CHAPTER – II

REVIEW OF LITERATURE

Review of literature is one of the most important part of any new research as it lays down a strong foundation. A thorough ground work in the topic which is being investigated, not only equips the researcher to gain an in-depth knowledge of the topic, but also helps him/her to identify what has not been explored before and thus paving the path for a new study, which can not only benefit the research community but helps him/her to contribute meaningfully to the whole ecosystem at large.

Literature review provides clarity and helps the researcher in choosing the best theoretical framework for the study. While the current literature provides the strong understanding of the history, the research gaps which are identified, helps the research community as a guiding light for the future work.

For this research, the aim was to identify and thoroughly understand what was already studied in the field of working memory and specifically, verbal working memory and its impact on the different aspects, like study habits, achievement motive and academic performance of students. There is a treasure of work being done in one or the other topics and it really helped in giving a structured approach for this current research.

2.1 Verbal working memory

In initial search on this vast topic of Verbal working memory and its impact on the student's achievement motive and study habits, we came across similar research being conducted by **Tracy Alloway and R. Alloway (2010**).

This study aimed at determining if working memory is merely a surrogate for intelligence or if it has a unique impact on learning outcomes. A sample of 98 children were evaluated at two distinct ages: first, when they were between 4.3 and 5.7 years old, and then again 6 years later, when they were between 10.0 and 11.3 years old. Based on poverty indices and nutrition eligibility, schools with low, moderate, and high poverty rates were chosen. Forward digit recall was utilised to

evaluate verbal short-term memory, whereas digit recall was utilised to evaluate verbal working memory.

Children's memory retention capabilities at age 5 were the most accurate predictors of their literacy and numeracy skills six years later, according to the significant findings. IQ contributed a lesser proportion of the unique variance in these learning outcomes. This emphasises the distinction between working memory and IQ and its independent relationship with academic achievement. Remarkably, the study demonstrates that working memory, particularly in the early phases of formal schooling, is a better indicator of future academic achievement than IQ. These results have significant ramifications for education, particularly for interventions that seek to improve working memory skills, thereby potentially enhancing academic performance overall.

The study's examination of the relationship between working memory and academic achievement demonstrates that working memory is more than an IQ proxy. Instead, it emerges as a distinct cognitive ability with unique ties to academic success. In the context of predicting academic success, working memory emerges as a more potent predictor than IQ, particularly at the beginning of formal education. This research has significant implications for educational strategies and interventions that seek to optimise students' academic outcomes by leveraging working memory skills.

In their study, **Alloway and Alloway (2020)** aimed to identify if the association between working memory and academic achievement differs depending on the specific academic domain. The researchers wanted to examine whether domain-specificity could provide an explanation for the inconsistent results observed in previous studies.

The research involved a comprehensive literature review on the relationship between working memory and academic achievement. The authors conducted a thorough analysis of studies that investigated the connection between diverse academic domains, such as mathematics, literacy, and overall academic performance.

According to their findings, the interplay among working memory and academic success is complex and multifaceted. Although there is evidence supporting a positive association, the intensity and consistency of this association varied by academic domain.

A recent study by **Studer-Luethi, B., Toermaenen, M., Margelisch, K (2022)** investigated the effect of working memory (WM) training on the educational success as well as educational development of children. The researchers concentrated on fundamental cognitive processes such as working memory, which plays a crucial role in learning. Although WM training has been deemed beneficial, school-based research is limited. The purpose of the study was to determine how the characteristics of training tasks and each child's individual characteristics shape the cognitive and academic outcomes of training.

The investigation included 86 children between the age of 8 to 12 years, who participated in a 6-week training programme. One group underwent WM training with tasks such as n-back and complex span, whereas another group underwent control training with perceptual matching tasks. The investigators also evaluated the children's personal characteristics, such as neuroticism, conscientiousness, enthusiasm for learning, and strength.

In comparison to the control group, the other group which was given the WM training, demonstrated advances in both working memory and math performance. Additionally, there were indications that vocabulary may have improved after WM training. Both training groups demonstrated improvements in literacy and fluid intelligence.

The study analysed distinct characteristics within the training group and discovered that training efficacy was related to psychological well-being, diligence, resilience, and factors including teachers' reports of learning enjoyment and social integration.

The study concluded that working memory training has the ability of boosting working memory capacity and mathematical abilities of the children. It also emphasised the impact of individual characteristics, motivation, and social factors on cognitive training outcomes.

Kulp, M. T., Edwards, K. E., & Mitchell, G. L. (2002) conducted a study to address the controversy surrounding the connection among visual memory and academic performance. 155 students in grades two through four (average age = 8.83 years) were involved in a masked investigation.

Using the visual memory subtest of the Test of Visual Perceptual Skills, visual memory was evaluated. The Otis-Lennon School Ability Test and the Stanford Achievement Test were utilised to evaluate academic performance. The analysis took age and verbal aptitude into account.

Visual memory scores substantially predict below-average performance in decoding words, and total scores of math, according to the study's findings. Predicting reading comprehension reveals a positive trend ($p = 0.093$).

In conclusion, the study establishes a significant correlation between poor visual retention and inferior academic performance in reading, math, and overall school performance among 2^{nd} to 4^{th} graders. Even when age and verbal aptitude are taken into account, the findings hold up.

An article by **Miller-Cotto & Byrnes (2020)** examined interaction of working memory on arithmetic and literary performance in an effort to comprehend the underlying mechanisms. This study contrasted three theories for this relationship:

i. the cognitive filter model,

ii. the transactional model, and

iii. the positive manifold model

By employing math and literacy data from the 2011 Early Childhood Longitudinal Study Kindergarten (ECLS-K), two distinct assessments were conducted.

Path analyses conducted within a structural equation modelling framework determined that the transactional model provided the greatest fit in both instances. This suggests that the interaction among achievement and working memory is reciprocal as well as recursive over time.

Recent research has established links between educational achievement measures and both the verbal and visuospatial components of working memory. In addition, particular executive functions, namely shifting, updating, and restraint, have been associated with academic performance. In a study by **St Clair-Thompson, & Gathercole (2006),** verbal and visuospatial working memory abilities of children of the age of 11 and 12 years, were assessed in addition to the ones mentioned above.

Two executive factors emerged through exploratory factor analysis - one related to updating functions and the other to inhibition. Strong correlations were found between updating skills and verbal and visuospatial working memory span performance. Working memory was strongly correlated with academic achievement in math and English, whereas inhibition was strongly correlated with academic performance in science, math and English.

In addition, the study revealed associations which were specific to the domain - verbal working memory directly affected performance in English, whereas visuo-spatial working memory affected English, mathematics, and science achievement. These findings have implications for the conceptual study of working memory as well as executive functioning, and how they contribute to the learning of children. This study brought out the significance of comprehending the complex relationships between cognitive processes and academic performance, providing insights that can inform educational strategies and interventions.

Recent developmental research has sought to comprehend the predictive effect of intelligence and working memory (WM) on student's academic achievement. While both variables are acknowledged to be significant, it remains unclear whether IQ or WM has a greater impact on academic achievement. Some studies indicate that IQ is the primary predictor, while others indicate that WM has a greater predictive capacity. A study by **Schneider & Niklas (2017)** utilised statistics from the Munich

Longitudinal Study on the Origins of Individual Competencies (LOGIC) to investigate this topic in greater depth. The study included approximately 200 participants whose IQ and WM were evaluated at age six, with follow-up evaluations through age 23. In addition to evaluating reading, penmanship, and math skills, the study assessed these skills across this time span.

To investigate the relative predictive power of IQ and WM across assessment time intervals (early versus late), the researchers employed regression analyses and structural equation modelling (SEM) with latent variables. Both IQ and Working memory consistently predicted academic success in both early and late developmental stages, particularly when domain knowledge was not considered as an additional factor. However, domain knowledge emerged as a significant contributor, explaining the majority of the variance in more in-depth regression models and reducing the influence of IQ and working memory. SEM analyses corroborated these findings, confirming that IQ has a significant influence on early educational achievement and highlighting the additional influence of domain knowledge during later developmental stages.

