MATHEMATICAL ACHIEVEMENT OF TRIBAL CHILDREN ON EKLAVYA MODEL RESIDENTIAL SCHOOLS AND JAWAHAR NAVODAYA VIDYALAYAS: A COMPARATIVE STUDY

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Abstract: The investigator tried to explore educational achievement of ST students in mathematics in class VIII in EMRS and JNV. Class VIII ST students in JNV performed better than their grade-mates in EMRS in mathematics. It may, however, be mentioned that the performance of students from two types of schools was not in the satisfactory range as students in EMRS schools scored only 41.40 % in mathematics, while those in JNV scored in the range of 48%. Even if the performance of JNV students was better than those in EMRS, their performance was not also satisfactory, as they scored 48.32 % in mathematics. there is no significant difference in mathematical achievements of ST students in EMRS and JNV. Strengths of mathematical achievement of ST students in EMRS as reported by students and teachers are: Supply of free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, interactive mathematics classroom and special attention to weak students. strengths of mathematical achievement of ST students in JNV as reported by students and teachers are: supply of sufficient and free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, high salary of mathematics teachers, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, house master's role in supervised teaching in hostels, interactive mathematics classroom , special attention to weak students and online coaching in mathematics wherever required. Concerns mathematical achievement of ST students in EMRS are: poor salary and service conditions of mathematics teacher, poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, poor community involvement in mathematical activities, no mathematics laboratory, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment in EMRS. The concerns in JNV are: poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment in JNV. Suggestions for EMRS to improve mathematical achievement of ST students in EMRS are: regular employment, proper salary and service conditions of mathematics teacher, solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff, student involvement in school practices and strengthening school-community link in EMRS. Suggestions for JNV to improve mathematical achievement of ST students in EMRS are solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff Student involvement in school practices, strengthening school-community in JNV.

Index Terms – Eklavya Model Residential Schools, Jawahar Navodaya Vidyalaya, Mathematical Achievement, Tribal Children
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I. INTRODUCTION

A new concept for educational development "Establishment of Model Residential Schools was launched during 1997-98 to provide quality education to the tribal students. A total 197 EMRSs have been sanctioned by the MHRD, Govt. of India in various parts of the country with an intake capacity of 480 students per school, of which 129 are fully functional and the remaining 68 are under construction. These schools are set up under the Article 275(1) of the Constitution of India on the pattern of Rajkiya Pratibha Vikas Vidyalaya (RPVV) in Delhi, Jawahar Navodaya Vidyalaya (JNV), and the Kendriya Vidyalaya (KV). 13 EMRS have been established across Odisha(India) covering total of 11 Districts. Among them three EMRSs are in Sundargarh District and one each in Mayurbhanj, Keonjhar, Nawarangpur, Koraput, Rayagada, Gajapati, Kandhamal, Jajpur, Malkangiri and Nuapada Districts. The objectives of setting of EMRS are to provide quality education up to Higher Secondary stage to Scheduled Tribe (ST) students in remote areas. These schools   provide access to the better opportunities in education at par with the non-ST population. And this is achieved by comprehensive physical, mental and social development of students enrolled in each EMRS. Consequently, they have been empowered to be changing agent, in their school, in their homes, in their villages and finally in a larger context in shaping the nation. These schools focus differentially on the educational support to be made available to that in

