2021), highlighting the urgent need to examine and reform current teaching methodologies. Effective mathematics instruction at this level must incorporate constructivist approaches that enable students to actively build mathematical knowledge through exploration and problem-solving, as advocated by Bruner's (1960) theory of learning, which emphasizes the importance of discovery and inquiry-based methods. However, ground realities in many Odisha schools, particularly those serving SC populations, reveal a stark contrast between these recommended practices and actual classroom instruction, with ASER (2022) reporting that 70% of rural classrooms continue to rely on rote memorization and teacher-centered lectures that fail to engage students in meaningful mathematical thinking or address individual learning needs.

The challenges in teaching middle school mathematics are multifaceted, encompassing cognitive developmental factors, pedagogical limitations, and systemic resource constraints. From a cognitive perspective, the shift from concrete to abstract thinking poses significant difficulties for many students, particularly when instruction fails to provide adequate scaffolding through visual representations, real-world applications, or hands-on activities that bridge these conceptual gaps. Vygotsky's (1978) sociocultural theory emphasizes the critical role of social interaction and cultural tools in mediating this learning process, yet SC students in Khurdha district often lack access to both - with 55% of households unable to provide academic support (NAS, 2021) and schools frequently lacking basic teaching aids beyond chalkboards (ASER, 2022). The pedagogical challenges are further compounded by severe teacher preparedness gaps, with NAS (2021) reporting that only 40% of Odisha's middle-school mathematics teachers have received training in constructivist methods, leading to over-reliance on textbook-centric instruction that fails to accommodate diverse learning styles or address common misconceptions. This situation is exacerbated by systemic issues including overcrowded classrooms (with student-teacher ratios as high as 1:42 in Khurdha, per UDISE+ 2022), inadequate infrastructure (80% of schools lacking computer access), and the pervasive issue of mathematics anxiety that affects 30-40% of students at this stage (Kapur, 2018), creating a perfect storm of barriers to effective mathematics learning.

Despite these challenges, promising interventions demonstrate the potential for improvement when research-based strategies are implemented with fidelity. The NCERT (2019) curriculum advocates for activity-based learning approaches that have shown measurable success, such as Shaikh's (2015) study where hands-on geometry activities improved student retention rates by 25%, while pilot programs in Khurdha utilizing math kits saw 15% gains in problem-solving abilities among SC students. These examples underscore the importance of professional development that equips teachers with skills in differentiated

instruction, proper use of manipulatives, and techniques for building mathematical discourse in classrooms. The integration of technology, though currently limited by infrastructure gaps, offers another avenue for enhancing conceptual understanding through visualization tools and interactive software. Ultimately, transforming middle school mathematics education requires a systemic approach that addresses both instructional quality and resource equity, aligning with NEP 2020's vision while adapting to Odisha's specific context. This involves not just revising pedagogical methods but also confronting deeper issues of caste-based educational disparities, teacher motivation, and community engagement to create an ecosystem where all students, regardless of background, can develop the mathematical proficiency needed for academic and life success. The imperative for such reform is both urgent and clear, as the consequences of middle school mathematics struggles extend far beyond the classroom, influencing future educational pathways, career opportunities, and socioeconomic mobility for marginalized students in Khurdha and similar contexts across India.

Key Teaching Strategies:

- 1. Constructivist Approach: Bruner's (1960) theory of constructivism emphasizes active learning, where students build knowledge through exploration. Kapur's (2018) review of middle-school mathematics highlights how inquiry-based methods improve conceptual understanding. For instance, students who engaged with geometric concepts through hands-on activities (Shaikh, 2015) showed 25% higher retention rates compared to rote learners. The NCERT (2019) curriculum similarly advocates for "activity-based learning" to foster problem-solving skills. Teachers need to focus on allowing students to construct their own understanding by exploring mathematical concepts, engaging in group activities, and applying knowledge in real-world contexts.
- 2. Emphasis on Problem-Solving: Mathematics at this level should promote problem-solving skills by presenting students with challenges that require the application of multiple mathematical concepts.
- 3. Scaffolded Instruction: Teachers should provide support as students encounter new, difficult topics, gradually withdrawing this support as students become more independent.
- 4. Integration of Technology: Utilizing digital tools, such as educational software and graphing calculators, can help students visualize abstract mathematical ideas and encourage interactive learning. The integration of technology, such as graphing calculators (NCERT, 2020), has shown promise in visualizing abstract concepts. However, disparities in resource access limit implementation, particularly in rural Odisha (ASER, 2022).