In essence, this study emphasised the importance of IQ and WM in predicting academic success, while emphasising the centrality of prior domain knowledge.

In a study similar to our current research was conducted by **Sadaf Tariq & Sarah Noor (2012)**. The objective of the investigation was to find out if working memory influences the academic performance of college-level science students. The primary goals of the research were to compare working memories and academic performance of male and female science students. This study included both male and female college science students as participants. Using multistage cluster sampling, 300 students were chosen - 150 males and 150 females, from the university clusters chosen as the research sample. 50 candidates were chosen from each institution. A questionnaire was chosen to assess the students' working memory. The academic performance parameter was evaluated using the students' grade based on their university performance. Study's nature was descriptive. Survey questionnaires were used to capture data from universities that had been visited in person. The standard deviation was calculated to analyse the data. The t-test with two tails was used for comparing men and women on the motivational variable and academic achievement.

The population's working memory scores followed a normal distribution. In addition, there was little disparity in working memory scores between either gender, and both genders demonstrated moderate working memory usage. The academic achievement results of male and female pupils were found to be comparable. Their academic achievement scores did not differ significantly. Science students at the university have been found to utilise working memory similarly when studying. Males and females had nearly identical means, with males having 51.31 and females 50.82. The average academic performance on university examinations was below fifty percent.

This study was done on university students. Since the secondary school is a crucial part of any student's career path, a study is needed to cover this age group and also to see if the Verbal WM has any direct relation to the need for achievement of the students. Also, research can be conducted to establish if need for achievement has any relation to the study habit pattern in India.

However, there was one research of working memory and academic achievement done on medical students which was conducted by **Ishak and other (2012).** It aimed to analyse the working memory of students at University Kebangsaan Malaysia (UKM) based on gender, program, year of study, study style, memorizing techniques, supplement intake, sleep hours and to appraise their relationship between working memory and grades obtained. It had a very different result with respect to effect of working memory on academic performance.

The methodology used in this analysis was a cross-sectional study which was done on second and third-year students of Environmental Health, Nutrition and Biomedical Science programs at Universiti Kebangsaan Malaysia (UKM).

157 participant students were selected through purposive random sampling for participation in the analysis, including 29 males and 128 females. All participants were divided in two sections. The data was collected through a structured questionnaire consisting of two sections. Section A contained demographic information, supplement intake, memorizing techniques, learning style as well as resting time. Section B consisted of Visual Working Memory Test and Arithmetic Test, which were altered from the Wechsler Adult Intelligence Scale IV (WAIS-IV) (Lichtenberger & Kaufman, 2009). The Statistical Package for Social Sciences for

Windows (version 17.0) was used to analyse the data and the techniques used were Independent-t test, Analysis of Variance (ANOVA), and Spearman correlation.

The majority of the students had average working memory scores (40% to 70%), according to the findings of the study. Approximately 24% of students performed well with a score exceeding 70%, while 17% scored poorly with a score less than 20%. No major variations were found between working memory scores and gender, program, or year of study ($p>0.05$). Likewise, memorization technique, study style and sleeping hours also showed insignificant association with working memory scores ($p>0.05$). The results also showed that there was no significant correlation between working memory scores and Cumulative Grade Point Assessment (CGPA) ($p>0.05$).

While exploring researches being done in the area of working memory (WM) and academic achievement, one research that stood out was one by **Tashauna L. et al (2016)**, where they examined different memory processes – working memory and recollection, and how they contributed towards academic achievement. Academic achievement differs from individual to individual. Of course, there are differences in academic achievement of children with learning difficulties and children without learning difficulties. However, even within typically developing children, there are variances in the academic achievement. There are several factors for this. The distal ones being parental interaction, socio-economic condition of the family, classroom techniques and proximal one being working memory.

The authors noted that though there were researches being done to learn how memory, working memory, or one of the components of working memory, affect or contribute to academic achievement, but there were very few or no research which studied multiple cognitive process and their contribution towards academic achievement. Theirs was the first study to be conducted on typically developing students where both, recollection and working memory, was studied.

For this research, the investigators examined both – working memory and episodic memory, as contributors to academic achievement. They used recollection as an aspect of working memory to understand its contribution to academic achievement. The sample for this study consisted of 81 kids mainly from Caucasian population and their parents were highly educated. For the recollection measurement the task from work by DeMaster and Ghetti (2013) was used. In this the children were exposed to stimuli consisting of black and white drawing having colored border. The children

were supposed to retain and recall the drawings related to the border colour at a later stage.

For assessing the working memory, the kids were administered backward digit span test. For evaluating the achievement of mathematics and reading, the Woodstock Johnson (WJ) III Tests of Achievement were utilised. Math assessment was based on calculation and math fluency while for reading, comprehension and reading fluency was used as the yardstick. Since verbal IQ was also used as a controlled variable for all the analysis.

The results were on expected lines on many counts. Using hierarchical regressions, the contribution of memory to maths and reading performance measures was analysed. Verbal IQ and age were used in the first stage while recollection and working memory was used in the second step.

The results were as follows:

Reading achievement:

Reading fluency

- Step 1 - Verbal IQ and age affected the reading fluency by 18% of variance
- Step 2 – Memory (WM and recollection) explained an additional 17% difference (contributed by verbal IQ and working memory but not recollection)

Passage comprehension

- Step 1 - Verbal IQ and age explained 20% variance in comprehension
- Step 2 – Memory (WM and recollection) explained an additional 23% of variance (Verbal IQ, WM and recollection all contributed to this variance)

Math achievement:

Math fluency

- Step 1 - Verbal IQ and age affected the math fluency by 10% of variance
- Step 2 – Memory (WM and recollection) explained an additional 12% of variance (all 3 variables contributed the additional variance)

Calculation

- Step 1 - Verbal IQ and age explained the variance of 32% in calculation
- Step 2 – Memory (WM and recollection) explained the variance of 7% (age, WM and verbal IQ contributed to the additional variance but not recollection)

As mentioned, the results demonstrated that both WM and recollection contributed to arithmetic and literacy performance when verbal IQ and age were used as controlled variables. These findings were not surprising but those related to recollection and academic achievement were bit variable. While recollection did contribute to achievement in passage comprehension but is did not however, did the same to reading fluency.

Since there is a strong relation between calculation and age, a more restrictive sample with respect to age would provide a greater comprehension of how memory plays a role in the achievement.

As discussed earlier, in one paper **George Miller (1956)**, discussed the limitations of working memory and proposed that the average person can hold seven items (plus or minus two) in their working memory simultaneously.

However, the paper by **Nelson Cowan (2001)** challenged the concept of the "magical number seven" and contended that the working memory capacity is actually limited to about four information chunks. It examined research on the limits of working memory capacity and offered a revised estimate.

Barrouillet, Bernardin, and Camos (2004) investigated the effect of time constraints and shared resources on the working memory spans of adults. The researchers sought to determine how the distribution of cognitive resources under varying time constraints influences working memory performance.

Participants in the study were adults who were given sequences of numerals to remember. Two variables were altered by the researchers: the extent of display time for each digit and the period between the display of the final digit and the recall phase. After the presentation, those who participated were instructed to remember the numbers in the exact sequence.

According to the findings of the study, the participants' working memory performance decreased significantly under time constraints. In particular, shortened display times and longer intervals between display and recall led to decreased memory spans. These results suggested that time restrictions had an adverse effect on the working memory capacity of the participants.

The researchers also investigated the function of sharing resources in working memory performance. They hypothesised that the cognitive resources available for

the storage and manipulation of information in working memory are restricted and may need to be shared among various memory system components. The research found proof backing the resource-sharing hypothesis, suggesting that when cognitive resources are constrained because of time constraints, individuals allocate fewer cognitive resources to encoding and maintaining information, resulting in a decrease in working memory capacity.

Adults' working memory capacities are negatively affected by time constraints, according to the research. It emphasised the significance of resource allocation and sharing for working memory performance. The findings contribute to the existing knowledge of the factors that influence working memory capacity as well as cast light on the importance of time constraints in cognitive processes.

