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A Study of Factors Responsible for Low Achievement of Grade 7 Students in Mathematics of Gajapati District in the Context of Slas-2024

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ABSTRACT:

Mathematics holds a relevant and unique place in the school curriculum as it is important for a better living of the individual. But it is known that most of the students are considering mathematics as difficult. This study examines the factors responsible for low achievement of grade 7 students in mathematics of Gajapati district in the context of SLAS-2024. One hundred twenty-six students and seven mathematics teachers participated in the survey. Gajapati district is not only performing low in State SLAS-2024 report card in grade 7 mathematics but also all districts performance low in mathematics. Gajapati got in 28 position which is comes under Below Basic. Which means Learners at this level are at the early stages of development. They have not achieved the required knowledge and skills to attain minimum grade- appropriate performance levels as per curriculum demands. They need continuous guidance and a lot of support and encouragement at every stage of learning. In grade 7 mathematics state average is 49.66% whereas Gajapati district average is 41.90%. After completion of the study, it found that after seven years of schooling and enormous inputs from public exchequer this level of performance is not acceptable. As mathematics is the basis for all further studies in science as well as arts subjects, poor performance will impair the attainments in secondary, higher secondary and higher levels of education leading to low human resource development.

7^{th} grade students are liking very much mathematics. But when it comes to practice, understanding concept, practicality, solving their own problem or performance results are clearly low in comparison to others subject. There are several factors impact the performance like: - lack of parental support, negative attitude towards subject, lack of LTM, less use of digital platform, lack of assessment in during teaching learning process, teachers do not connect with the real-life experiences etc. Responses reveal that maximum number of conceptual difficulties in grade 7, like- Mensuration, algebra, data management, ratio proportion, fraction, variation, algebra, area & perimeter and construction. Whereas 70% students found difficulty in Mensuration, algebra, data management and ratio proportion of sampled school respectively. As compared to other area of difficulties are concern, which is 30% in variation, algebra, perimeter and construction.

Pedagogical processes are major thrust area which has to be addressed promptly in the teachers to enhance their capacity. Teachers' responses reveal that 71% students afraid of examination in their schools on the other hand 29% students are ready for assessment. Teacher should use more innovative way of assessment that would be reduce the exam phobia of mathematics. Hence, in some point teachers need to enhance

capacity in developing higher order questions development in math. It means teachers need to be sensitized and oriented in higher order thinking skill questions to assess their children. For teaching mathematics Learning Outcomes, Competences, Formative Assessment and its ways needs to be focused in depth in different capacity enhancement programmes. Teachers should focus on more parental involvement.

KEYWORDS: Factor, Low achievement, SLAS and Mathematics.

1. INTRODUCTION TO THE RESEARCH STUDIES :

Education must be accessible, acceptable, available and adoptable to all. By using participatory process with the active involvement of all stakeholder's education can evolve with the changing needs of emerging and challenging demand of society. Time to time different committees, reports, frameworks strongly address universal access, improving retention, reducing dropout, maintain quality and meet out daily life challenges. Different initiatives have helped improving above concerns. To ensure inclusive and equitable quality education is the basis of sustainable development as emphasized in 2030 global agenda.

To deliver quality education and accomplishment of learning outcomes are major challenges and thrust areas that has to be addressed primarily. SLAS results reflects that the gaps in learning and curriculum need to be identified timely and systematically in order to made appropriate corrective measures and thereby improving the learning and progress of students as well to strengthen conducive learning environment.

The State Level Achievement Survey (SLAS) is a large-scale survey conducted across the State of Odisha particularly to see the achievement performance of class 2,4 and 7 students in different setup of schools i.e. Government, Government aided and TRW school. Aforesaid NAS survey also provides a system level reflections regarding school education. It is a one of important point that SLAS correlates students' performance with contextual variables which gives insight to educational planners, policy makers to uplift educational quality in a holistic way. This is the preparation for NAS which will be conducted in November 2024.Which is conducted periodically in Nation level to see the performance of students in different setup. SLAS findings and results are of much importance and helpful to diagnose learning gaps and identify as well as to make necessary and fruitful interventions keeping in view educational policies, pedagogical practices and acquire best result in NAS survey.

RATIONAL OF THE STUDY:

Difficulty in learning mathematics is found as a common and significant problem throughout the school years. That is close to half of population still not have basic skills. In SLAS-2024 report card, grade 7 mathematics state average is 49.66% whereas Gajapati district average is 41.90%. From this point the researcher felt a necessity to study the causes that make mathematics learning difficult for students.

There is a major shift towards competency-based learning and which is focused on students' learning outcomes. There is a need of early mathematical skills for developing logical thinking and reasoning as well as pedagogical processes to enhance mathematical skills. The present dipstick study would promote and understanding about particular dimension or area that can help to evaluate the situation on ground. The present study would also provide valuable inputs for improving the performance of the students in subject mathematics of grade 7 students.

RESEARCH QUESTIONS:

1. Is child centred pedagogy being use by the teachers in classroom transaction according to pedagogy of mathematics?
2. Do schools get parental/community support at regular intervals?
3. What measures are being taken by the teachers to ensure the achievement of students in mathematics?

STATEMENT OF THE PROBLEM:

"A Study of Factors Responsible for Low Achievement of Grade 7 Students in Mathematics of Gajapati District in the Context of SLAS-2024."

OPERATIONAL DEFINITION OF KEY TERM USED:

- **Factor-** Factors in this study refer to things that cause or influence achievement of Grade -7 children in mathematics.
- **Low Achievement**- Low achievement refers to the level of attainment which does not measure up to the expected level in mathematics at Middle stage (Grade-VII).
- **SLAS-**The State Level Achievement Survey,2024.
- **MATHEMATICS-** Mathematics refers to VII standard as prescribed by State Curriculum Framework in Odisha.