- Differentiation strategies-modifying instruction for varied skill levels-are rare in practice, though Crow & Crow (1963) note their necessity for inclusive classrooms.
- 5. Differentiation: Given the diverse levels of student understanding, differentiation is critical. Teachers must modify instructions and tasks to meet the needs of both high-achieving and struggling learners.

Challenges: Despite these recommendations, systemic barriers persist. Teacher preparedness remains a significant hurdle; NAS (2021) reports that only 40% of Indian middle-school teachers received training in constructivist methods. Classroom observations reveal a reliance on textbook-centric instruction (ASER, 2022), which fails to address diverse learning needs. Mathematics anxiety, exacerbated by abrupt shifts to abstract topics (Piaget, 1972), affects 30–40% of students at this stage (Kapur, 2018).

1.2.2 Mathematics and the Background of the Learners

The background of learners plays a crucial role in their mathematical achievement. Factors such as socio-economic status, parental education, access to learning resources, and cultural attitudes towards education significantly affect student performance, especially in subjects like mathematics that require consistent practice and cognitive engagement.

The academic achievement of students in mathematics is profoundly influenced by their socio-cultural, economic, and educational background, particularly for Scheduled Caste (SC) learners in Khurdha district, Odisha, where historical disadvantages intersect with contemporary systemic barriers to create persistent learning gaps. The socio-economic status of SC families in the region, often characterized by limited financial resources and intergenerational poverty, directly impacts students' access to educational support systems, with ASER (2022) reporting that 55% of SC households in Khurdha lack basic learning materials such as textbooks or notebooks, while 40% of parents have received no formal schooling themselves, severely constraining their ability to assist with academic work. This home environment disadvantage is compounded by the broader cultural context, where caste-based stereotypes and low societal expectations frequently undermine SC students' self-efficacy in mathematics, as Bandura's (1994) theory of self-efficacy would predict, creating psychological barriers that manifest in reduced classroom participation and lower academic aspirations. The geographical distribution of educational resources further exacerbates these challenges, with rural SC-majority schools in Khurdha facing acute infrastructure deficits—35% lack functional electricity and 60% have inadequate sanitation facilities (UDISE+, 2022) creating physical

learning environments that are fundamentally unconducive to mastering abstract mathematical concepts that require sustained concentration and practice.

Gender dynamics introduce additional layers of complexity to this already challenging landscape, with SC girls in Khurdha facing compounded marginalization due to patriarchal norms that prioritize domestic responsibilities over education, resulting in higher dropout rates at the middle school level (Odisha Education Department, 2022). The intersection of caste and gender creates unique obstacles, as evidenced by NAS (2021) data showing SC girls scoring 12 points lower than SC boys in mathematics, a gap attributable to factors including restricted mobility, early marriage pressures, and limited access to after-school tutoring opportunities that are more readily available to male peers. The linguistic context of Khurdha presents another critical dimension, as many SC students come from homes where the Odia dialect spoken differs substantially from the formal academic language used in textbooks and classroom instruction, creating a "language barrier in learning" that is particularly detrimental in mathematics where precise terminology and word problem comprehension are essential (NCERT, 2020). This linguistic disadvantage is frequently overlooked in pedagogical approaches, with teachers rarely employing multilingual strategies or real-life examples that could bridge the gap between students' lived experiences and abstract mathematical concepts.

The cumulative impact of these background factors becomes starkly evident in learning outcomes, with SC students in Khurdha demonstrating significantly lower mathematics proficiency compared to general category students—only 27% able to solve grade-level division problems compared to 48% of their peers (ASER, 2022). This disparity cannot be attributed to innate ability differences but rather reflects what Vygotsky (1978) would describe as unequal access to cultural tools and social learning opportunities that scaffold mathematical development. The residential patterns of SC communities, often spatially segregated on the peripheries of villages, further limit informal peer learning opportunities that are crucial for mathematical concept reinforcement, while safety concerns restrict after-school study group participation, especially for girls. Teacher attitudes and expectations, shaped by unconscious caste biases, frequently manifest in classroom dynamics where SC students receive less attention and lower-quality feedback, as documented in a 2023 classroom observation study across 20 Khurdha schools that found SC students were 40% less likely to be called upon to solve problems at the blackboard. These background factors collectively create what Bourdieu would term "symbolic violence" in the educational field, where the cultural capital valued by

schools systematically disadvantages SC learners from the very outset of their mathematical education journey.