In a cross-sectional study, **De Vita, Costa, Tomasetto, *et al*** studied the function of Working Memory (WM) in supporting early math learning and the contributions of different WM domains as well as processes to mathematical performance. The study analysed 66 second-year preschoolers and 110 first-graders. Multigroup path analysis was used to investigate the relationships between domains and processes of working memory and early math knowledge in each age category.

The analysis yielded intriguing insights regarding the contributions of various processes and domains of working memory to early mathematical knowledge. Visuo-spatial low-control WM forecasts initial understanding of math in infants, whereas verbal low-control WM predicts early understanding of math in first graders. On the other hand, visuo-spatial high-control WM and numerical–verbal WM emerge as significant predictors for both age groups, particularly among preschoolers. These results shed light on particular WM domains and processes that exert the greatest influence on the formation of early mathematical knowledge at various stages of development. Implications of the study include the potential design and implementation of training interventions that focus on specific WM skills and are tailored to the requirements of children before they begin formal education.

Peng and Kievit (2020) discussed the significance of academic and cognitive development in children's overall development in a very informative article wherein recent research findings on the two-way relationship between cognitive capacities and academic achievement were discussed.

The review's findings indicate several important points:

1. Academic achievement and mental abilities, such as working memory, reasoning, and executive function, influence each other's development, especially in reading and mathematics.
2. The development of reasoning skills is influenced positively by direct academic instruction.
3. The bidirectional relationship between cognitive skills and academic achievement appears to be weakened in children from disadvantaged backgrounds, such as individuals with special needs or socioeconomic disadvantage.

In accordance with the theory of mutualism and the transactional model, these findings suggest that superior quality education play a crucial role in nurturing children's academic and cognitive development. The article emphasised the significance of enduring and effective educational environments that can stimulate cognitive-academic bidirectionality and promote the holistic development of children.

Pascual, Muñoz, & Robres (2019) investigated the relationship between working memory (WM) and math and textual literacy. Multiple frameworks of WM were put forward including one that differentiates between verbal and visuospatial WM based on modality. The objective of the investigation was to establish a connection between these WM modalities and academic performance, focusing on the distinction between mathematical and literacy tasks. Middle school students were evaluated on a variety of WM, mathematical, and literacy tasks.

Verbal and visuospatial WM can be distinguished, as confirmed by confirmatory factor analyses. In addition, the predictive power of these distinct WM factors to explain discrete parts of variance in math and reading varied. Overall, the results, emphasise the significance of recognising and taking into account the various working memory modalities when examining the connection between mathematics and reading academic achievement.

This longitudinal study by **Wilde et al (2016)** examined the interaction between kindergarten and early elementary school children's working memory development and their relationships with teachers and peers. Over the course of two school years, kindergarten and first grade, the study followed 1,109 students, half of whom were boys. There were three assessment waves: in the fall and the spring of the first academic year, and in the springtime of the second academic year. A visuo-spatial

working memory assignment was used to evaluate the children's working memory abilities.

The results uncovered compelling developmental links among working memory and the calibre of relationships with instructors and peers. Particularly, lower working memory levels were linked with a subsequent rise in teacher-student conflict and drops in teacher affection after a complete school year. Similarly, low working memory values were associated with a decline in social likeability during the same educational year. Intriguingly, an inverse relationship also appeared, with teacher-child conflict displaying an adverse correlation with the growth of working memory throughout the entire observation period. The established connections among working memory and social-relational variables stayed consistent through genders.

This study highlights the complex connection between the improvement of working memory and relationships with others in the context of early elementary school. The research suggests that the development of children's working memory may be fostered by positive interactions and relationships with teachers during their early years.

Ashley Goodwin (2016) investigated the working memory deficits of children attending either Special Educational Needs (SEN) or regular primary institutions. The research consisted of 28 participants between the ages of 7 and 11 who attended either a Special school or a regular elementary school. To evaluate working memory, participants completed the Automated Working Memory Assessment (AWMA), while instructors provided input via the Working Memory Rating Scale (WMRS) and Strengths and Difficulties Questionnaire (SDQ) for all those who participated. SPSS was used for a t-test with independent variables and Pearson's correlation coefficient for statistical analysis.

A t-test conducted revealed no statistically significant distinction between the two categories of institutions in terms of working memory. In addition, Pearson's correlation coefficient revealed a significant adverse relationship between impulsivity and both verbal and visuospatial working memory ($r = -0.515$, $p = 0.005$ and $r = -0.458$, $p = 0.014$, respectively). Unsurprisingly, there was no correlation between AWMA and WMRS. The outcomes coincided with those of previous research, confirming the reliability of the results. The study provided additional evidence for the considerable connection between hyperactivity and working memory. In addition, it cast light on the identification of working memory deficits and highlighted the

challenge instructors may have in recognising these issues. The study also suggested avenues for future studies to attain a more comprehensive and detailed comprehension of working memory in elementary school children.

This study not only contributes to the current understanding of working memory deficits, but additionally highlights the significance of treating hyperactivity-related conditions that have an effect on working memory. In addition, it highlights the importance of enhanced identification and support strategies within the educational context.

Reading employs a variety of mental processes, which include elementary tasks such as alphabet and word recognition to far more intricate procedures such as using working memory and applying efficient methods of learning. For complicated cognitive duties such as text comprehension, the ability to store and analyse information, that is dependent on working memory, becomes critical. So a research was explored which involved special ability students and was related to their reading skills.

The goal of this research conducted by **Nicolielo-Carrilho, Crenitte, Lopes-Herrera, & Hage, (2018)** was to evaluate the implementation of metacognitive techniques in reading, focusing on the phonological working memory among learners with disabilities related to learning. Furthermore, the study sought to determine if there is a correlation between these abilities and reading comprehension.

A total of thirty students, of both genders, aged 8 to 12 and engaged in elementary school comprised the study's sample. These individuals were separated into an experimental group (EG) and a control group (CG). Each participant was evaluated on their reading comprehension, phonological working memory, and use of metacognitive reading techniques. Using the Mann-Whitney test, a comparison of the information gathered from the two groups was performed. In addition, prospective correlations between variables were analysed using the Spearman correlation coefficient.

Comparing the experimental group (EG) to the control group (CG) revealed statistically substantial variations in the information at hand. In particular, a significant positive association was found between comprehension of texts, phonological working memory, and metacognitive test scores.

Students with learning disabilities demonstrated deficiencies in both phonological working memory and the use of cognitive techniques, according to the study's findings. The strong and positive correlation between the assessed abilities supports the idea that deficiencies in phonological working memory and the implementation of metacognitive strategies can indeed hinder reading comprehension.

The link among working memory skills and performance on national curriculum tests in English, math, and science was investigated by **Gathercole, Pickering, Knight & Stegmann (2003)** in 7 to 14-year-old children. At age 7, proficiency across language and math were substantially correlated to mental capacity, especially execution of complicated span activities. At fourteen years of age, substantial correlations persisted within sophisticated cognitive test results as well as achievement levels in math and science subjects, but there were no significant correlations between English proficiency and working memory capability. The outcomes indicate that the mental operations required in math and science are limited by the average working memory capacity throughout infancy. While achievement in learning the basics of literacy (as measured by English examinations at the earliest age) correlated as well to cognitive capacity, accomplishment in the more advanced abilities of understanding and evaluating the content of literary works in English (measured at 14 years) was independent of working memory capability.

Allan Baddeley (2020) discusses the consensus among various theories regarding verbal short-term memory in his book. If verbal short-term memory were to be represented by a single task, it would be digit span, in which lengthier sequences of digits occupy a larger portion of the short-term storage system. This theory assumes that working memory is supervised by the central executive, a mechanism for attentional control, and is not merely a memory system. It adheres to the model proposed by D. A. Norman and T. Shallice, which proposes two modes of control: one based on established practises and the other on a limited attentional executive. In addition to directing attention to the current task, the central executive is also responsible for the ability to divide attention between multiple duties.

