |
|------------------|----------------|-------|-------------|------|
| | Mean | SD | Mean | SD |
| MFFT Total Error | 17.00 | 7.24 | 17.40 | 7.22 |
| Average Latency | 6.82 | 6.15 | 14.26 | 6.07 |
| Depression | 14.06 | 10.92 | 16.93 | 9.81 |
| RPM | 50.2 | 3.61 | 42.37 | 4.51 |

The result table shows that the mean of errors of both the medium is 17.00 and 17.40 respectively. This indicates no significant difference in their intellectual ability. Both groups commit the same number of errors. But in the case of average latency, it shows that the means of both the groups are 6.82 and 14.26 respectively. It means the English medium students recognize the picture within less time. The SD of both the groups are 7.24 and 7.22 which indicates no significant difference between the two in case of total errors and in the case of latency the standard deviations are 6.15 and 6.07 indicating no significant difference.

But, in RPM, the means of the two groups are 50.2 and 42.37 respectively which shows that the English medium students have better intellectual ability than the Odia medium students. Their SDs are 3.61 and 4.51 respectively. The means obtained from the depression questionnaire are 14.06 for the English medium and 16.93 for the Odia medium. This indicates that the Odia medium students are more depressed than the English medium students. Their obtained SDs are 10.92 and 9.81 respectively.

Table 2: Mean and SD of TCBC

| Variables | English Medium | | Odia Medium | |
|----------------------|----------------|------|-------------|------|
| | Mean | SD | Mean | SD |
| Academic disability | 0.13 | 0.73 | 0.30 | 1.83 |
| Aggressive | 0.73 | 4.02 | 1.33 | 7.30 |
| Anxious | 1.07 | 5.84 | 1.33 | 7.30 |
| Delinquent | 0.3 | 1.64 | 1.1 | 6.03 |
| Depressed | 0.77 | 4.20 | 1.1 | 6.03 |
| Hyperactive | 0.9 | 5.30 | 1.4 | 7.7 |
| Immature | 0.8 | 4.56 | 1.4 | 7.7 |
| Obsessive-Compulsive | 1.27 | 6.94 | 1.57 | 8.6 |
| Schizoid | 0.67 | 3.65 | 1.57 | 8.6 |
| Sexual problem | 0.13 | 0.73 | 1.43 | 7.85 |
| Sleep problems | 0.13 | 0.73 | 1.43 | 7.85 |
| Social withdrawal | 0.93 | 5.11 | 1.3 | 7.12 |
| Somatic complaints | 0.8 | 4.56 | 1.1 | 6.03 |
| Uncommunicative | 0.4 | 2.12 | 1.1 | 6.03 |

Table 3: Mean and SD of Academic Achievement of both English and Odia medium students

| Variables | English Medium | | Odia Medium | |
|----------------|----------------|-------|-------------|-------|
| | Mean | SD | Mean | SD |
| English/Odia | 64.96 | 6.77 | 55.06 | 4.81 |
| Mathematics | 69.90 | 8.48 | 77.73 | 5.72 |
| Science | 70.83 | 4.49 | 72.93 | 5.31 |
| Social Science | 69.73 | 3.92 | 68.20 | 6.32 |
| Odia/English | 69.56 | 6.67 | 64.10 | 4.18 |
| Total | 334.37 | 35.07 | 330.23 | 12.81 |

From the marks obtained by the students in their last academic year of both English as well as Odia medium, Mean and SD were calculated which shows that in subjects like English/Odia (1st language) social science and Odia/English (2nd language), the English medium students perform better that is 64.96, 69.73, 69.56 than those of Odia medium students whose means in respective subjects were 55.06, 68.20, and 64.10. But in subjects like Mathematics

and Science, Odia medium students performed better (i.e., 77.73 and 72.93) than the English medium students whose means are 69.90 and 70.83 respectively. However, the total marks obtained by the English medium students are more than the Odia medium students which indicate that English medium students have better academic achievement than the Odia medium students.

Table 4: One-way ANOVA for English and Odia Medium Students on MFFT, Depression, and RPM

| Variables | Sources | SS | Df | MS | F | P |
|------------------------|---------|----------|----|---------|-------|-------------------|
| MFFT (Total Error) | Between | 845.200 | 17 | 49.178 | 0.893 | 0.595 $p>0.01$ |
| | Within | 668.167 | 12 | 55.681 | | |
| | Total | 1513.37 | 29 | 104.86 | | |
| MFFT (Average latency) | Between | 985.251 | 27 | 36.491 | 0.884 | 0.663 $p>0.01$ |
| | Within | 82.595 | 2 | 41.298 | | |
| | Total | 1067.84 | 29 | 77.78 | | |
| Depression | Between | 1653.917 | 15 | 110.261 | 1.354 | 0.288 $p>0.01$ |
| | Within | 1139.950 | 14 | 81.425 | | |
| | Total | 2793.87 | 29 | 191.69 | | |
| RPM | Between | 187.667 | 12 | 15.639 | 0.659 | 0.766 $p>0.01$ |
| | Within | 403.300 | 17 | 23.724 | | |
| | Total | 590.97 | 29 | 39.36 | | |

The ANOVA table shows that in the case of MFFT error for English and Odia medium students, results revealed that there is no significant difference between these two groups ($F=0.893$, $p>0.01$) and in case of MFFT Average Latency for both the medium results revealed that there is no

significant difference between the two groups ($F=0.884$, $p>0.01$).