OBJECTIVES OF THE STUDY:

1. To find out the factors responsible for low achievement of grade 7 students in mathematics.
2. To find out the perception of grade 7 students about classroom processes and assessment.
3. To find out the perception of teachers about pedagogical and assessment process.
4. To suggest measures for further improvement in NAS in mathematics.

DELIMITATION OF THE STUDY: Gajapati District comprises of 07 Block. Total number of sampled schools participated in SLAS is 70. Out of this I have taken 7 schools from the 7 blocks for this study which has given by the state.

DESIGN OF THE STUDY: Survey/Dipstick study will be followed by the researcher for the present study.

POPULATION: Population of the study covered 70 no. of Govt school of Gajapati district respectively. The sample of the study constituted in those schools where State Level Achievement Survey 2024 was conducted.

SAMPLE: Purposive sampling technique has been used to collect data from the sampled schools. 7 low performing schools of Gajapati district have been chosen to administer the study. Keeping in view diversity and nature of schools as well as that participated in SLAS-2024.

TOOLS USED:

Three self-structured tools have been developed for data collection.

1. Pupil Questionnaire

2. Teacher Questionnaire
3. Checklist

DATA ANALYSIS AND INTERPRETATION:

After collection data, all the indicators were interpreted into different tabular and graphical form and analyzed through statistical tools and techniques such as percentage was calculated according to the requirement of the study.

(1). Pupil QUESTIONNAIRE (PQ)-

Table-1

SL.NO	AREA	ITEM NO.
1	Perceptions of Students	1,2,3,4
2	Pedagogical Process	5,6,7,8,9
3	Digital Platform	10,11
4	Assessment Processes	12,13,14

Table 1. Perception of students-

Table-2

SL.NO	Items No	Statement	Yes	No
1	1	I like to study mathematics.	95%	5%
2	2	I understand the language used in mathematics.	88%	12%
3	3	I use mathematical concepts in my daily life.	88%	12%
4	4	I get a chance to discuss with my classmates while studying mathematics.	86%	14%

Table shows that 95% students like mathematics. 88% students understand the language used in mathematics. 88% students are used mathematical concepts in daily life. On the other hand, 88% students got chance to discuss with their classmates while studying mathematics. Some of students shows interest in subjects which are taught in classroom.

Student of 04 Schools (100%) liked math, where as in Govt. Upper Primary School PADMANABH, GOVT. UPPER PRIMARY SCHOOL R. UDAYAGIRI and GOVT. UPPER PRIMARY SCHOOL ALLIGANDA of students 83% Like the same. It is interested that 100% students like the mathematics as a subject.

GRAPH-1

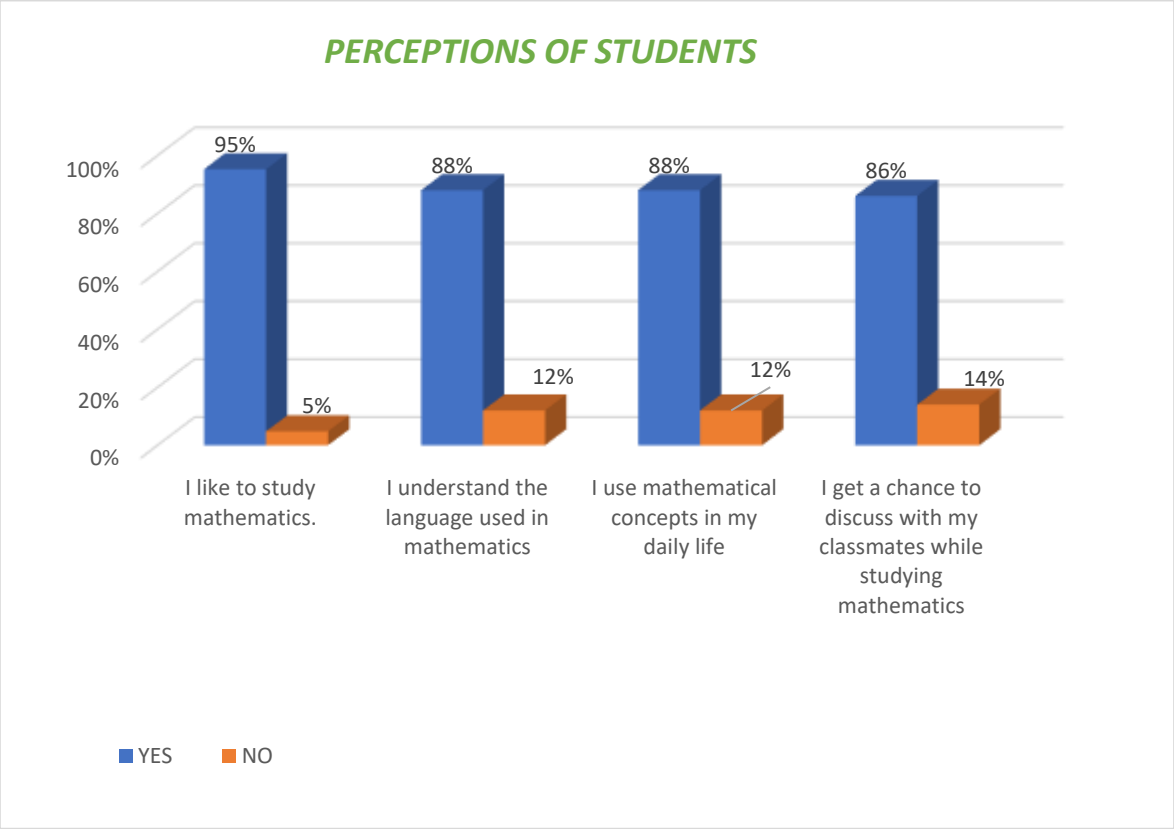


Table 2. Pedagogical Process-

Table-3

SL.NO	Items No	Statement	Yes	No
1	5	I ask questions while learning mathematics.	87%	13%
2	6	I understand the basic concepts of mathematics when learning.	89%	11%
3	7	I learn mathematics easily by using study materials.	91%	9%
4	8	I connect my experience with the textbook while learning mathematics.	83%	17%
5	9	I solve questions from textbooks and other math books.	82%	18%

As far pedagogical processes is concern, table 2 reveals that 87% students ask questions while learning to discuss and converse about mathematics. But when opportunity to solve questions from textbooks and other materials are shows less response as compared to the statements which is 82% respectively. 91% students learn mathematics easily by using study materials. Overall students are understand the basic concepts of mathematics and connect their experiences with the textbook 83% and 89% respectively.

