

Enhancing Study Habits of Class Xii Science Students Through Structured Study Hours and Concept Mapping

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Abstract

Sonamthang Central School has recently faced a decline in the academic performance of Class XII Science boarding students, with pass rates dropping from 60% to 50%, despite structured study hours. This trend highlighted poor utilization of study time and weak study habits, as students often used study periods for homework or recreational activities rather than focused revision. The inconsistency in performance, particularly in the BHSEC examinations, not only affected the school's reputation but also impacted student enrolment and community support. In response, this action research implemented a targeted intervention involving a structured study timetable and the use of concept maps to improve students' study habits, time management, and academic outcomes. Findings from supporting studies affirmed that structured study schedules and concept mapping can enhance learning consistency, reduce procrastination, and deepen understanding.

This study utilized a mixed-methods approach to collect both qualitative and quantitative data, providing a comprehensive understanding of the issue and evaluating the impact of the intervention. The approach enabled a thorough analysis by combining numerical data with in-depth insights from both teachers and students.

Quantitative data were collected using a survey questionnaire, while qualitative data was gathered through teacher and student interview. The concept maps were also analyzed. The survey assessed both students' and teachers' perceptions of the current use of study hours and the impact of the intervention plan.

1. Introduction

1.1. Background of the Study

In recent years, Sonamthang Central School witnessed a concerning inconsistency in the academic performance of Class XII Science students, particularly among boarding students. Despite three hours of supervised study each weekday and additional study periods on weekends, there was a notable decrease in pass percentages—from 60% to 50% over the years. This decline highlighted a significant issue with how study time was utilized and suggested potential deficiencies in study habits among boarding students. In addition, the Science students' performance in the Bhutan Higher Secondary Examination Certificate (BHSEC) examination had been inconsistent. Not only the principal of the school was held accountable

for poor academic performance by XII Science students, the negative school reputation continued to effect student enrolment and community support.

The observed trend revealed that students repeatedly used their allocated study hours for completing homework or engaging in recreational activities, rather than focusing on in-depth learning and revision of academic material. This ineffective use of study time, coupled with a lack of clear guidance on optimizing study hours, contributed to the widening performance gap and raised concerns about future academic success in competitive fields. Other hand, effective study habits, characterized by disciplined routines, structured approaches, and organized study methods, significantly enhance comprehension, retention, and application of knowledge (Rabia et al., 2017; Cerna & Pavliushchenko, 2015). Research indicated that these habits are more important than the amount of time spent studying, with quality study time being a key determinant of academic success (Nonis & Hudson, 2021).

To address this issue, this action research implemented a targeted intervention designed to enhance the study habits and academic performance of Class XII Science students. The intervention introduced a structured study timetable along with developing concept maps of their study materials. This approach sought to provide a clear framework for effective study, ensure comprehensive coverage of subjects, and foster regular revision. A recent study by Suranto & Pramitasari (2024) reported that implementing a structured timetable during study hours help students manage their time effectively, ensuring balanced attention to all subjects and fostering consistency in learning, which in turn prevents procrastination and improves academic outcomes. Additionally, Sieben et al. (2021) stated that the reflective practices, such as concept mapping, further reinforces learning by helping students consolidate and connect key concepts. Together, these practices contribute to the development of productive study habits, better time management, and deeper learning, ultimately leading to academic success. By evaluating the impact of this intervention, the research aimed to offer insights into improving study practices and ultimately reversing the decline in academic performance.

1.2 Action Research Problem

At Sonamthang Central School, despite structured study hours for Class 12 Science students, there was a notable decline in pass percentages, particularly among boarding students. The current study periods were often used for homework and recreational activities rather than focused academic study, resulting in disengagement and ineffective study habits. This trend impacted the academic performance of these students, with a significant drop in the pass rate from 60% to 50%. The problem lay in the inefficient use of allocated study hours and the lack of effective study habits, leading to inadequate preparation for science subjects and, therefore, a drop in academic performance.

1.3. Aim of the Action Research

The aim of this study was to investigate whether the implementation of structured timetables and the incorporation of the use of concept maps for summarizing learning material could improve study habits among Class XII Science students during supervised study hours.

1.4. Objectives of Action Research

The objective of this action research was to:

1. To determine the impact of a structured timetable on the study habits of Class XII Science students during supervised study hours.
2. To evaluate the effectiveness of concept maps in enhancing study habits among Class XII Science students.
3. To identify how the new study structure influences the overall study culture among Class XII Science

students.

1.5. Action Research Question

How do structured timetable and concept mapping influence the study habits and overall study culture among Class XII Science students during supervised study hours?