Results revealed from the RPM scores between the two groups is insignificant ($F=0.659$, $p>0.01$) and the results revealed for depression score for both groups are also insignificant ($F=1.354$, $p>0.01$).

Table 5: One-way ANOVA for English and Odia medium students' previous year academic achievement

| Variables | Sources | SS | Df | MS | F | P |
|----------------|---------|---------|----|-------------------|-------|-------|
| English | Between | 246.86 | 18 | 13.71 11.72 | 1.169 | 0.406 |
| | Within | 129.0 | 11 | | | |
| | Total | 375.86 | 29 | | | |
| Mathematics | Between | 1134.41 | 16 | 70.90 57.80 | 1.227 | 0.359 |
| | Within | 751.45 | 13 | | | |
| | Total | 1885.86 | 29 | | | |
| Science | Between | 375.169 | 15 | 250.011 15.071 | 1.66 | 0.175 |
| | Within | 211.00 | 14 | | | |
| | Total | 586.16 | 29 | | | |
| Social Science | Between | 300.61 | 18 | 16.70 13.20 | 1.265 | 0.353 |
| | Within | 145.25 | 11 | | | |
| | Total | 445.86 | 29 | | | |
| Odia/English | Between | 279.36 | 13 | 21.49 24.53 | 0.876 | 0.59 |
| | Within | 392.50 | 16 | | | |
| | Total | 671.86 | 29 | | | |

The ANOVA table shows that there is no significant difference between the English and Odia medium students as regards their previous year's academic achievement.

5. Discussion and Conclusion

In the current study, we are examining how the effect of schooling, as examined by the medium of instruction affects students' cognitive, behavioural, and academic achievement in both Odia medium and English medium institutions.

As it is frequently said, schools do more than just impart information; they also play a special and significant role in influencing children's social and cognitive development. Every school has its social environment and pedagogical philosophy, with some being integrated and others being segregated. Additionally, while some schools teach in a foreign language, others do so in a regional or local language. Children's scholastic proficiency, mental stability, and social development are significantly impacted by these school-based variations.

Many schools in Odisha offer teaching in either the native language (Odia) or in English/Hindi, depending on the framework or curriculum. Therefore, to determine the impact of education and its delivery on the effectiveness of both Odia and English language institutions, regardless of gender, 60 students were selected, 30 from English and 30 from Odia medium institutions respectively. The respondents were all in Grade VII and varied in age from 12 to 14 years. To analyze these two groups and determine the differences in cognitive processing, the MFFT and RPM tests were used. Both groups have average academic achievement, and to determine whether the students have any behavioural issues or not, Achenbach and Edelbrock's TCBC was given to the instructors of each group as well as depression questionnaires.

All the students received instructions as per the medium of the school before the test administration. All four tests were taken in four separate testing sessions, and their most recent academic achievement standing was used to compare them. After compiling the results of all four tests, the means and standard deviation of the group were determined.

In comparison to English medium students, Odia medium students made more mistakes and took longer to complete tasks, according to Table-1 of the results for the MFFT, RPM, and depression. In addition, English medium students

outperformed Odia medium students in the RPM, and it is obvious from the depression mean that the Odia medium students suffered from greater depression than the English medium students. The behavioural issues of students were displayed in TCBC Result Table-2. The table shows that the Odia medium students were more academically challenged, aggressive, anxious, delinquent, depressed, hyperactive, immature, more obsessed and prone to compulsive behaviours, schizoid, some of them had sexual problems, sleep issues, were unsociable, had somatic complaints, and were generally less communicative than the English medium students.

Table-3 of the results displays the means and standard deviations of the student's academic achievement in both groups. The table shows that English medium students fared better in subjects like English/Odia (1st language), social science, and Odia/English (2nd language) while Odia medium students did better in subjects like mathematics and science. When all marks were considered, it was discovered that students in the English medium schools had higher academic achievements than those in the Odia medium schools. One-way analysis of variance was found for all the tests except for TCBC, due to lack of statistical analysis, to find the significant difference between the two groups of subjects and unfortunately, there was an insignificant difference between the two groups of all the tests.

The difference between English and Odia medium students in terms of general, cognitive, and social ability has previously been emphasized. Additionally, it was hypothesized that English medium students would have better coping mechanisms and social-motivational competence due to their independence, exploratory tendencies, assertive and positive risk-taking behaviours, high expectations and aspirations, and high parental expectations, whereas Odia medium students would not have these skills due to a lack of adequate environmental stimulation. But due to insignificant findings and the fact that only a limited number of participants were used in the research, this theory was rejected. As a result, whether the students attended an English or Odia medium school, it was determined that education and the medium of instruction had no significant impact on their performance. Accordingly, the medium of instruction does not appear to

be a strong determinant in the development of competencies in students.

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7. Conflict of Interest

The author declared no conflict of interest.

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