GRAPH-2

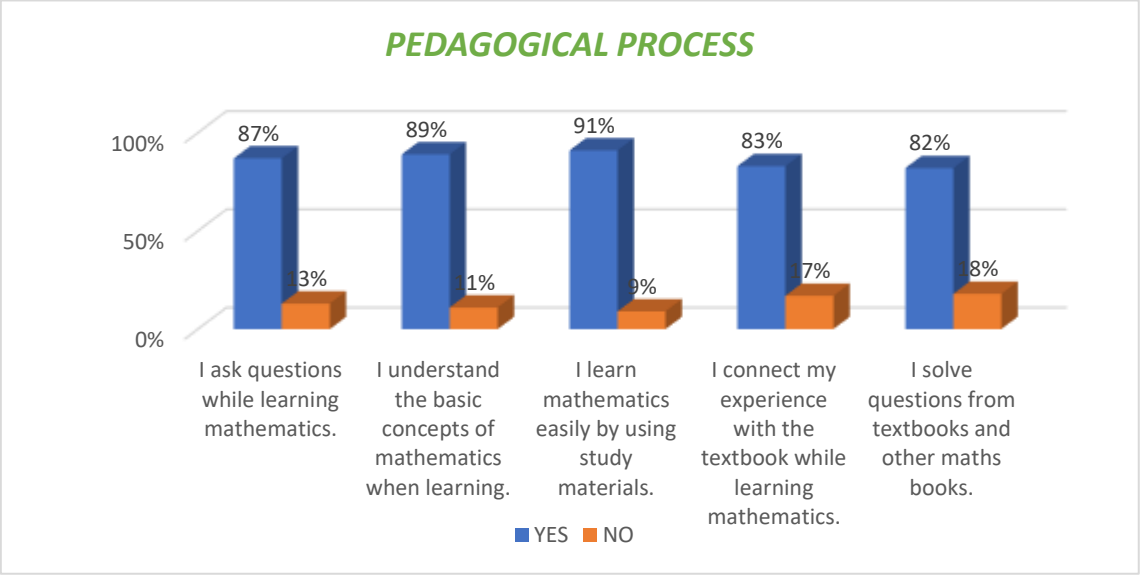


Table 3. Digital Platform-

Table-4

SL.NO	Items No	Statement	Yes	No
1	10	I have opportunity to use the technology in the classroom.	68%	32%
2	11	I can easily learn mathematics through technology.	66%	34%

But when opportunity to learn from digital platform in classroom and accordingly to inter these shows less response as compared to the statements which are 68% and 66% respectively. 32% students didn't get opportunity to use the technology in the classroom. While 34% students are not digitally aware about their uses.