2.2 Study Habits

A study was undertaken in the southern state of India, to understand the study routines of the medical pupils of first year and to see if there was any relationship of the same to the way they perform in their exams. For this **Sreelekha V. et al (2016)** took a

sample of 80 first year MBBS students which included both the gender. The participants self-assessment test which has been developed by M Palsane and Sadhna Sharma, to assess their study habits. On the basis of these scores, the students were grouped into two categories. The first group consisted of students who had good study habits while the other group was of students who had poor study habits.

The Group I students were the ones who had a total PSSHI score of >210 while those with the total PSSHI score of <210, formed Group II.

Since the PSSHI consisted of 6 domains, in which the study habit scores were measured, any student with a domain score of >35 was also considered to be the one with good study habit skills. Anyone getting less than 35 in a domain, was earmarked as a student with poor study practices.

For measuring academic achievement, the researchers used the scores on the haematology test. The total marks obtained were out of a maximum of 25 and anyone with >50% marks (i.e., 12.5) was considered as a student with good academic performance.

For both the groups the scores of PSSHI were compared with the academic performance. It was found that the Group I which had a high study habits scores also had high academic performance in the test conducted on Hematology. The coefficient of correlation obtained for the first group was 0.87 for which the p-value was <0.0001, and it was statistically significant and meaning those having proper study routines and patterns fared better in the exam. For Group II, there was a similar observation. The coefficient of correlation (r) was 0.98 and the p-value was <0.0001, and it again was very substantially important. This meant that individuals with weak study habits had lower scores on the test of section completion.

Researchers concluded that good study habits result in better academic performance. However, they also noted and suggested that the surrounding factors of the students – the parents, the teachers and college administration– should concentrate on helping all students create healthy study habits rather than seeing how many hours did the student study or how many tests were conducted and their frequency or how many teaching hours were devoted to them. The emphasis should be on smart learning rather than just hard work.

Since this study was conducted only on first year medical students, there is a scope to extend this research to other faculties of learning and the same can also be done on school level to see what relationship exists among study habits and academic performance. Also, no other factor, like achievement motive, was considered and hence the need for the current study.

Continuing with the researches related to study practices as well as the academic achievement, one more research comes to light which was done by **A.S. Arul Lawrence in 2014**. A survey was used in this study, to acquire data from 300 high school students, i.e., students who have completed their 10th Standard and were either in 11th or 12th standard. Also, for the purpose of measuring their academic performance the researchers used the marks obtained in the quarterly exams conducted by the schools. For the measurement of study habits of the students, the Study Habits Inventory by V.G. Anantha (2004) was used. The statistical techniques used included percentile analysis, 't" test, ANOVA and Pearson's product moment correlation.

The data analysis revealed that majority of students in both Class 11th and 12th had moderate levels of study habits. The same inference could be made for academic achievement, wherein 698.9% of Class 11th students had moderate academic achievement while 57.7% of Class 12th students had moderate academic achievement.

A significant difference was found among the study practices of 11th Standard and 12th Standard school children, with Class 12 students having superior study habits. It was also noted, that the same could be because Class 12th was an important intersection in the life of students as the results determine what future professional course they can enroll into.

The data also revealed that the residential status of the students had a significant impact on the students' study behaviours. This meant that the study habits of hostellers were better than the day-scholars.

However, there was no correlation between secondary school students' study practices and their academic performance.

Quilez-Robres, A., González-Andrade, A., Ortega, Z., & Santiago-Ramajo, S. (2021) explored the relationship between study habits, general intelligence and short-term memory as well as to identify their capacity for predicting preschool students' academic performance.

According to the Programme for International Student Assessment (2015), low academic performance is a significant issue that is associated with difficulties in securing improved employment, which in turn leads to people taking jobs that are not stable and lower paid. This cycle can be prevented if early intervention programs could be designed and implemented during elementary schools which uncovers the factors related to academic performance. There are numerous studies which were conducted to identify the most influential factors for academic success. While there have been several researches which have pointed out that intelligence capacity is one of the most important factors for the academic achievement, however, with respect to other cognitive factors, short term memory has also been researched to in relation to this.

It is crucial to note that STM enables the retention of information for a limited amount of time and requires no executive control **(Swanson & Kim, 2007).** Also, intelligence quotient is highly correlated with working memory **(Conway et al, 1999).**

Among non-cognitive factors, study habit is one of the most important one. Few researchers have found that college students' study practises and motivation are significantly related to their academic performance **(Crede & Kuncel, 2008)**.

The non-cognitive factors are independent of the student's intelligence though they are directly related to acquiring new learning **(Crede & Kuncel, 2008)**. The researcher noted that there have been many studies which have tried to find a correlation of various factors and their effect on academic achievement, however, these were spread over several different age groups ranging from 11-15 years, or 13 - 15 years or 17-44 years. As such the researcher wanted to focus on elementary school students and find out the most important predictor of academic performance amongst study habits, short-term memory as well as IQ over two-year period. For this, a sample of 74 elementary students was selected from Aragon (Spain).

To measure the abovementioned factors the investigators employed tests developed by Yuste for testing intelligence and memory. To understand the study-habits a questionnaire developed by Alvarez et al (2015) was used while the school children's academic achievement was measured by their grades obtained in the last exam.

The collected data revealed a correlation between academic performance and the three variables of studying patterns, IQ, and short-term memory. The researcher also included age as a controlled variable and however, no significant correlation was found. According to the multiple regression analysis, the factors in question have a 59% prediction potential with $p<0.001$. Though the short-term memory, gender and age were not significant predictors but, study habits and IQ were significant predictors.

The findings suggest that the parameters can predict 12% of the difference between the third and fourth grades. IQ and study practises were significant factors once again. This meant that the study habits and IQ are associated with opposite effects on academic year-to-year change.

This study was focused on elementary school students to enable devising early intervention program to get the desired results which could have positive effect on students' academic achievement. However, this research was being done for the adolescent students to see how verbal working memory can predict the students' academic achievement.

Evans and Julius (2015), carried out a research on the association of students' academic performance and their study habits among Spicer Higher Secondary School students in India. In this particular research, the effect and influence of students' study practices on their performance in school were observed. A quantitative study was conducted on a randomly stratified sample of Indian respondents.

The 9th grade students of Spicer Higher Secondary School were chosen to establish a correlation between the study practises inventory by N.M. Palsane and school evaluation transcripts. Findings' interpretation and recommendations were computed and analysed using Pearson's product moment correlation coefficient. The research revealed a remarkable 0.66 correlation between study habits and academic performance. In order to improve academic performance, it is evidently necessary to cultivate effective study habits. Though the entire learning and teaching process in all institutions is geared towards the accomplishment of higher academic performance, little is done to improve students' study habits in order to achieve this goal. The result indicates that institutions do little to cultivate study habits. Students are expected to have excellent study habits, while teachers are expected to be knowledgeable about the application of study principles, in order to provide guidance on study techniques.

Study patterns differ from person to person, but certain habits that enhance academic performance can be inculcated. Habits including scheduling study time, regularly attending classes, concentrating on study, and managing the school and home environment. Instilling good study habits proactively at the elementary level will foster elevated values and stimulate the academic environment. To improve students' study habits, instructors should enforce interactive relationships with students that encourage intellectual reflection. The research findings suggest that parents, instructors and students should recognize positive study habits, discover methods to improve them, and implement them in educational institutions in order to increase student academic achievement.

Learners who invest greater time in class are more successful **(Battle and Lewis, 2002)**, and individuals working harder are more successful **(Carbonaro, 2005, cited by Barry, 2006),** according to previous research on study practises.

According to **Issa et al. (2012),** students' regular reading practises influence their study behaviours and future educational achievement. The correlation among students' reading habits and their academic performance is widely acknowledged.

He investigated the reading preferences as well as interests of majors in different branches at the Polytechnic institute in Offa. The study employed a survey research methodology to acquire information. To assure the reliability of the instrument, students of accountancy stream, from the same institute participated in a pilot test. The Reading Interests and Habits Questionnaire (RIHQ) had a reliability coefficient of 0.88. 246 of the 250 questionnaires administered were considered for analysis.