Standards VI to XII, so that their distinctive needs can be met, support the annual running expenses in a manner that offers reasonable remuneration to the staff and upkeep the standard, support the construction of infrastructure that provides education and improves physical, environmental and cultural needs of student life. The Ministry of Tribal Affairs have suggested for management of these schools through a registered society. In Odisha Model Tribal Education Society(OMTES) is in charge of management of these schools. The Board of Directors of the said Society has representatives of the ST& SC Development Department, representatives of other concerned Government Departments, Eminent Educationists, Selected Representatives and Community Leaders from among the Tribal Communities in the State. These schools have sufficient number of Post Graduate, Graduate and other trained teachers to maintain the optimum teacher pupil ratio of 1:30. The time table of these schools is devised in a manner to provide sufficient time for activities, such as teaching, vocational training, sports, cultural activities and other extra- curricular activities so as to ensure all round development of the children. The number of seats for boys and girls is equal. Education is entirely free. Every class is having 60 students and the total sanctioned strength of the school to be 420 students with only one stream at +2 levels. However, it should be 480 if Arts/ Humanities is also added at +2level.Admission to these schools is to be through selection process with suitable provision or preference to children belonging to particularly vulnerable Tribal groups, first generation students, etc. These schools are primarily located in scheduled or tribal areas, keeping in view the availability of drinking water, power, health facilities, communication and other minimum information facilities. However, in exceptional cases such schools may also be located outside the tribal areas with the prior approval of the Ministry of Tribal Affairs. These schools to also have the facility for vocational training and for practical training in agriculture, Animal husbandry and related areas. Scholarships is to be given to all the Schedule Tribe Students pursuing their studies in EMRS. The schools is fully residential with residential quarters even for the teaching staff and also for some of the non-teaching staff, as considered necessary. OMTES is responsible for efficient management of finances, location of schools, selection of students and to formulate policies and programmes for management improvement, diversification and any other related matter with regard to the functioning of these schools. Navodaya Vidyalaya System is a unique experiment unparalleled in the annals of school education in India and elsewhere. Its significance lies in the selection of talented rural children as the target group and the attempt to provide them with quality education comparable to the best in a residential school system. Such children are found in all sections of society, and in all areas including the most backward. But, so far, good quality education has been available only to well-to-do sections of society, and the poor have been left out. It was felt that children with special talent or aptitude should be provided opportunities to proceed at a faster pace, by making good quality education available to them, irrespective of their capacity to pay for it. These talented children otherwise would have been deprived of quality modern education traditionally available only in the urban areas. Such education would enable students from rural areas to compete with their urban counterparts on an equal footing. The National Policy on Education-1986 envisaged the setting up of residential schools, to be called Jawahar Navodaya Vidyalayas (JNV) that would bring out the best of rural talent. (Navodaya Vidyalaya Samiti,18.01.2018 & Dash, 2018). Primitive, geographically isolated, shy and socially, educationally & economically backwardness, these are the traits that distinguish Scheduled Tribes (ST) of our country from other communities. Tribal communities live in about 15% of the country's areas in various ecological and geo-climatic conditions ranging from plains to forests, hills and inaccessible areas. Tribal groups are at different stages of social, economic and educational development (Tribal Cultural Heritage in India Foundation 2018 & Dash 2018). Students' mathematical achievements in secondary school have an influential effect on their performance in college and their future careers. Having a solid background in mathematics helps students develop sophisticated perspectives and offers more career options. The importance of mathematical learning has repeatedly been emphasized by educators and politicians (Wilkins & Ma, 2002 and Lingling & Bradley, ,2018). A lot of research study has been conducted in the field of tribal education like Pratap & Raju (1973), Masavi (1976), Desai and Patel (1981), Tripathi (1981), Jha (1985), Ekka (1990), Biswal (1991), NCERT (1995), Garnaik & Barik (2012), Joy and Srihari (2014) conducted studies in the field of tribal education. But very few studies conducted on educational status of children studying in EMRS and JNV in mathematics. Thus, the investigator decided to conduct this study to examine and analyze the educational status of tribal children studying in EMRS and JNV in mathematics and to find out strengths, concerns and challenges of mathematical achievement and draw implications for policy making on education of tribal children.

II. OBJECTIVES OF THE STUDY

1. To study the educational achievement of ST students in mathematics in class VIII.
2. To find out the difference in mathematical achievement of ST students in EMRS and JNV.
3. To identify strengths, concerns and challenges of mathematical achievements of ST students.

III. RESEARCH QUESTIONS

1. What is the educational achievement of ST students in mathematics in class VIII?
2. Is there any difference in mathematical achievement of ST students in EMRS and JNV?
3. What are the strengths, concerns and challenges of mathematical achievements of ST students in EMRS and JNV?

IV. HYPOTHESIS

1. There is no significant difference in mathematical achievements of ST students in EMRS and JNV

V. RESEARCH METHODOLOGY

EMRS Rampilo, EMRS Ranki and JNV, Khatiguda have been used as sample for the present study. Snowball sampling technique was used by selecting 89 students from three schools (53 from two EMRSs and 36 students from class VIII of Jawahar Navodaya Vidyalayas). Four mathematics teachers and 15 other teachers from three schools also constitute the sample of the study. Descriptive survey method was used by the investigator.