GRAPH-3

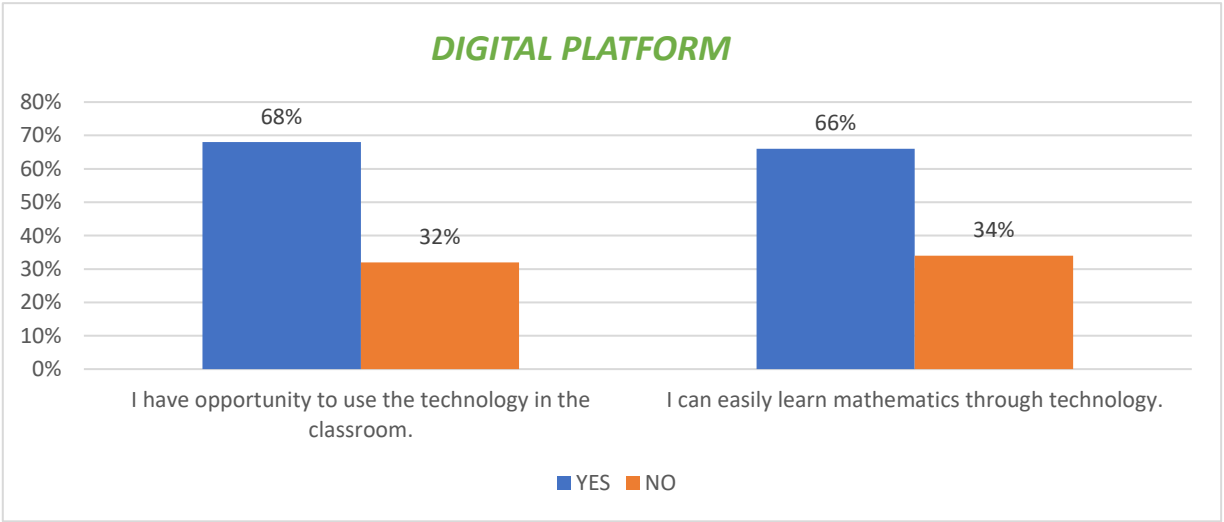


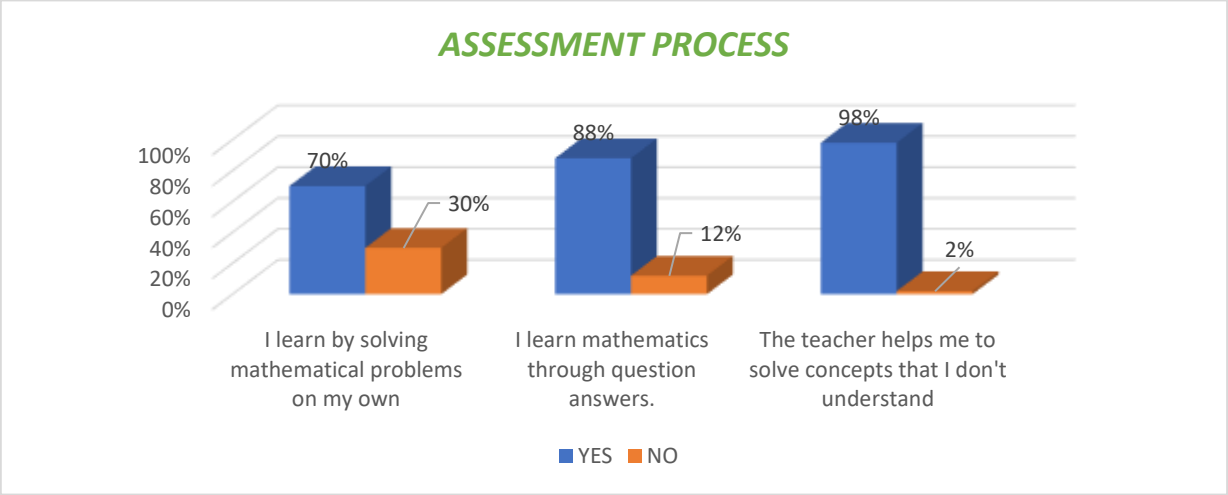
Table 4. Assessment Processes-

Table-5

SL.NO	Items No	Statement	Yes	No
1	12	I learn by solving mathematical problems on my own	70%	30%
2	13	I learn mathematics through question answers.	88%	12%
3	14	The teacher helps me to solve concepts that I don't understand	98%	2%

88% students reflect that they were asked questions during teaching-learning process simultaneously. It means there is a need to motivate the students to ask the questions or raise their questions and to create such conducive environment. 98 % to 100% students solve the concepts through the help of teachers. 30% students did not solve their problem. Whereas 70% students try to solve their own mathematical problem.

GRAPH-4



OPEN ENDED ITEMS

ITEM No 15 – Likes very much during teaching-learning of mathematics

GRAPH-5

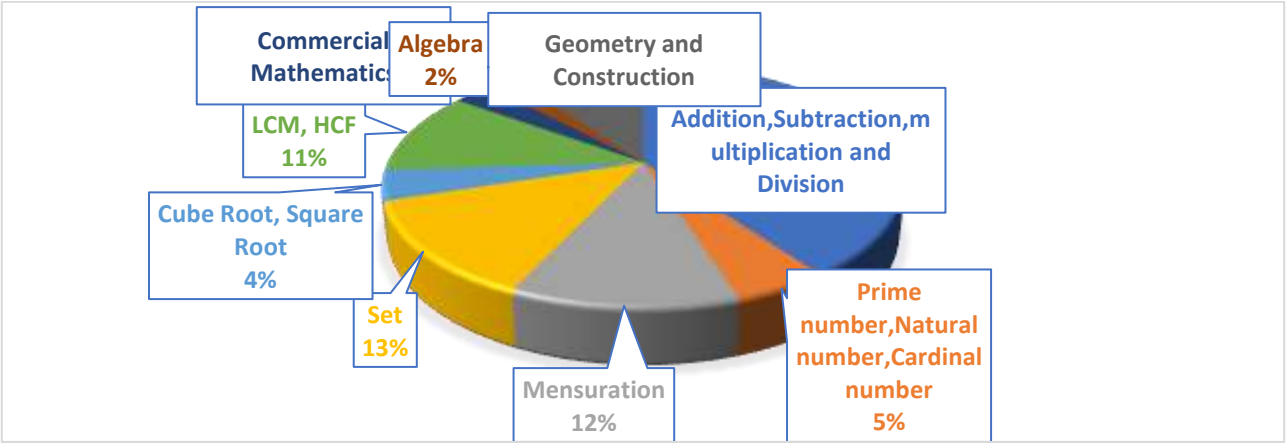
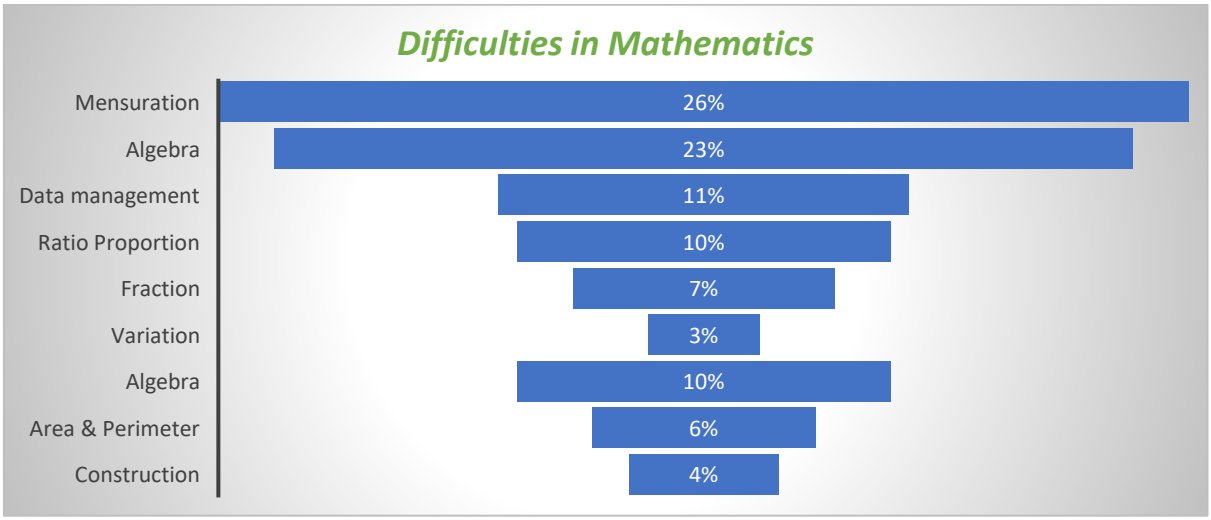


Figure shows that overall, 40% students like Addition, Subtraction, multiplication and Division. Students were found to like followed by set (13%), mensuration (12%), LCM HCF (11%), Geometry and construction (10%), prime numbers (5%), cube root and square root (4%), Algebra (2%) and Commercial mathematics (3%) respectively during teaching of mathematic. It is interesting that 100% students liked activities during teaching and learning of Mathematics.