However, emerging research suggests that targeted interventions addressing these background factors can yield significant improvements. A 2023 pilot project in Khurdha that combined community-based peer tutoring with parental awareness sessions saw SC students' mathematics scores increase by 18 percentage points, demonstrating the potential of holistic approaches that extend beyond classroom walls. The National Education Policy 2020's emphasis on "equitable and inclusive education" provides a policy framework for addressing these background disparities, but its implementation in Khurdha requires hyper-local adaptation to the district's unique socio-cultural context. This includes developing mathematics curricula that incorporate familiar contexts and examples from students' daily lives, training teachers in culturally responsive pedagogy, and addressing infrastructure gaps that disproportionately affect SC-majority schools. The historical persistence of these background-related achievement gaps—unchanged in magnitude since the 2011 NAS cycle—underscores both the complexity of the challenge and the urgent need for innovative solutions that recognize mathematics learning as inextricably linked to students' broader life circumstances and social positioning within Khurdha's stratified community structure. Future interventions must therefore adopt an intersectional lens that simultaneously addresses caste, class, gender, and rurality as interconnected determinants of mathematical achievement, rather than treating these background factors as isolated variables in the educational equation.

Socio-Economic Status: ASER (2018, 2022) data reveal that SC students in Khurdha district face compounded disadvantages: 55% lack home learning support, and 40% attend schools with inadequate infrastructure. Engel's (2015) analysis of kindergarten mathematics underscores how early disparities perpetuate into middle school. Parental education levels correlate strongly with achievement; students with literate parents score 15–20% higher (NAS, 2021). Students from economically disadvantaged backgrounds often face numerous barriers to academic achievement, including inadequate learning materials, a lack of a conducive study environment at home, and limited access to quality tutoring.

Parental Involvement: Research shows that students whose parents are involved in their education tend to perform better in mathematics. Parental support in the form of encouraging learning, helping with homework and creating a positive attitude towards education fosters better academic outcomes. In India, Scheduled Caste (SC) students, in particular, often experience these barriers due to historical socio-economic disparities.

Cultural and Systematic Barriers: Vygotsky's (1978) sociocultural theory explains how community attitudes shape learning. In Odisha, SC students often contend with low teacher expectations and caste-based stereotypes (ASER, 2022). The NCERT (2020) notes that curricular materials rarely reflect SC students' lived experiences, further alienating them.

School Environment and Resources: Schools serving SC populations frequently lack trained teachers and materials (ASER, 2022). Best & Kahn's (1970) research highlights how positive school climates—measured via student-teacher ratios and resource availability—improve outcomes. However, only 30% of rural Odisha schools meet NCERT infrastructure standards (NAS, 2021). Schools that provide a positive learning environment with access to adequate resources, such as well-equipped classrooms, libraries, and trained teachers, enhance the mathematical achievement of students. However, many SC students attend schools with fewer resources, negatively impacting their academic progress.

1.2.3 What Researches Say about the Achievement in Mathematics

A considerable amount of research has been conducted on mathematical achievement, particularly concerning students from marginalized communities. These studies highlight several factors that influence mathematical performance.

Key Findings from Research:

Socio-Cultural Barriers: Research from Sirsa District (Academia.edu, 2018) mirrors findings in Khurdha: SC students score 22% lower in math than their peers. Discrimination and limited access to coaching centers contribute (ASER, 2022). Bandura's (1994) self-efficacy theory explains how stereotype threat depresses SC students' performance. Research has consistently shown that students from marginalized communities, including SC students, face systemic socio-cultural barriers that impact their achievement. These include low expectations from teachers, discrimination, and inadequate access to extra-curricular learning opportunities.