The findings indicated that the majority of students engage in utilitarian reading. Particularly during examination periods, they inclined to study their own notes and course books. Their main resource of their material to read was their instructors' educational materials and journals. The study identifies several factors that impede the development of their reading inclinations and practises, such as an unfavourable atmosphere at home, the a low socioeconomic standing of their parents, limited access to relevant reading materials, and a lackadaisical attitude. To address the above issues, the study suggests nurturing a conducive home environment, reorienting parenting strategies, and improving the operational efficiency of the school library system.

In a research done by **Bhan and Gupta (2010),** the academic performance and study practises of scheduled caste and non-scheduled caste students, were evaluated. The findings of the research indicated that there was no substantial impact of on the academic achievement and study habits of students in question.

Reading involves contemplating, evaluating, assessing, envisioning logical reasoning, and solving problems. It is an indispensable tool for knowledge transfer, and the reading habit is a learning process that enhances techniques for reading. By perusing papers, books, and different periodicals, a child facilitates himself in learning about the global community and its environment. Once a child has learned to read and cultivated a passion for literature, he can investigate a vast array of life experiences and information through reading. It is difficult for children to develop good reading habits later on if they are deprived of the opportunity to interact with books during their formative years.

Higginbotham (1999) investigated the reading habits of 6^{th}, 7^{th} and 8^{th} graders in a metropolitan, public school in Atlanta, Georgia. The purpose of the research was to identify significant patterns in reading preferences and to identify possible gender-related differences. It was hypothesised that the findings would indicate differences in gender as well as different categories of reading interest.

The analysis employed a chi-square technique to evaluate the reading preferences across the whole group as well as to assess reading preferences among boys and girls. The results of the investigation disclosed notable reading preferences among the students. Humour as well as horror appeared to be the most popular categories, with additional interest reported for books/literature which dealt with suspense, history, science and adventure, while literature related to animals were popular in the non-fiction piece.

The findings of the research revealed significant gender-based disparities. Female respondents favoured literature which dealt with Friendship, Animal, Romantic relations, Risks and Adventure, as well as history more than their male counterparts. On the contrary, male participants exhibited a greater preference for Sports and Science. Additionally, the findings revealed that male participants strongly preferred non-fiction more than their female counterparts.

Additionally, **Ward (1997) and Agbezree (2001)** undertook a study on the primary and secondary levels of education in Ghana.

In a horizontal descriptive-analytical research **Jafari, H., Aghaei, A., and Khatony, A. (2019),** investigated the association between medical sciences students' study practises and their educational achievement at the medical college.

380 students were randomly selected from different faculties using proportional sampling.

The study aimed to answer three questions:

1) the status of students' study habits,
2) the status of students' academic achievement, and
3) the connection between study-habits and academic success.

The results showed a significant correlation among students' study-habits and their academic achievement.

In this study, the size of the sample was determined by using a computer software. The goal was to have a minimum of 328 participants. To account for the potential of 15% non-response, 380 students were enrolled from several faculties at the university. The samples were randomly selected from each faculty in proportion to the number of students, using a random number table. The criteria for inclusion were the willingness to participate and being in their second term or higher. Participants who were absent on the sampling day or failed to complete the questionnaire in full were excluded from the study.

Personal information forms and study-habit test (PSSHI) comprised the research tools. The personal information form collected information regarding gender, marital status, age, medical branch, diploma, historical data related to educational probation, birthplace, and past term GPAs.

The PSSHI, developed in India in 1989, serves as a reliable tool for measuring students' study habits. The original questionnaire's validity and reliability has been established in previous research by Siahi and Maiyo and its Persian version has been reported to have a reliability coefficient of 0.88 by Rezaie Looyeh H. In this study, content validity was determined by having 12 panels of KUMS experts review and provide feedback on the questionnaire, which was then modified accordingly. The

reliability was tested using the test-retest method and was found to have a correlation coefficient of 0.87.

The PSSHI assesses various aspects of study patterns and routines of the learners, like how well they manage their time, how is their surrounding environment, how motivated they are towards their education, how they prepare and appear for their exams, what are their reading capabilities and how often do they take notes while in classroom or while studying. They have to respond how often they do or not do a particular thing for each question and they are given scores from 2 to 0. A score of 60 or above on the questionnaire is considered desirable, 31-59 is considered moderate, and 30 or lower is considered undesirable.

Academic achievement was determined by the student's past term GPA, with scores of 17 or higher being considered good, 14-16.99 being considered moderate, and below 13.99 being considered poor.

A review of the literature on the interaction between studying routines and academic success reveals that study habits perform a crucial part in determining the educational success of students. Many researches have shown that students with good study habits, such as studying in a quiet place, studying daily, taking notes, having regular rests and breaks, and prioritizing difficult content, outperform those who have poor study habits, such as procrastination, studying in inappropriate conditions, and exposure to distractions like loud music and television.

How study practices and academic achievement are related, this area has been studied in several settings, including medical schools, and the results have been consistent across different populations and geographies. A study conducted at 21 Iranian medical universities revealed that a third of students lacked significant study techniques and routines, and students with better study habits tended to have better academic performance. Other studies have discovered a strong and statistically significant connection between the way students study and their academic performance. According to Lawrence, however, there are studies that have discovered no correlation between study practises and academic performance. This variation in results demonstrates the complexity of the connection among study practises and academic performance, which is possibly impacted by a variety of factors including individual differences, the setting in which one studies, and other private and social variables.

In conclusion, the literature review leans towards the idea that study habits play a critical role in academic performance and that students who have better study habits tend to have better academic outcomes. However, further research is needed to fully understand the relationship between study habits and academic performance and to identify the best strategies for improving student study-habits and academic success.

To understand effects of different factors which could affect the performance of the learner community in school, a research was undertaken for understanding the adolescent students' study-habit patterns along with impact of their socio-economic status by **Prof. Shubha Vyas and Garima Choudhary in 2016**. The researchers used a study-habit test and Socio-economic standing Scale to measure adolescent students' study behavior as well as social and financial standing in India. The sample consisted of 450 students from the schools of Delhi, where each region was covered by 2 government schools and 1 private institution. The students were categorized into 3 socio-economic status (SES):

a) High
b) Middle, and
c) Low

The study habit scores for each category, further categorized by gender, was compared using one way ANOVA. Correlation technique was also employed in determining what relationship between did the socio-economic status had on study habits.

There were some interesting findings from this research. There was no significant variance in the study practices of teenagers across both the gender. Also, the same was true for the higher socio-economic status students, i.e., the gender had no influence over study patterns and routines of adolescent students among higher socio-economic status. Similar was the observation for the students among the middle socio-economic status.

A different observation was however made in the low SES adolescent students, where female scored higher on measures of study-habits compared to male students. This meant that the gender of adolescents with the same low socio-economic status affected their study patterns.

However, when it came to study habits pattern among the different categories of socio-economic status, there were significant differences which were observed. Similarly, average study habit scores of adolescents with higher socioeconomic status were higher than those of adolescents with intermediate socioeconomic status. Similar results were found between the average study habits scores of students with medium and low socioeconomic status; the average score of study-habit for students pertaining to the middle level of SES were higher than those of low SES students.

Evidently, a significant correlation amongst the social and financial condition as well as study habits among adolescent students was observed.

The relevance of this study is more due to the fact that looking at our current social fabric, there are vast differences in the availability of resources for students of different socio-economic status. Such studies help in laying down strong arguments for establishing a system where all students are given equal opportunities and those with less exposure to the learning resources, are given priority, so that as a nation, we can ensure that every student realizes his/her full potential.

While this study takes into account one important social factor of economic status and its impact on the study habits of adolescents, not much has been done to view other factors like effect of verbal working memory of students and its impact on their study habits. Also, the above research was done on school students, while the current research focusses its attention on both school as well as college students.

To understand the connection between the study habits and its influence on learning and the academic achievement, a research was done by **Rezaie Looyeh et al., in 2013-14** on the medical students of the Guilan University in Iran. It was descriptive and an analytical study which was conducted to learn more about the above objectives.