ITEM No 16 –Difficulties in mathematics

GRAPH-6



Difficulty in learning mathematics is found as a common and significant problem throughout the school years. It can stem from various sources, including issues with understanding mathematical languages and problems with spatial reasoning or attention.

Here responses reveal that maximum number of conceptual difficulties in grade 7, like- Mensuration, algebra, data management, ratio proportion, fraction, variation, algebra, area & perimeter and construction. Whereas 70% students found difficulty in Mensuration, algebra, data management and ratio proportion of sampled school respectively. As compared to other area of difficulties are concern, which is 30% in variation, algebra, perimeter and construction.

(2). TEACHER QUESTIONNAIRE (TQ)

Table-6

SL.NO	AREA	ITEM NO.
1	Perceptions of teachers	1,2
2	Pedagogical Process	3,4,5,6
3	Assessment Processes	7,8,9,10,11,12
4	Use of Digital Platform	13,14
5	Sharing with PTA	15,16

Table 1. Perception of Teachers-

Table-7

SL.NO	Items No	Statement	Yes	No
1	1	I have skills of teaching mathematics.	100%	0%

2	**2**	**I need to develop more skills related to mathematics.**	86%	14%

Above table reveals that 100% teachers feel competent enough to teach mathematics. Whereas 86% teachers need more knowledge and competency regarding mathematics teaching. On the other hand, 14% teacher doesn't want any skills related to math. It reflects the improvement area that has to be addressed in a proper way. Teachers reflect that they need more inputs to develop diversified questions as well as skill to ask questions. It is also major thrust area which needs more attention.

GRAPH-7

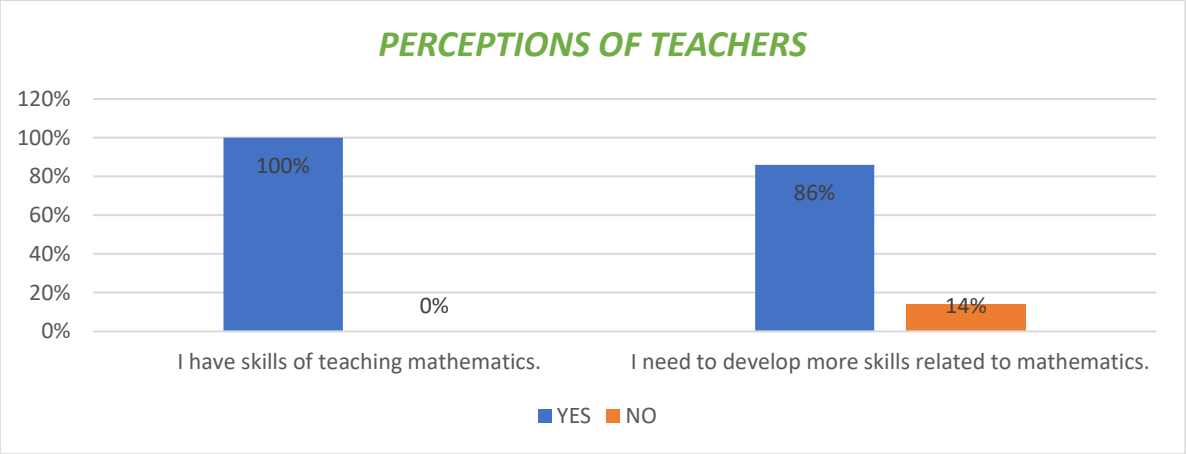


Table 2. Pedagogical Process

SL.NO	Items No	Statement	Yes	No
1	**3**	**I follow different methods for teaching of mathematics.**	100%	0%
2	**4**	**I teach students in an innovative way.**	100%	0%
3	**5**	**I plan well before teaching students.**	100%	0%
4	**6**	**I use supplementary materials to teach.**	86%	14%

Table-8

As far transaction methodology of mathematics is concerned. It is pleasant to see that there was no negative response about method of teaching, innovative way of teaching and planning before teaching. Both male and female teachers responded 100% towards pedagogical processes.14% teachers are not used any other materials related to math. Whereas 86% teachers used different materials to taught mathematics.
Pedagogical processes are major thrust area which has to be addressed promptly in the teachers to enhance their capacity. One of the major areas on which appropriate input or knowledge is required for learning pace of students.