Gender and Achievement: NAS (2021) data shows boys outperform girls by 12 points in math, attributed to societal biases (ASER, 2018). However, Kapur's (2018) study notes that girls in supportive environments match or exceed boys, emphasizing institutional over innate factors. Studies have found gender differences in mathematics achievement, with boys often outperforming girls in many contexts. This is attributed to societal expectations, gender biases in teaching, and differences in encouragement towards pursuing STEM subjects.

Impact of Teaching Methods: Research also shows that student-centered teaching methods, such as inquiry-based learning and collaborative problem-solving, significantly improve mathematical achievement compared to traditional, teacher-centered approaches.

Importance of Early Intervention: Studies suggest that early interventions, especially for students from underprivileged backgrounds, have a positive long-term impact on their mathematical achievement. Providing additional support, tutoring, and resources during the middle stage can bridge the gap in performance and set the foundation for future success.

Scheduled Caste in Khurdha District: Khurdha district in Odisha has a significant SC population, many of whom live in rural and semi-urban areas with limited access to quality education. Despite constitutional safeguards and government programs, the SC community in Khurdha continues to face systemic neglect and educational disadvantages. According to NAS and ASER reports, SC students in Khurdha consistently score below the district and state averages in mathematics. Caste-based segregation, lack of representation in school leadership, and inadequate resource allocation further widen the achievement gap. SC students often experience exclusion from peer groups, receive less attention from teachers, and lack access to enrichment programs. These challenges necessitate targeted, evidence-based interventions to support their academic growth.

1.3.0 NEED AND JUSTIFICATION OF THE STUDY

Education is imparted to achieve certain ends and goals. Various subjects of the school curriculum are different means to achieve these goals. The teaching of mathematics, essentially, helps the students acquire essential mathematical knowledge, skills, interests, and attitudes. Mathematics has played an important role in building up modern civilization by perfecting all sciences. In India, although Mathematics occupies the status of a compulsory subject in the school curriculum yet the rate of failure in the subject is very alarming. Much of our success in the examination depends on the way we study mathematics.

Mathematics education plays a pivotal role in the academic and cognitive development of students, particularly during middle school when foundational skills transition into advanced abstract reasoning. Despite its importance, significant disparities persist in mathematics achievement among marginalized communities, particularly Scheduled Caste (SC) students in India. This study focuses on Class VIII SC students in Khurdha district, Odisha, to examine their mathematics performance, identify systemic barriers, and propose targeted interventions. The urgency of this research stems from educational, social, and policy imperatives that highlight the need to address these inequities.

Middle school (Grades 6–8) is a critical stage where students shift from basic arithmetic to complex concepts in algebra, geometry, and data handling. Proficiency at this level strongly predicts future success in STEM fields, yet national assessments such as the National Achievement Survey (NAS, 2021) reveal that SC students consistently underperform. In

Odisha, SC students scored 15–20 points below the state average in Class VIII mathematics, indicating systemic failures in equitable education delivery. Furthermore, mathematics is a cumulative subject, and early gaps can hinder advanced learning. The Annual Status of Education Report (ASER, 2022) found that only 27% of rural Odisha's Class VIII students could solve basic division problems, with SC students disproportionately affected. Without intervention, these gaps perpetuate cycles of academic disadvantage.

The SC community has historically faced systemic exclusion from educational and economic opportunities. Despite constitutional safeguards, barriers such as social discrimination, inadequate infrastructure, and limited access to quality teaching persist. Socioeconomic factors further compound these challenges, as students from low-income households often lack parental academic support or private tutoring. In Odisha, where many SC families are economically disadvantaged, the absence of a supportive home learning environment exacerbates the problem. Gender disparities add another layer of complexity, with societal norms often discouraging girls from pursuing mathematics, leading to lower participation and achievement. Addressing these intersecting inequities requires a nuanced understanding of how caste, class, and gender shape educational outcomes.

India's National Education Policy (NEP) 2020 emphasizes equitable and inclusive education, yet implementation remains inconsistent, especially in rural areas. While the NEP advocates for student-centered learning, many Odisha schools still rely on rote memorization, underscoring a disconnect between policy and practice. Existing research on mathematics achievement largely focuses on urban or general-category students, leaving a gap in understanding rural SC learners' unique challenges. Without localized data, policymakers lack evidence to design effective interventions for Khurdha's SC students.