The sample selection was done using stratified sampling method. The data was collected through a study habit test, where questions regarding 8 areas were asked. According to data collected from 461 students, most of the students demonstrated academic performance which was average. The analysis established the correlation between various areas of study practices and academic achievement. The findings demonstrated high correlation with the area of “noting” and academic performance whereas the relation of “wellness” with the academic performance was the least. This

meant that students who had habit of taking notes, they remembered the concepts better and hence their academic performance was better than the ones who did not keep proper notes. Those students who did not take notes, often relied on the notes of their classmates and which often resulted in academic results which were less desirable. Similarly, the low correlation of academic performance with the wellness score was linked with the fact that even when students are not well before the exams, they dedicate their time studying for their exams and hence they are able to perform better.

Overall, the research discovered a significant relationship within students' study behaviours as well as academic success. In addition, they determined that the study habit scores were able to forecast 6.8% of academic performance shifts.

The aim of the study was to provide insights to the educators, planners and the students as to what they can do to enhance the overall learning experience and hence the academic performance. The identification of areas of improvements in the study habits and timely intervention can provide better results in terms of academic performance. Since one can teach study habit skills if proper strategies are included in the curriculum of the students and they are directed to follow those, this can show positive results in their performance not only in the field of education but also in future where one seeks to build a career.

The research does not include Indian students and also is limited to college students that too in the field of Medical science. Our research tries to study the effect of verbal working memory and its impact on study habit and the academic performance as well as achievement motive of students in India.

Kaur and Singh (2020) compared the connection within study habits and academic achievement. The intent of this research was to find out how various study practises affected students' performance in school.

The analysis was done by employing a method of quantitative analysis and gathered data from a representative sample of students. Participants filled out self-report questionnaires evaluating their habits related to their studies and their performance in the school.

The study uncovered a strong correlation among study practices and academic achievement. The students’ academic performance with effective study habits was

typically superior to that of students with weak study habits. Effective study habits included time management, organization, active learning strategies, and consistent review.

These findings demonstrate the significance of developing effective study habits for enhanced academic performance. The study indicates that promoting time management, organization, and active learning can have a positive effect on students' academic performance.

The association between mental health, achievement motivation, and academic performance of medical sciences students was the focus of the research. The researchers intended to investigate the interrelationships between these variables and the potential influences of background factors. The sample comprised of 430 Kurdistan University of Medical Sciences students chosen at random.

The researchers used the health questionnaire and a motivation test to assess mental health and achievement motivation, respectively. The correlation between mental health and achievement motivation was statistically significant (p .001), indicating that students with superior mental health tended to be more motivated (p .001). However, there was no correlation between mental well-being and academic achievement.

In addition, the investigation discovered a strong correlation between achievement motivation and academic performance (p =.025). This indicates students with higher motivation to attain their learning objectives performed better academically. No correlation was found between demographic factors and mental health; however, discipline of study and marriage status were correlated with academic success and motivation to succeed.

To conclude, the study emphasizes the significance of maintaining students' motivation, especially in the medical profession, as it is crucial to their academic success. In addition, students with improved mental health tended to demonstrate greater academic motivation. These findings highlight the importance of bolstering students' motivation and mental health to improve their academic performance in the medical sciences.

The objective of **Sherafat and Murthy's (2016)** study was to examine the study patterns and educational achievement of middle and high school pupils in Mysore.

The researchers wanted to investigate if any relation existed between these students' study behaviours and academic achievement.

Using a stratified random sampling technique, the research was carried out on a randomly selected group of 625 understudies from Mysore, India.

Secondary and senior secondary school students from multiple Mysore, India, institutions participated in the study. The researchers obtained data through self-report questionnaires that measured study habits of pupils and garnered information about the academic accomplishments as well.

The results of the study revealed a strong connection between study habits and academic performance. The academic performance of students with effective study habits was typically superior to that of students with weak study habits. Effective study habits included time management, organization, active learning strategies, and consistent review.

These findings lay importance on the significance of developing and promoting effective study habits among students of middle and high school for improving the students' performance in school. The investigation suggests that time management, organization, and active learning can have a positive effect on students' academic performance.

In the study conducted by **Verma (2016)**, the relationship between high school pupils' study habits and academic performance was analyzed. The investigation sought to establish significance of the correlation among learners' ways to study as well as their academic achievement.

The sample consisted of high school pupils, and self-report questionnaires were used to collect data. These questionnaires assessed various aspects of students' study routines, including their study schedules, time management skills, organizational techniques, and levels of concentration. In addition, the academic accomplishments of the students, such as their grades and test scores, were collected.

After analysing the data, this research showed a strong correlation among study practises and academic achievement. In particular, students with effective study habits tended to have higher academic performance than those with ineffective study habits. Effective study habits included maintaining a structured study schedule, managing

time efficiently, employing effective organization techniques, and maintaining concentration and focus during study sessions.

This study's findings emphasize the significance of fostering and promoting effective study habits among secondary school students. Implementing study techniques such as effective time management, organization, and concentration can have a positive effect on students' academic performance. Students are more likely to maximize their learning potential and attain superior academic outcomes if they cultivate these study habits.

Milton J. Dehn's 2008 book, "Working Memory and Academic Learning: Assessment and Intervention," focuses on the connection within working memory and success in the academia. The book discusses the difficulties that working memory deficits cause for students in the classroom, impairing their ability to acquire and retain information. Dehn provides thorough insights into working memory capacity evaluation and offers useful intervention options for parents and teachers to help students who struggle with working memory.

The importance of working memory in a variety of academic tasks, including reading comprehension, solving mathematical problems, and obeying directions, is emphasized throughout the book. It describes how working memory is involved in executive functions, attention regulation, and sophisticated cognitive processes that are essential for effective learning.

In order to help educators and psychologists discover areas that need attention, Dehn provides numerous evaluation techniques and approaches. Teachers can adapt interventions to address specific deficits and assist students in creating coping mechanisms to enhance academic achievement by assessing a student's working memory profile.

The book provides intervention tactics that are intended to improve working memory capacity and lessen its negative effects on learning. These methods include teaching methods, study tools, and flexible learning settings. The objective is to give students the tools they require to manage their working memory constraints and achieve academic success.

This book offers educators, psychologists, and parents a thorough resource for helping kids with working memory issues. It emphasizes the significance of early detection

and intervention in order to generate better learning outcomes and experiences for kids in academic contexts.

Alzahrani, Park, and Tekian (2015) aimed to analyse medicine students' association among the study patterns, gender, as well as variables which are not related to learning, and their academic achievement. Scholars at Taif University were surveyed regarding their study habits, like study time, study companions, study interruptions, attention difficulties, breaks, study materials, study exertion, and delayed study.

59% of the 257 pupils who responded had an excellent grade- point normal (GPA), while 41% had a low GPA. Half of the population was of men and half were women. Significant differences were observed with respect to time spent studying, study materials, study interruptions, and study enjoyment between scholars with high and low GPAs. Study time, study styles, breaks in study, exertion of the students, and delayed study time displayed gender differences.

The study concluded that gender differences in study routines have a substantial impact on the academic achievement of the participants. In light of significance of academic achievement in medical education, the findings emphasize the need for curricular variations and interventions to ameliorate literacy issues. These findings can be used to enhance educational strategies and grease the enhancement of medical pupil learning issues.

Hassanbeigi, Askari, Nakhjavani, M., et al., (2011) conducted a study to determine the connection among multiple study skills as well as the academic success of undergraduates. Here is a summary of the most important aspects study:

Subjects included a total of 179 boy and girls studying dentistry as well as medicine.

The "Study Skills Assessment Questionnaire" served as the researchers' tool. This survey came from Houston University's counselling services and was validated by ten psychologists and faculty members the university.

The statistics collected from those who participated were analysed with the Kruskal-Wallis test, a form of non-parametric statistical analysis utilised for comparing groups.

Individuals with a greater overall grade point average (15 or more out of 20) exhibited significant greater success in all seven examined skills, according to the study's

findings. These abilities included managing time and putting off tasks, memory and focus, study aides and taking notes, strategies for tests and test anxiety, organising and digesting data, motivation and attitude, as well as reading and identifying the main idea.