GRAPH-8

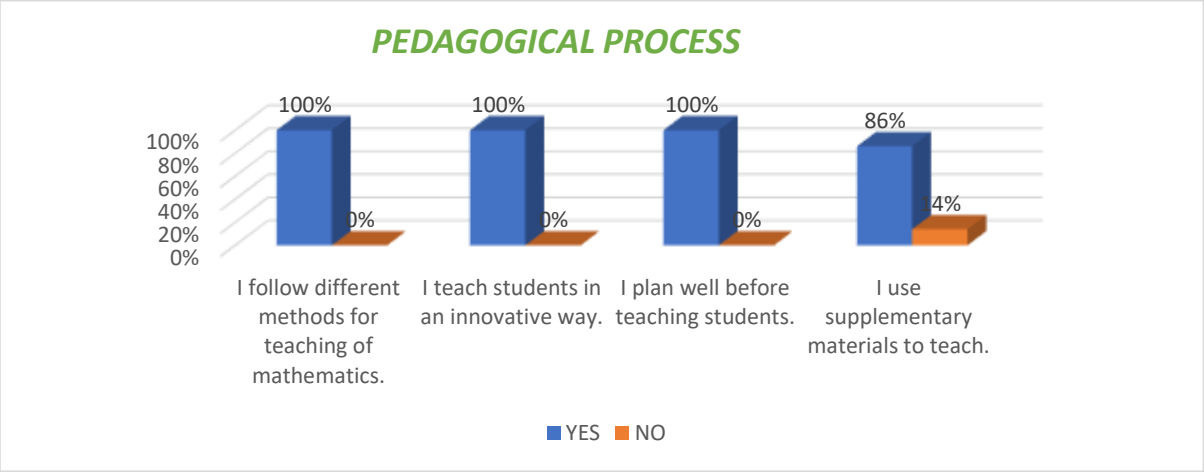


Table 3. Assessment Process

Table-9

SL.NO	Items No	Statement	Yes	No
1	7	**Students fear assessment of mathematics.**	71%	29%
2	8	**Students ask questions in mathematics class.**	86%	14%
3	9	**Students are assessed during the teaching process.**	80%	20%
4	10	**I make students understand the application of mathematics in real life situations.**	60%	40%%
5	11	**I undertake activities to achieve learning outcomes.**	65%	35%
6	12	**I correct the notebooks of students regularly.**	70%	30%

As far assessment process is concern it is found that 86% teachers responded students ask questions during math teaching whereas 14% students do not participate in discussion during teaching learning process. Clarity among learning outcomes, competencies and knowing ways of formative assessment reflections shows that 65% teachers responded positively in this regard. It means teachers need to be oriented in learning outcomes, competences, and ways of assessments in more comprehensive way.

Teachers' responses reveal that 71% students afraid of examination in their schools on the other hand 29% students are ready for assessment. Teacher should use more innovative methods that would be reduce the exam phobia of mathematics. Only 70% teachers respond positive that they correct the notebook of students.

80% teachers responded that they are assessed the students regularly during teaching learning. But when it comes to make students understand the application of mathematics in real life situations teachers responds only 60%. Hence, in some point teachers need to enhance capacity in developing higher order questions development in math. It means teachers need to be sensitized and oriented in higher order thinking skill questions to assess their children. For teaching mathematics Learning Outcomes,

Competences, Formative Assessment and its ways needs to be focused in depth in different capacity enhancement programmes.

GRAPH-9

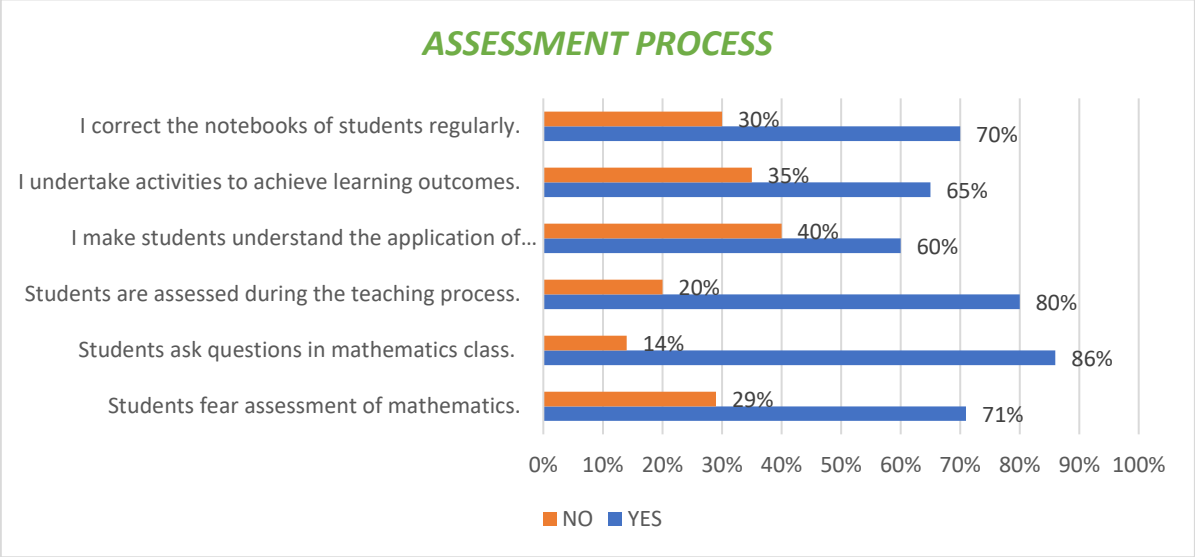


Table 4. Use of Digital Platform

Table-10

SL.NO	Items No	Statement	Yes	No
1	13	**I use digital platforms to teach mathematics.**	57%	43%
2	14	**I encourage students to use digital platforms for learning mathematics.**	71%	29%

Digital platforms offer a versatile toolkit for teaching mathematics, enhancing engagement, accessibility, and personalization. These platforms can provide interactive simulations, virtual manipulatives, and online tutorials, allowing students to explore mathematical concepts in a dynamic and engaging way.
Overall, 57% teachers used digital platforms to teach Mathematics. On other hand, more than 43% teachers do not use any digital platform or digital tool in classroom transaction. It means teachers do not have any technological knowledge. It was found least in respective Schools. But 71% teachers are encouraging students to use digital platform. Instead of encouraging students, teacher should be integral digital technologies into their teaching practices to enhance students' engagement and academic performance.