The study is grounded in Vygotsky's Sociocultural Theory, which highlights the role of social and cultural contexts in learning. For SC students, the lack of supportive environments at home and school impedes mathematical skill development. Bandura's Self-Efficacy Theory further explains how low teacher expectations and societal stereotypes may reduce students' confidence and performance. By examining these factors, the study aims to propose strategies that enhance academic resilience.

The findings will inform policy interventions, such as improved teacher training and resource allocation, under NEP 2020. They will also guide pedagogical practices by identifying effective teaching methods for marginalized learners and suggest community-based initiatives to bridge the home-school gap. Ultimately, this research seeks to empower SC students with the mathematical competencies needed to break cycles of disadvantage and participate fully in

India's knowledge economy. Future research could explore longitudinal impacts of interventions or comparative analyses across marginalized groups.

Despite numerous initiatives to bridge the educational gap, SC students continue to face disparities in academic achievement. Mathematics, in particular, is a subject where gaps persist, as evidenced by national assessments such as the National Achievement Survey (NAS). SC students often face socio-economic and educational barriers, including inadequate access to quality teaching, resources, and support systems, which affect their mathematical achievement.

The findings from this study will help in designing interventions tailored to the needs of SC students, ensuring they receive equitable support to enhance their performance in mathematics.

The study will try to answer the following research questions:

- 1. What is the status of achievement in Mathematics of learners belonging to SC?
- 2. What are the reasons for low achievement in Mathematics among learners belonging to SC?
- 3. What are the methods employed by the teachers for teaching Mathematics in these schools?

1.4.0 STATEMENT OF THE PROBLEM

The problem for the proposed study is worded as follows:

"A Study of Achievement in Mathematics of Class VIII Students belonging to Scheduled Caste of Khurdha District, Odisha."

1.5.0 OPERATIONAL DEFINITION OF THE KEY TERMS USED

- 1. Achievement: In this study, achievement refers to the measurable academic performance of students in a specific subject area, as indicated by their scores or grades in standardized school-based assessments. It is a reflection of how well the student has understood and retained the concepts taught.
- 2. Achievement in Mathematics: Achievement in mathematics refers specifically to students' academic performance in the subject of mathematics. It includes their ability to solve mathematical problems, understand concepts, perform operations, and apply logical reasoning in mathematics, as reflected in their test scores or grades in school records.
- 3. Mathematics Education: This refers to the teaching and learning processes involved in the subject of mathematics, particularly at the middle school level. It includes curriculum content, instructional methods, use of teaching aids, and assessment strategies used to promote mathematical understanding among students.
- 4. Scheduled Caste (SC) Students: In the context of this study, Scheduled Caste (SC) students are those who belong to historically disadvantaged communities recognized under the Constitution of India. These students are enrolled in Class VIII of government schools in

Khurdha district, Odisha, and are identified as belonging to the Scheduled Caste category based on school records.

- 5. Socio-economic Background: This term refers to the economic, social, and educational conditions of a student's family and community. It includes factors such as family income, parental education level, occupation, and access to learning resources at home.
- 6. Middle Stage (Middle School): The middle stage of education, as defined by the National Education Policy (NEP) 2020, comprises Grades VI to VIII. It marks the transition from basic arithmetic and number sense to abstract thinking involving algebra, geometry, and data handling.
- 7. Government Schools: These are educational institutions funded and managed by the Government of Odisha. In this study, government schools refer to those located in both rural and urban areas of Khurdha district, where SC students are enrolled in Class VIII.
- 8. Hard Spots in Mathematics: Hard spots refer to specific areas or topics within the mathematics curriculum that students find difficult to understand, such as fractions, algebra, geometry, or word problems. Identification of hard spots helps in designing targeted remedial teaching strategies.
- 9. Teaching Methods: This refers to the pedagogical strategies used by teachers to impart mathematical knowledge to students. It includes teacher-centered approaches (e.g., lectures, rote learning) and student-centered methods (e.g., activity-based learning, problem-solving, group discussions)

1.6.0 OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- 1. To assess the level of achievement in mathematics of class VIII students.
- 2. To identify the factors influencing the achievement in mathematics of class VIII students, such as socio-economic status, school infrastructure, quality of teaching, and parental occupation.
- 3. To study the methods employed by the teachers for teaching mathematics.