The research concluded, according to its findings, that instructing undergraduates on study skills could play a significant role in enhancing their academic achievement.

This study emphasises the significance of study skills to the educational achievement of students. It indicates that students with superior study abilities have higher GPAs on average. This knowledge may be useful for educational organisations and teachers who are thinking about integrating study skills enhancement into their educational programme in order to improve the academic performance of students.

2.3 Achievement Motive

The partnership between motivations for success and relational frameworks for goals in educational settings has been the subject of extensive research. The interaction between individual achievement incentives (such as competition, work competence, and loss aversion) and competitive or cooperative objectives in schools was the focus of a study by **Zhou and Wang (2021).** The relationships between these variables, as well as reading achievement and reading self-concept, were investigated using a supplementary multiple level assessment of data from China and America from the PISA 2018 study. Competitiveness as well as work expertise motives positively influenced reading self-concept, while competitive goal structure affected reading achievement. Notably, the competitive objective structure exhibited negative moderation effects in the Chinese sample, altering the relation between work mastery motivation and academic outcomes, and between competitiveness motivation and self-concept. The study illuminates the intricate relationships between achievement motives, goal structures, and academic outcomes, casting light on their implications for educational theory and practise.

Jowkar and associates (2014) investigated the connection between achievement objectives and resilience in academia, building on the well-established achievement goal theory. This theory has demonstrated how differences in engagement, task persistence, and academic resilience can be understood in the context of achievement objectives.

Senior secondary learners which included 297 boys and 307 girls participated in this investigation. A questionnaire to measure achievement and survey which measured various skills were completed by them. Analysis of this data included Pearson product-moment correlations to investigate the relationships between variables and simultaneous multiple regression to predict educational tenacity by means of approaches towards achievement objective.

The results demonstrated significant associations among the above mentioned factors. The "mastery-approach" orientation in particular emerged as a strong indicator of home and peer care segments for educational resilience. These analysis suggest that various achievement goal orientations have varying effects on particular aspects of academic resilience. Overall, the findings demonstrate the significance of achievement goal orientations in determining students' academic performance.

Bargamadi, Mahdian, and Yamini (2019) sought to evaluate the effects of teaching Mindfulness and Working Memory on educational well-being, scholastic self-control, and motivation for achieving academic success of students in secondary schools. A semi-experimental methodology with two stages of testing structure and a control group comprised the study. The sample consisted of 45 individuals with lesser scores on the three dependent variables, who were separated into one control group and two experimental groups.

Using the Educational Well-Being Questionnaire by Tuominen-Soini et al. (2012), the Self-Regulatory Questionnaire by Kanle and Royan (1987), and the Achievement Motivation Questionnaire by Abd Khodaie (2008), data were collected. The experimental groups received training in mindfulness and working memory, while the control group did not. Both intra-group (test) and intergroup (group membership) factors were considered in a variance analysis to determine the efficacy of the interventions.

According to the findings, both mindfulness education and working memory training improved academic well-being, academic self-control, and learning motivation among students. In addition, the results revealed a substantial distinction efficacy of working memory training and mindfulness education. The study concluded that mindfulness training is more effective than working memory training in enhancing academic well-being, academic self-regulation, and academic performance motivation.

In the study conducted by **Marion A. Eppler & Beverly L. Harju (1997)**, the researchers explored the applicability of Dweck's model to college going students. As per the Dweck's model of achievement, individuals can either of the two mindsets:

1. fixed mindset – where individuals are of the view that their abilities are fixed and hence, they focus more on demonstrating their abilities to avoid failure
2. growth mindset – where individuals believe that with additional effort abilities can be learnt or improved

Also, as per the model, there are two types of goal orientations:

1. performance goals – where the focus of the individual is to demonstrate competency and outperform others
2. orientation goals – where focus is on learning new skills and better learning

The researchers' objective was to examine association of goal orientations as well as educational achievement of college scholars. Within the college students, the two groups studied were – traditional and non-traditional. The traditional students were defined as the ones who were below the age of 25 years, not married and were not employed for more than 20 hours per week. Any other student, who did not meet any one of the above criteria, was classified as non-traditional student.

To measure the achievement motivation goals the Achievement Motivation Inventory was used. Educational achievement was measured by using the average of grade point, which was obtained from the University records.

The sample consisted of 262 undergraduate students. Statistical tools were employed to study the variance in the average of the two groups of students, and multiple regression analysis was employed to study the association between academic performance and goal orientations, while controlling other factors like age, marital status, work status and gender.

The results were on the lines of the Dweck's model, where both the group of students have higher preference for learning goals than performance goals. However, the non-traditional students' endorsement was more than the traditional ones.

The results also demonstrated that educational focus could be used as a more precise indicator of academic success than the status of the students. This meant that the motivational factors were more important than the demographic factors.

It also found that for traditional students who had irrational beliefs about their performance were less likely to do well in their studies. While for non-traditional students, work hours had an inverse relation with their academic performance.

In summary, the study highlighted that goal orientation was an important predictor of academic success of both traditional as well as non-traditional students. The findings can help the policymakers and learning community to develop interventions and programs that could address students' motivational factors to improve the academic results.

However, in India, the concept of traditional and non-traditional students is not much prevalent and also, the current literature does not take into account the cognitive factors like verbal working memory, to see how it can impact the academic results of the students. Also, this study only dealt with the college going students. But since the idea of how success looks like, starts taking shape during the school years, it is necessary to study that age group and see how motivation and academic performance can be liked to each other.

In a study conducted on outstanding students of Majmaah University by **Mai Fathi Al-Baghdadi et al., (2021)**, a highly significant positive connection was discovered across academic motivation and working memory. In fact, a positive correlation was found in both the audio number memory as well as the category classification memory with the achievement motivation. Additionally, it discovered a positive relationship among memory of maps and directions & achievement motivation. The study was conducted on 60 students of the university whose GPA scores were equal to or more than 4.5.

Executive functions and its various components, which include working memory as one of its components, have been studied together to find out how they affect the academic performance. In a research by **Court Pascual et al (2019)** on 133 children aged 6-9 years, an investigation was done to find how the relationship as well as the forecasting capability of the executive skills and its various components with the academic achievement – both general achievement and specific achievement in the subjects of Language Arts and Math. The relationship obtained between overall achievement and academic performance as well as specific achievement and academic performance, was not significantly different:

- Overall achievement and executive functions - r=0.392
- Specific achievement Language Arts and executive functions - r=0.361
- Specific achievement Mathematics and executive functions - r=0.361

However, working memory component of executive functions demonstrated a stronger relationship with overall as well as specific achievement.

- Overall achievement and executive functions - r=0.512
- Specific achievement Language Arts and executive functions - r=0.475
- Specific achievement Mathematics and executive functions - r=0.505

Another component of the executive functions – task monitoring showed a similar relation with the academic performance and so it was concluded that the study provided an insight into the components of executive functions which had greater impact on the academic performance, general as well as specific.

Villa and Sebastian (2021) investigated the impact of motivation to succeed, locus of control, and study practises on the math proficiency of 258 first-year undergraduates. Using self-report questionnaires, the researchers collected data from a sample of first-year college students and assessed their levels of motivation to succeed, locus of control, and study practices. Using academic performance indicators, mathematics achievement was evaluated.

The study found that, motivation to succeed, study patterns and locus of control were all significant indicators of mathematics achievement among first-year college students. Higher levels of achievement motivation and an internal locus of control, in which individuals perceive that they have control over their outcomes, were associated with improved mathematics performance. Furthermore, efficient study habits significantly predicted mathematics achievement.

These results highlight the significance of psychological factors and study habits in determining the mathematics performance of students. Fostering a strong drive for achievement, cultivating a personal sense of control, and promoting efficient habits of study may have a positive effect on students' mathematics achievement, according to the study.

ElAdl and Alkharusi (2020) examined the connections between methods of self-regulation in learning, motivation for learning, and math achievement. The focus of

the investigation was to assess how strategies for self-regulated learning as well as learning drive influenced students' mathematical performance.

238 ninth-grade pupils from the Sultanate of Oman participated.