GRAPH-10

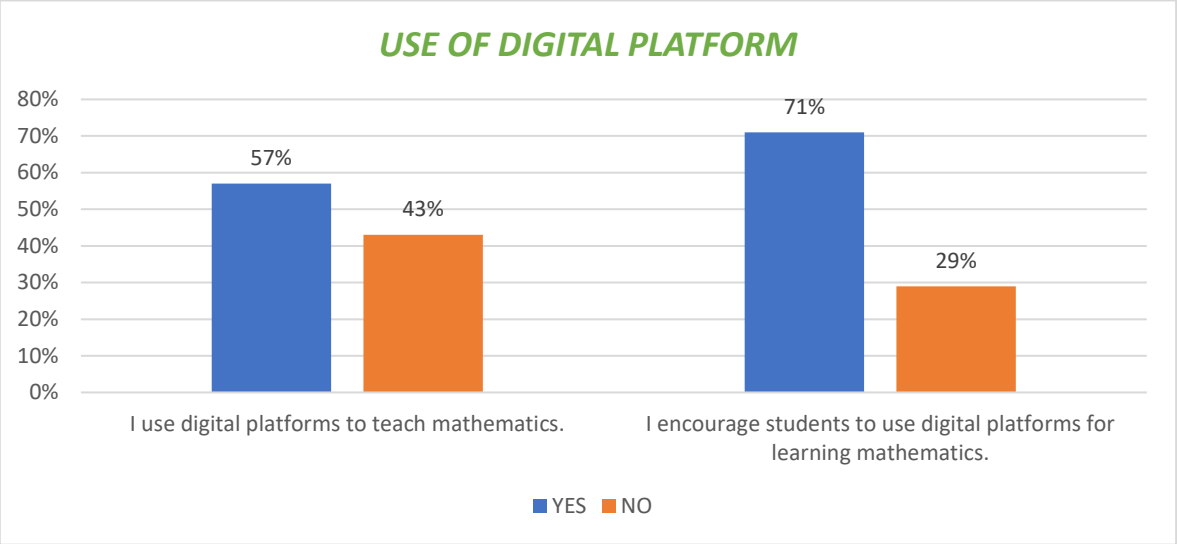


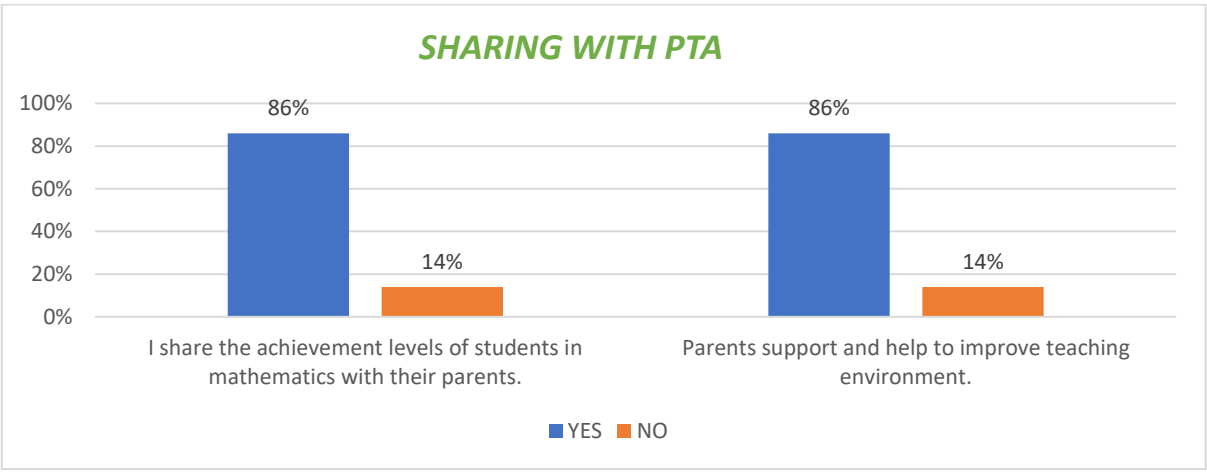
Table 5. Sharing with PTA

Table-11

SL.NO	Items No	Statement	Yes	No
1	15	I share the achievement levels of students in mathematics with their parents.	86%	14%
2	16	Parents support and help to improve teaching environment.	86%	14%

Above 86% teachers shared learning things with their parents. 86% parents also support and help to improve teaching environment.On other hand, rest 14% teacher do not share the performmance of students with their parents. It shows that parental involvement should be their for enhanching academic achievement of students.

GRAPH-11



(3). CHECK LIST-

After analysing Checklist following major points emerged out, which needs to be more structured and deliver in proper way –

- Child centred Pedagogy
- Pedagogy of Mathematics
- School Based Assessment (SBA)
- School Based Assessment Activities
- Clarity of Learning outcomes
- Role of teacher as a facilitator
- School Development Plan (School Improvement Plan)
- Documentation of meetings with School Management Committee
- Local specific LTM (Learning Teaching Materials)
- Orientation on NEP-2020 and NCF-SE

MAJOR FINDINGS:

From the above research the researcher has found following major findings: -

- There is a major shift towards competency-based learning and which is focused on students' learning outcomes. There is a need of early mathematical skills for developing logical thinking and reasoning as well as pedagogical processes to enhance mathematical skills. The present dipstick study would promote and understanding about particular dimension or area that can help to evaluate the situation on ground. The present study would also provide valuable inputs for improving the performance of the students in subject mathematics of grade 7 students.
- According to Pupil Questionnaire (PQ), 7th grade students are likes very much mathematics. But when it comes to practice, understanding concept, practicality, solving their own problem or performance results are clearly low in comparison to others subject. There are several factors impact the performance like: - lack of parental support, negative attitude towards subject, lack of LTM, less use of digital platform, teachers do not connect with the real-life experiences etc.
- Here responses reveal that maximum number of conceptual difficulties in grade 7, like- Mensuration, algebra, data management, ratio proportion, fraction, variation, algebra, area & perimeter and construction. Whereas 70% students found difficulty in Mensuration, algebra, data management and ratio proportion of sampled school respectively. As compared to other area of difficulties are concern, which is 30% in variation, algebra, perimeter and construction.
- Teachers should adapt various pedagogical methods, including the use of digital platforms, should be tailored to meet student needs and preferences. Assessment processes should also be designed to provide feedback and opportunities for growth, rather than just measuring achievement.
- Teacher Questionnaire (TQ) reveals, 100% teachers feel competent enough to teach mathematics. Whereas 86% teachers need more knowledge and competency regarding mathematics teaching. It reflects the improvement area that has to be addressed in a proper way. Teachers reflect that they need more inputs to develop diversified questions as well as skill to ask questions. It is also major thrust area which needs more attention. Both male and female teachers responded 100% towards pedagogical processes.14% teachers are not used any other materials related to math. Pedagogical processes are major thrust area which has to be addressed promptly in the teachers to enhance their capacity.