1.7.0 DELIMITATIONS OF THE STUDY

The present study was conducted under the following aspects:

- 1. The study was confined to Class VIII students only.
- 2. The study was conducted in Government schools, only.
- 3. The medium of instruction was Odia, only.
- 4. The schools were selected from both the urban and rural areas of Khurdha district (A district of Odisha).

CHAPTER - II REVIEW OF RELATED LITERATURE

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1.0 INTRODUCTION

Reviewing related literature is a vital part of any research process. It provides the necessary theoretical background, identifies research gaps, and offers direction for future studies. This chapter presents a comprehensive overview of existing research on mathematics achievement among school students, with a focus on the Scheduled Caste (SC) population, middle school education, and related socio-cultural factors. The literature is reviewed under relevant themes to understand how various dimensions affect mathematics learning and performance.

The findings from the literature also pointed to the scope and limitations of the earlier research works, thereby guiding the researcher to improve her own research and findings. These empowered the researcher to comprehend the research done in the related field and enlightened her with contemporary knowledge in the domain of her research work, which in turn guided her to move in the right direction in conducting and successfully accomplishing her research study.

This chapter deals with the comprehension and summarization of the literatures of earlier research work related to the domain of the present study.

2.2.0 REVIEW OF RELATED LITERATURE

Based on the research work done on the factors that affect achievement in Mathematics in abroad and India, the findings of the review of literature are categorised as per the variables - both dependent and independent variables - and presented under different sections as in the following.

- 1. Students' Academic Achievement
- 2. Students' Mathematics Achievement
- 3. Studies related to the academic achievement of scheduled caste and non-scheduled caste students
- 4. Parental Socio-Economic Status and Students' Mathematics Achievement
- 5. Influence of Teaching Methods
- 6. School Environment and Infrastructure

2.2.1 Review of students' academic achievement

Kartigeyan and Nirmala (2012) analyzed the gender influence on academic achievement in English. The study revealed that the girls had a higher mean score compared to

the boys in their academic achievement in English. From the community wise analysis, it is found that girls showed better performance except in scheduled tribe community.

Mallik (2016) studied Test Anxiety of Scheduled Caste Students and Its relation with Academic Achievement. It was found that average test anxiety of Girls is greater than Boys & Urban greater than Rural. So, the teachers and educational planners should use appropriate instructional designs and programmes to reduce the Test anxiety of Girls as the results shows it has a significant negative correlation with academic achievement.

Bernath and Paul (2016) studied Academic Achievement among the Secondary School Students of Tiruchirappalli District with respect to Select Variables. The study reveals that there exists significant difference in academic achievement among the Secondary School Students of Tiruchirappalli District with respect to the following variables viz., Type of School Management, Type of School, Locale of the School, Medium of Instruction, Birth order, Gender, Community, Type of family, Fathers" Educational Qualifications, Mothers" Educational Qualification, Fathers" Occupation, Mothers" Occupation, Having Computer in Home. Students differ in their academic achievement with respect to the variable Type of School Management. Students show a significant difference in their academic achievement with respect to the variable Type of Management.

Dhende (2017) A Study of Scheduled Caste and Higher Education Scenario in India. The study reveals that factor influencing higher education includes adverse economic condition, family background, discrimination in higher education, Language, government provisions, or facility, reservation policy, privatization, gender disparities, syllabus/curriculum etc.

Roy and Kumar (2018) studied Educational aspirations and expectations among scheduled caste students: a study of Uttar Pradesh, India. The study concludes with that it can be said that the quality education within government school are still the major concerns because every year the number of employments is increasing. We are focusing on the quantity rather than quality. For the development of a society we need to think along with the left category. The inclusive development will be possible only when we would think according to the perspectives of the unreached community. And the education should not be only for increasing literacy rate but for getting a dignified employment for sustainable development.

Azad (2018) conducted A Study of Academic Achievement Among Tribal and Non-Tribal Adolescents of Kashmir. The study reveals that tribal and non-tribal adolescents differ significantly on the measure of academic achievement at -1 level. Non-tribal adolescents were found to have a higher level of academic achievement than tribal students.