5.1 Selection of the Case

For the purpose of the present study, EMRS Rampilo, Jajpur district EMRS Ranki, Keonjhar district and JNV, Khatiguda, Nabarangpur district constitute the case; and that is the unit of the study. Three schools were selected employing purposive sampling.

5.2 Tools and Techniques Used for Collection of Data

Mathematics achievement test for students was constructed by the investigator with consultation from mathematics experts from schools. A semi-structured interview schedule for students and teachers was developed to find out the strengths, concerns and challenges of mathematical achievements. The tools were validated by two subject and language experts in the field.

5.3 Variables of the Study

The study sought mainly to study mathematical achievement of ST students in EMRS and JNV.

5.4 Techniques of Data Analysis

Quantitative analysis techniques were employed to calculate the result of the study.

5.5 Profile of the Study Area

The study was conducted in EMRS Rampilo, Jajpur district EMRS Ranki, Keonjhar district and JNV, Khatiguda, Nabarangpur district of Odisha.

VI. RESULTS AND DISCUSSION

The results presented about educational achievement of ST students in mathematics in class VIII as follows:

6.1 Analysis of Objective 1: - Mathematical Achievement of ST students in class VIII

The below table presents mean achievement level of class VIII ST students in mathematics.

Table 1: Mean Achievement Level of Class VIII ST Students in Mathematics		
School Type	N	Mean (SD)
EMRS	53	10.35 (3.25)
JNV	36	12.08 (4.48)

The above table indicates that class VIII ST students in JNV performed better than their grade-mates in EMRS in mathematics. The following figure no 1 also depicts that class VIII ST students in JNV performed better than their grade-mates in EMRS in mathematics.
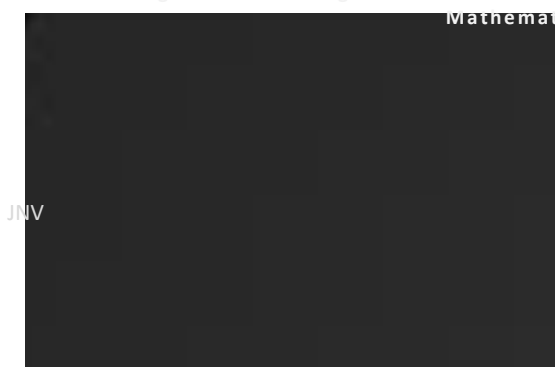

Figure 1: Mean Achievement Level of Cl...
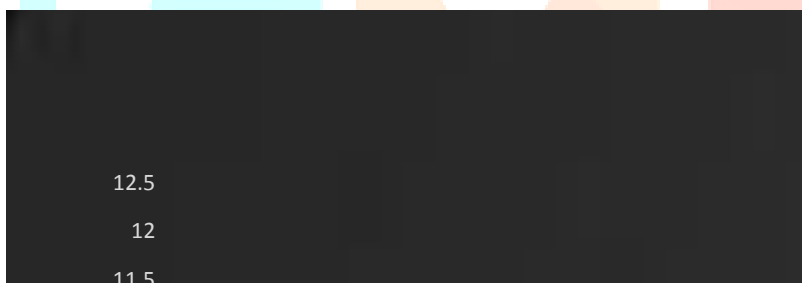
Table 2: Percentage Achievement Level of Class VIII ST Students in Mathematics		
School Type	N	%
EMRS	53	41.40
JNV	36	48.32

It may, however, be mentioned that the performance of students from two types of schools was not in the satisfactory range as students in EMRS schools scored only 41.40 % in mathematics, while those in JNV scored in the range of 48%. Even if the performance of JNV students was better than those in EMRS, their performance was not also satisfactory, as they scored 48.32 % in mathematics. Figure no 2 clearly presents that JNV students score higher than EMRS students.

Figure: 2 Percentage Achievement Lev... Mathemat...

6.2 Analysis of Objective No 2: - Comparisons across EMRS and JNV in respect of achievement level of class VIII ST students in mathematics.