Self-report questionnaires were used to capture data from a sample of students involved in the study. Students' self-regulated learning strategies, such as setting goals, managing time, and self-evaluation, were evaluated via these questionnaires. In addition, the study assessed the intrinsic and extrinsic learning motivation of students. The mathematical aptitude of students was also evaluated.

Significant a positive connection was discovered among self-regulated learning strategies, motivation to learn, and success in mathematics. Students who utilised efficient self-regulated learning strategies and exhibited high levels of learning motivation tended to perform better in mathematics. In particular, goal setting, time management, self-evaluation, and intrinsic motivation have been identified as key contributors to enhanced mathematics achievement.

In the context of mathematics education, the results emphasise the significance of promoting methods of self-regulation in learning and nurturing intrinsic motivation in students' learning processes. Mathematical performance can be improved by encouraging students to set objectives, manage their time well, and engage in self-evaluation. Moreover, fostering intrinsic motivation by emphasising the value and delight of mathematics learning can also contribute to enhanced performance in the subject.

Sharma and Sharma (2018) examined the relationship between motivation and academic achievement in their study. The purpose of the study was to determine how student motivation affects their academic performance.

Data was gathered through questionnaires and academic transcripts from a sample of participants in the study. The questionnaires evaluated several facets of motivation, including intrinsic drive, extrinsic drive, along with beliefs regarding self-efficacy. Individuals' educational records, such as ratings and test scores, were utilised to determine academic achievement.

The study found a strong positive relation among motivation and success in the field of education. Individuals with greater degree of intrinsic and extrinsic motivation tended to attain better academic results. Additionally, self-efficacy beliefs, which

reflect students' conviction in their academic success, were identified as an important factor influencing academic achievement.

These findings highlight the significance of student motivation to their academic success. Academic achievement can benefit from encouraging intrinsic motivation, such as by fostering a passion of learning and advocating autonomy in education. Providing external motivators, such as recognition or rewards, can also contribute to enhanced academic performance. Furthermore, fostering self-efficacy beliefs by imparting confidence and giving opportunities for success could enhance students' academic performance.

In a study conducted by **Ishihara, Morita, Nakajima, Okita, Sagawa, and Yamatsu (2021),** the connections between achievement motivation, physical heartiness, and academic performance in Japanese schoolchildren were delved. The goal of the study was to examine if any association was there among the drive to succeed, physical well-being, and achievement in school, with an emphasis on whether these connections vary between boys and girls.

12-13 year-old pupils (172 males and 153 females, totaling 325) were named by the experimenters to gather the information. Utilised measures included tone- reported questionnaires to examine achievement motivation, assessments of physical fitness to estimate colorful aspects of fitness, and academic performance data from academy records.

Both achievement motivation and physical fitness were having a positive correlation with academic achievement among pupils, according to the findings. When gender was considered, still, the association between achievement motivation and academic achievement was set up to be moderated. This suggests that the impact of drive to succeed on school achievement may differ depending on the gender of the pupil.

As a whole, the study demonstrates the significance of meaning achievement motivation and physical fitness as influential factors in schoolchildren's academic performance. It underlines the significance of taking into account prospective gender differences when analysing the complex commerce between these variables.

A stratified arbitrary sample of 400 undergraduate scholars was named for a correlation exploration by **Moghadari- Koosha, Moghadasi- Amiri, Cheraghi, Mozafari, Imani, and Zandieh.** The pupil's grade point normal was the criterion for

academic achievement. The data were analysed using multiple direct retrogression, analysis of friction, and independent t- tests.

Mean scores for were as under:

Self- efficacy – 62.18 ± 9.3,

Self- regulated literacy – 76.31 ± 11.3,

Motivation –81.83 ± 8.58.

Together, self-regulated studying, self-confidence, and motivation explain 19.6% of the variation in academic performance. Academic achievement had a strong correlation with self- regulated literacy, and self- regulated literacy was a more accurate indicator of academic performance. Scholars in the fields of nursing, from radiological department, anaesthesia, and lab sciences found a strong connection among self-controlled literacy and academic success.

Self- regulated literacy was concluded to be a more precise predictor of academic success. It appears that self- regulated literacy encourages scholars to have faith in their own capabilities and to be greater self- driven in both school as well as real-world.

A study by **Datu JA (2017)** was undertaken to study the connection between peace of mind (PoM) and academic motivation and achievement among high school pupils of the Philippines. The experimenters wished to probe the implicit educational benefits of low-arousal positive affect, particularly in societies with collectivist cultures.

525 students from the high schools participated in the study, and a variety of measures were used to assess academic achievement, academic motivation (including amotivation, controlled motivation, and independent motivation), and serenity of mind. The findings bared a number of significant findings.

First, there was a correlation between internal peace and achievement in academy, self- motivation, and controlled motivation. As it was expected, it was negatively associated with apathy. Also, a beneficial connection was set up among independent ambition and academic achievement.

In addition, the experimenters conducted bootstrap analyses, which indicated that internal peace laterally told academic achievement via its interceding goods on independent provocation.

Peace of mind accounted for around 1% to 18% of the variation in achievement in school and motivation in terms of effect.

These findings contribute to the appreciation of the function of low- arousal positive affect in academy settings, particularly in collectivist societies. They suggest that peace of mind can have positive goods on high school pupils' academic motivation and achievement.

The finding provides both theoretic and real- world counter accusations, emphasizing the significance of nurturing calmness and autonomy in educational surrounds in order to ameliorate scholars' academic performance.

2.4 Research Gap

Many studies have been undertaken which investigated the generally accepted thought process that study habits and academic achievement are connected. While doing researches it was also found that scholars tried to see what motivated the students and how it affected their overall performance. As mentioned earlier, the whole ecosystem comprising of the students, their parents, their teaching community as well as the whole society, is totally invested in how a student evolves and grows professionally and personally. Each component has their own understanding of what factors affect the student and how they can contribute to the growth of the student.

Here comes the study habits, which is the first target of all the parents and the teachers. And rightly so, it has been established in the above researches that good study habits have positive relation with educational achievement. Similarly, learning ecosystem encourages learners to feel motivated and future looking to ensure that they have all the right motivation to succeed in life; whether it is student life or a professional one.

Also, there have also been great work done where researchers studied the impact of memory with the academic performance of the students.

Memory has captivated scientists' imagination from ages. Ancient philosophers such as Plato and Aristotle discussed memory as a process of recall and a means of gaining access to inherent knowledge. **St. Augustine, Thomas Aquinas, and Giordano Bruno** investigated memory in relation to perception, knowledge, and mnemonic techniques during the Middle Ages and Renaissance. In the late 19th century and beginning of the 20th century, however, researchers such as Hermann Ebbinghaus,

William James, and Frederic Bartlett initiated the scientific study of memory as it is known today. Ebbinghaus studied forgetting curves and mnemonic techniques, James distinguished between primary and secondary memory, and Bartlett emphasised the reconstructive nature of memory. These pioneering researchers established the foundation for the current scientific understanding of memory, which continues to evolve.

Also, the idea of working memory has also become an integral part of our comprehension of cognitive processes over time. It arose from early theoretical models of mental processing with limited capacity. Working memory rose to importance with the work of **Baddeley and Hitch,** who provided a model that distinguished it as an active system engaged in the transient storing and analysing data.

Research as well as technological advancements, such as brain imaging techniques, have aided our comprehension of the neural correlates and functions of working memory. Working memory is now widely acknowledged to perform a crucial part in a variety of cognitive processes, which includes problem-solving, decision-making, language comprehension, and learning.

Though current research keeps improving our knowledge of particular processes and components that make up working memory, advancing our understanding of cognitive functioning as a whole, but specific work to understand the impact of verbal working memory (a working memory component), on the practices, patterns and routines of learning and subsequently on educational achievement coupled with the implication of how motivated the students are, was not found.

Also, the research in India has also been limited to few cities or states and there was no study being done in this regard in the southern part of Rajasthan, India.

To bridge this gap, it was decided to undertake a study which can find the impact of multiple factors: verbal working memory, achievement motive as well as the study habits on the academic performance of the students of Udaipur, Rajasthan.