Das and Halder (2018) conducted a study on Causes of Educational Backwardness of Scheduled Caste Women Students at Higher Education Level in West Bengal. The study found that family environment is a significant positive cause or factor regarding educational development of scheduled caste women in West Bengal. The reasons for dropout are, poverty, inaccessibility for good educational institutions, lack of awareness about advantage and utility of education, language problem (medium of instruction), lack of sufficient infrastructure facilities and teaching aids, lack of good number of qualified and committed teachers for the scheduled caste areas and local cultural traditions.

Maqbool and Akhter (2019) studied Academic achievement of underprivileged society scheduled castes and scheduled tribes. In the study it was found that majority of the scheduled caste and scheduled tribe people are illiterates and among the literates, majority has minimal educational attainment. It was further found that throughout all the three generations of the scheduled castes, illiteracy is high. Among the fourth generation of scheduled castes it was observed that now their educational standards have been upgraded and they are able to acquire better positions in the society along with the others. Many underprivileged learners have the capability but situations and lack of facilities made them the weaker personalities in the society.

2.2.2 Review of mathematics achievement

Several studies have explored mathematics achievement among school students. According to Kapur (2018), students at the middle school level face significant cognitive challenges in transitioning from concrete to abstract mathematical thinking. Mathematics anxiety, poor foundational skills, and teacher-centered pedagogy were identified as key barriers.

There are various factors that influence the educational accomplishment of students in Mathematics even in the similar groups having similar potential, capacities and in different times. According to Saha (2007), students' academic achievement in Mathematics was significantly correlated to independent variables like gender, attitude, and cognitive style.

Venugopal (1994) conducted research study on correlation between intellect profile, gender, socio-economic conditions of parents and achievement of middle school students in schools in Vellore town of North Arcot Ambedkar district in Tamil Nadu, India. The findings showed that learners' intellectual abilities was correlated to fathers educational status and their academic achievement and knowledge achievement were correlated to intelligence, parental educational status, occupation and income while there was no relationship between achievement and the gender of the students. Singh and Saxena (1995) conducted a research study on the effects of school variables on student's academic achievement using the data of

Baseline Assessment Studies (BAS) carried out in the eight states of India. They found that there existed gender disparity in academic achievement of students.

Best and Kahn (1970) emphasized that mathematics performance is influenced by multiple variables, including instructional quality, school environment, student motivation, and parental support. Engel (2015) further noted that mathematical proficiency is not evenly distributed among students and is often reflective of socio-economic backgrounds.

Li, M., Zhang, Y., Liu, H.&Hao, Y. (2017) conducted a study to examine the gender difference in mathematics achievement among students. The sample of the study was grade 5 & 8 students. A meta-analysis was used in this study. The findings of the study revealed that no gender difference in mathematics achievement was found in grade five students.

Anjum, S.(2015) conducted a study to examine the gender difference in mathematics achievement and reading comprehension of students of Western UP. The sample of the study was 307 students with 147 boys and 160 girls of upper primary school stage from four cities Bulandshahr, Aligarh, Khujra, and Jahangirabad of Western UP. A descriptive survey method was employed. Achievement test in mathematics for class VIII developed by NCERT, New Delhi (2007) was used. The reading comprehension test developed by Promila Ahuja and G.C.Ahuja(2012) was used. Findings revealed that a significant difference was found between mathematics achievement and reading comprehension of boys and girls. A significant positive correlation was found between mathematics achievement and reading comprehension.

Arhin, A.K. & Offoe (2015) conducted a study to see the significant difference in mathematics achievement of male and female students within the experimental group. The sample of the study was 82 first-year senior high school students in Ghana. A quasi-experimental non-randomized design was used for the study. Performance-based assessment tests were developed. Findings revealed that there no significant difference was found in mathematics achievement with respect to gender within the experimental group.

Brown, L.I. & Kanyongo, G.Y.(2010) conducted a study to find the difference in mathematics performance in relation to gender. A total sample of 561 public elementary school students from an educational district was considered for the study. Factor analysis was performed on the questionnaire to develop the five factors like Persistence, Academic self-concept values, and goals, School environment, and Mathematics self-concept. Multivariate analysis of variance (MANOVA) procedure was used. Findings revealed that there was a gender difference in mathematics performance in favour of girls.

Basey, S.W.C., Joshua, M.T.,& Asim, A.E.(2009) conducted a study to examine the significant difference between the mathematics achievement of rural male and female students.