Teachers' responses reveal that 71% students afraid of examination in their schools on the other hand 29% students are ready for assessment. Teacher should use more innovative way of assessment that would be reduce the exam phobia of mathematics.

- Hence, in some point teachers need to enhance capacity in developing higher order questions development in math. It means teachers need to be sensitized and oriented in higher order thinking skill questions to assess their children. For teaching mathematics Learning Outcomes, Competences, Formative Assessment and its ways needs to be focused in depth in different capacity enhancement programmes. Teachers should focus on more parental involvement.
- Teachers in Gajapati, Odisha face several difficulties when teaching mathematics including limited resources, student attitudes towards math, lack of pre request knowledge and skill, lack of positive attitude, non-availability of instructional material and laboratory, limited access of technology, long period of students absent and the need to adapt diverse learning styles etc.
- After analysing the checklist following major points emerged out, which needs to be more structured and deliver in proper way i.e. Child centred Pedagogy, Pedagogy of Mathematics, School Based Assessment (SBA), School Based Assessment Activities, Clarity of Learning outcomes, Role of teacher as a facilitator , School Development Plan (School Improvement Plan), Documentation of meetings with School Management Committee, Local specific LTM (Learning Teaching Materials) and Orientation on NEP-2020 and NCF-SE etc.
- These initiatives are indicating a comprehensive effort towards improving the assessment landscape in Odisha schools with a focus on enhancing the quality of education and learning outcomes.

RECOMMENDATIONS & SUGGESTIONS

The analysis and findings of the present Dipstick Study have certain implications and suggestions for improving the planning strategies to enhance the teaching-learning process in general and for specific target groups in particular.

- Hard Spots should be selected as far as Mathematics teaching is concern to provide benefits the participants. The subject matter should be explained with proper illustrations, examples and activities. Teaching practices and more information related to Foundational Numeracy Skills (FNS) needs to be addressed effectively.
- Students should also be given opportunity to work in groups as well as according to their interest.
- Every teacher who is engaged in teaching mathematics at grade 7 should get opportunity to participate in capacity enhancement programmes to improve pedagogical process of mathematics. For that regular trainings should be organized online or offline as feasible.
- There is the need to improve the quality of mathematics teachers by giving short term and continues training to equip them with skills of teaching mathematics in schools as most of the teacher do not use active learning method.
- Teachers should include different methods of teaching such as of learner centred teaching in order to make mathematics teaching/learning more attractive for learner.
- Counselling and guidance should be given for the students so that students will be aware of the importance of education particularly mathematics, work hard in the subject and view mathematics like the rest of the subjects in the school curriculum.
- Parents should encourage and help their children by supplying them with appropriate teaching material further more parents should give time for discussion about the education of their children.

- More teachers should be hired and extra classes should be built to reduce the burden on the teachers.
- School environment should be convenient for the teaching learning process.
- Educational facilities should be improved; production of instructional materials should be increased.
- Students should be encouraged to attend the school.

EDUCATIONAL IMPLICATIONS

- Before starting a new topic, the related previous content should be revised and mastered.
- Instruction should be designed in a manner that reduces cognitive load by prior development of relevant schema.
- Knowledge should be well structured and connected to previous content to promote meaningful understanding and memory.
- Students should be instructed to follow deeper learning strategies so as to improve understanding and memorization.
- Students should be given problems that promote metacognition instead of blind drill work.
- Students' self-efficacy, expectancy beliefs regarding mathematics to be finely tuned to increase their effort.
- Provide clear the curricular goals to students and help them to set their own goals.
- Make students confident that ability can be improved through effort and effort is important than ability.

REFERENCES:

1. Iyer, K.K. (1977) "Some factors related to under achievement in Mathematics of Secondary School Students". - Second Survey of Research in Education, NCERT, New Delhi.
2. Kothari and Garg, Research Methodology: Methods and Techniques, New Delhi, 2020
3. National Education Policy 2022, MoE, Government of India, 2020 (Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0. pdf)
4. NIPUN Bharat Guidelines, MoE, Government of India, 2021 (Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/nipun_bharat_eng1.pdf)
5. National Curriculum Framework 2005, NCERT, New Delhi, 2006 (Retrieved from https://ncert.nic.in/nc-framework.php?ln=)
6. National Curriculum Framework 2005, NCERT, New Delhi, 2006 (Retrieved from https://ncert.nic.in/nc-framework.php?ln=)
7. NIPUN Bharat Guidelines, MoE, Government of India, 2021 (Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/nipun_bharat_eng1.p df)
8. Position Paper of National Focus Group on Teaching of Mathematics, NCERT, New Delhi, 2006 (Retrieved from https://ncert.nic.in/pdf/focus group/math.pdf)
9. Quezada, V. D. (2020). Difficulties and Performance in Mathematics Competences: Solving
10. Problems with Derivatives. Int. J. Eng. Pedagog., 10(4), 35-53
11. Rameli, M. R. M., & Kosnin, A. M. (2016). CHALLENGES IN MATHEMATICS LEARNING: A STUDY FROM SCHOOL STUDENTS'PERSPECTIVE.
12. State Level Achievement Survey 2024: District Report Card (Gajapati) (Retrieved from https://slas.gov.in/report-card2024).

13. State Level Achievement Survey 2024: State Report Card (Retrieved from https://slas.gov.in/report-card2024).