Table 3: t values showing comparisons across EMRS and JNV in respect of achievement level of class VIII ST students in mathematics			
School Type	Mean	df	t
EMRS vs. JNV	10.35 12.64	65	1.86 (Not Significant)

The above table presents that there is no significant difference in mathematical achievements of ST students in EMRS and JNV. Thus, null hypothesis is accepted.

6.3 Analysis of Objective No 3: - Strengths, concerns and challenges of mathematical achievements of ST students

Table 4: Strengths of Mathematical Achievement of ST Students in EMRS
➢   Supply of free textbooks and uniforms and learning materials (100% students' view and 100% teachers' view)
➢   Engagement of qualified teaching staff for mathematics subject (100% students' view and 100% teachers' view)
➢   Special attention and coaching to students in mathematics (41% students' view and 89% teachers' view)
➢   Remedial teaching in mathematics (67% students' view and 76% teachers' view)
➢   Supervised teaching (64%)
➢   Interactive mathematics classroom (54% students' view and 61% teachers' view)
➢   Special attention to weak students (43% students' view and 85% teachers' view)

The above table presents strengths of mathematical achievement of ST students in EMRS as reported by students and teachers are: Supply of free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, interactive mathematics classroom and special attention to weak students.

Table 5: Strengths of Mathematical Achievement of ST Students in JNV
➢   Supply of sufficient and free textbooks and uniforms and learning materials (100% students' view and 100% teachers' view)
➢   Engagement of qualified teaching staff for mathematics subject (100% students' view and 100% teachers' view)
➢   High salary of mathematics teachers (100% students' view and 100% teachers' view)
➢   Special attention and coaching to students in (71% students' view and 94% teachers' view)
➢   Remedial teaching in mathematics (56% students' view and 92% teachers' view)
➢   Supervised teaching in hostels (85% students' view and 91% teachers' view)
➢   House master's role in supervised teaching in hostels (74% students' view and 85% teachers' view)
➢   Interactive mathematics classroom (65% students' view and 71% teachers' view)
➢   Special attention to weak students (75% students' view and 98% teachers' view)
➢   Online coaching in mathematics wherever required (35% students' view and 37% teachers' view)

The above table presents strengths of mathematical achievement of ST students in JNV as reported by students and teachers are: supply of sufficient and free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, high salary of mathematics teachers, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, house master's role in supervised teaching in hostels, interactive mathematics classroom , special attention to weak students and online coaching in mathematics wherever required.

Table 6: Concerns of Mathematical Achievement of ST Students in EMRS
▪   Poor salary and service conditions of mathematics teacher (67% students' view and 92% teachers' view)
▪   Poor hostel atmosphere for teaching-learning process in mathematics (71% students' view and 45% teachers' view)
▪   Personal problems of students in mathematics not addressed (63% students' view and 34% teachers' view)
▪   Poor community involvement in mathematical activities (23% students' view and 54% teachers' view)
▪   No mathematics laboratory (81% students' view and 67% teachers' view)
▪   Teacher-directed rather than student-initiated activities (83% students' view and 24% teachers' view)

- Poor attention to build capacities of teachers (64% students' view and 84% teachers' view)
- Adoption of Continuous Comprehensive Evaluation(CCE) in student assessment (45% students' view and 53% teachers' view)

The above table presents concerns mathematical achievement of ST students in EMRS. The concerns are: poor salary and service conditions of mathematics teacher, poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, poor community involvement in mathematical activities, no mathematics laboratory, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment. The below table presents concerns mathematical achievement of ST students in JNV. The concerns are: poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment.

Table 7: Concerns of Mathematical Achievement of ST Students in JNV
▪ Poor hostel atmosphere for teaching-learning process in mathematics (71% students' view and 46% teachers' view)
▪ Personal problems of students in mathematics not addressed (61% students' view and 32% teachers' view)
▪ Teacher-directed rather than student-initiated activities (84% students' view and 23% teachers' view)
▪ Poor attention to build capacities of teachers (62% students' view and 85% teachers' view)
▪ Adoption of CCE in student assessment (53% students' view and 86% teachers' view)