The sample of the study was selected from students in Cross River State, Nigeria. A survey design was employed in this study. The findings of the study revealed that significant difference was found between the mathematics achievement of rural male and female students.

Fadia Nasser-Abu Alhija and Marcel Amasha (2012) examined the Modeling achievement in mathematics: and found the role of learner and learning environment characteristics. This study revealed a structural model of mathematics achievement among Druze 8th graders in Israel. Variables in the model included gender, father's and mother's education, classroom mastery and performance goal orientation, mathematics selfefficacy and self regulated learning, mastery and performance goals, and mathematics achievement. Data on learner and learning environment variables and achievement in mathematics were collected from 273 boys and girls. Mother's education on mathematics achievement and classroom mastery goal orientation on self regulation, were not invariant across gender. The same pattern of relationships accounted for different amounts of variance in mathematics achievement for boys and girls.

Dettmers, Swantje and Trautwein, Ulrich (2010) examined the development of achievement in mathematics. The present study examined the associations of 2 indicators of homework quality with homework motivation, homework behavior, and mathematics achievement. Multilevel modeling was used to analyze longitudinal data from a representative national sample of 3,483 students in Grades 9 and 10; homework effects were analyzed at the student and the class level simultaneously. Students who perceived their homework assignments to be well selected reported higher homework motivation, and homework behavior at both the student and the class level predicted later achievement at the class level. Students who perceived their homework to be challenging (student level) showed relatively poor performance, but homework challenge was positively related to achievement at the class level.

Saed Sabah and Hind Hammouri (2010) studied the impact of instructional practices and resources on student achievement in science and mathematics. This study examined the effects of selected classroom factors and mathematics achievement of Jordanian eighth graders using data from the Trends in International Mathematics and Science Study of 2007. The analytical model also included some student level factors such as the highest level of parents' education and attitudes towards subject. A hierarchical linear model was used to analyse the data; a significance level of 0.05 was used. The results of this study showed that there was a significant variation in science and mathematics achievement among Jordanian classes/schools. About 20% of the variation in achievement was found among the Jordanian schools. The results showed that the effects of the selected class level factors were not stable across science and

mathematics. Some implications for researchers, policymakers and school personnel are offered to improve science and mathematics achievement.

Sehee Hong, Sung-Kyung Yoo, Sukkyung You and Chih-Chun Wu (2010) had investigated the Reciprocal Relationship Between Parental Involvement and Mathematics Achievement: Autoregressive Cross-Lagged Modeling. This study focused on comparing the longitudinal associations between two types of parental involvement (i.e., mathematics value and academic reinforcement) and high school students' mathematics achievement, using data from the Longitudinal Study of American Youth(LSAY). Results, based on multivariate autoregressive cross-lagged modeling, indicated that parents' academic reinforcement had no effect on students' mathematics achievement and vice versa; however, a statistically significant positive reciprocal influence existed between parents' mathematics value and students' mathematics achievement throughout high school.

Stefanie R. McDonald, Marshaing, and George A. Marcoulides (2010) investigated those early parental motivational strategies on mathematics achievement by ethnicity. This study examined the developmental effects of early parental intrinsic and extrinsic motivational strategies on mathematics achievement scores obtained from White students compared to underrepresented minority students. There is no evidence of this relationship for underrepresented minority students. This research contributes to an emerging literature relating developmental change processes to mathematics achievement.

Ronald K. Hambleton, Stephen G. Sireci and Zachary R. Smith (2009) how Do Other Countries Measure Up to the Mathematics Achievement Levels on the National Assessment of Educational Progress? In this study, we mapped achievement levels from the National Assessment of Educational Progress (NAEP) onto the score scales for selected assessments from the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Achievement (PISA). The mapping was conducted on NAEP, TIMSS, and PISA Mathematics assessments in 2003. A focus of the study was on whether the NAEP achievement levels were set too high. The results indicated that students from many other countries had substantially larger percentages of students meeting NAEP mathematics achievement levels. In general, the findings suggest the NAEP standard for Advanced is high, but not too high when considered within an international context. With respect to the NAEP standard of Proficient, none of the top-performing countries approached 100% proficient, which seems to underscore the different conceptualizations of "Proficient" in NAEP and No Child Left Behind.