Table 8: Suggestions (need to be implemented) in EMRS
♣ Regular employment, proper salary and service conditions of mathematics teacher (91% students' view and 100% teachers' view)
♣ Solving mathematical achievement crises (87% students' view and 78% teachers' view)
♣ Strengthening laboratories (85% students' view and 87% teachers' view)
♣ Adopting innovative educational practices including CCE in true spirit (76% students' view and 87% teachers' view)
♣ Special measures for improving students' mathematics proficiency (91% students' view and 92% teachers' view)
♣ Capacity building of teaching staff (61% students' view and 82% teachers' view)
♣ Student involvement in school practices (45% students' view and 87% teachers' view)
♣ Strengthening school-community link (35% students' view and 67% teachers' view)

The above table presents suggestions for EMRS to improve mathematical achievement of ST students in EMRS. The suggestions are: regular employment, proper salary and service conditions of mathematics teacher, solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff, student involvement in school practices and strengthening school-community link in EMRS.

Table 9: Suggestions (need to be implemented) in JNV
♣ Solving mathematical achievement crises (35% students' view and 28% teachers' view)
♣ Strengthening laboratories (45% students' view and 35% teachers' view)
♣ Adopting innovative educational practices including CCE in true spirit (25% students' view and 12% teachers' view)
♣ Special measures for improving students' mathematics proficiency (32% students' view and 15% teachers' view)
♣ Capacity building of teaching staff (34% students' view and 41% teachers' view)
♣ Student involvement in school practices (12% students' view and 24% teachers' view)
♣ Strengthening school-community link (9% students' view and 21% teachers' view)

The above table presents suggestions for JNV to improve mathematical achievement of ST students in EMRS. The suggestions are: solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff Student involvement in school practices, strengthening school-community in JNV.

VII. MAIN FINDINGS

7.1: Class VIII ST students in JNV performed better than their grade-mates in EMRS in mathematics. It may, however, be mentioned that the performance of students from two types of schools was not in the satisfactory range as students in EMRS schools scored only 41.40 % in mathematics, while those in JNV scored in the range of 48%. Even if the performance of JNV

students was better than those in EMRS, their performance was not also satisfactory, as they scored 48.32 % in mathematics. there is no significant difference in mathematical achievements of ST students in EMRS and JNV.

7.2: Strengths of mathematical achievement of ST students in EMRS as reported by students and teachers are: Supply of free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, interactive mathematics classroom and special attention to weak students. strengths of mathematical achievement of ST students in JNV as reported by students and teachers are: supply of sufficient and free textbooks and uniforms and learning materials, engagement of qualified teaching staff for mathematics subject, high salary of mathematics teachers, special attention and coaching to student in mathematics, remedial teaching in mathematics, supervised teaching in mathematics, house master's role in supervised teaching in hostels, interactive mathematics classroom , special attention to weak students and online coaching in mathematics wherever required.

7.3: Concerns mathematical achievement of ST students in EMRS are: poor salary and service conditions of mathematics teacher, poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, poor community involvement in mathematical activities, no mathematics laboratory, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment in EMRS. The concerns in JNV are: poor hostel atmosphere for teaching-learning process in mathematics, personal problems of students in mathematics not addressed, teacher-directed rather than student-initiated activities, poor attention to build capacities of teachers and adoption of CCE in student assessment in JNV.

7.4: Suggestions for EMRS to improve mathematical achievement of ST students in EMRS are: regular employment, proper salary and service conditions of mathematics teacher, solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff, student involvement in school practices and strengthening school-community link in EMRS. Suggestions for JNV to improve mathematical achievement of ST students in EMRS are solving mathematical achievement crises, strengthening laboratories, adopting innovative educational practices including CCE in true spirit, special measures for improving students' mathematics proficiency, capacity building of teaching staff Student involvement in school practices, strengthening school-community in JNV.

VII. CONCLUSION

Mathematical achievement of ST students in EMRS and JNV are average in achievement. Thus, in order to improve mathematical achievement of ST students in school regular mathematics teacher need be appointed, mathematics laboratories need to be strengthened, innovative educational practices in mathematics need to be adopted, assessment and identification of mathematics problems in ST students need to be done in true spirit, special measures should be taken for improving students' mathematics proficiency, the capacity mathematics teacher need to be built.

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