1.6. Significance of the study

The decline in academic performance among class XII Science students at Sonamthang Central School indicates a critical gap in the effective utilization of supervised study hours. Therefore, the findings of this study hold significant value as it addresses the ineffective study habits during supervised study hours. By implementing structured timetable and concept mapping, the study aimed to enhance students' time management, engagement and retention of concepts during the study hours. The findings will not only provide actionable strategies for teachers and school administrators to optimize study hour utilization but also contribute to broader educational practices by demonstrating the efficacy of structured routines and reflective learning tools in STEM education. Additionally, the findings of the study will encourage other students to adopt this intervention in order to make best use of study hours which ultimately contributes to the enhanced study habits and improved overall academic outcomes.

2. Reconnaissance

2.1. Situational Analysis

Sonamthang Central School, established in 2009 as a middle secondary school, was upgraded to a high school in 2015 and became one of the first central schools in the country. The science stream was offered to students since 2021. At that time, the school offered classes from grades 7 to 12 and had a total enrollment of 676 students, with the majority being boarders.

The mid-term examination results revealed a significant decline in the pass percentage among Class XII Science students, marking a notable deviation from previous years. This decline was predominantly observed among boarding students, with the pass percent rate dropping from 93% the previous year to 85% that year. Out of the 50 students in the Class XII Science stream, 6 of the 36 boarding students failed, whereas only 3 out of 14 day-scholar students failed. Notably, there was no significant difference in academic performance between boarders and day-scholar students.

Further, the experience of the researcher as a principal of this school over the past 7 years (2017-2024) accepted that an ineffective use of study hours by his students has indeed resulted to lower academic achievement.

This trend was alarming, given that hostellers were required to attend three hours of supervised study on weekdays and special study hours on weekends, separate from regular class schedules. The weekday study periods were divided into one-hour sessions in the morning, evening, and night. Despite these structured study hours, teachers teaching Class XII Science students observed that boarding students frequently spent their free time on recreational activities and used study hours to complete homework or write notes, rather than engaging in deep learning. One teacher noted, "Despite the extra study hours, students seemed disengaged and often resorted to last-minute note-taking rather than focusing on understanding the concepts." The other teacher said, "Our students are not serious with their study hours." Additionally, majority of the teachers agreed that these students lacked effective study habits.

Teacher on Duty (ToD) reports corroborated these observations, indicating that a majority of Class XII Science students did not utilize their study periods to concentrate on core academic subjects. Many students admitted to using study hours primarily for homework. Some said that study hours were used to

read library books. In fact, Science students had a dedicated 50-minute library class, and the school library remained open for an additional hour after the formal academic session.

The school's academic policy mandated that boarding students attend three hours of supervised study periods; however, there were no clear guidelines on how this time should be utilized. This lack of direction may have led students to gradually perceive study hours as a time to complete homework and project works, rather than engaging in focused study of subject material.

Regarding parental guidance, the majority of parents were both farmers and illiterate, which limited their ability to assist their children with their studies. During vacations, students often dedicated their time to helping their parents with farm work or engaging in part-time jobs within the community. As a result, they had minimal opportunity for leisure reading, let alone for engaging in academic work.

Despite constant reminders from the school administration during morning assemblies and ToDs' rigorous supervision, students continued to use study hours to write their homework. The declining study habits would surely affect academic performance in science, which would ultimately impact students' eligibility to continue their education in higher education programs, particularly in competitive fields like engineering and medicine. In addition, if this trend continued, it might extend to students of other grades and consequently affect the academic performance of the school as a whole.

To address these issues, an intervention was proposed to create structured study hours for Class 12 Science students. This involved providing students with a study timetable to help them organize their study sessions effectively. Additionally, students were required to create concept maps or summary maps of what they had studied and submit them to their respective subject teachers. This intervention aimed to ensure that students studied all subjects comprehensively and regularly revised the material they had learned.

2.2.Competence

The lead researcher, who was the principal of the school, held a Master's Degree in Leadership and Management from Paro College of Education in Bhutan and brought a wealth of research expertise. The co-researcher held Master's Degrees in Education, specializing in Physics from Samtse College of Education in Bhutan. He had extensive experience and had attended Action Research workshops at the national level. Both the researchers actively contributed to supporting the teacher-researchers in the school's Action Research efforts. In 2023, three Action Research papers from the school were selected at the district level.

The critical friend also held a Master's Degree in Education from Samtse College of Education in Bhutan. He was an active research participant in the school.

2.3.Literature Review

Study habits are the pivotal factor that influence the learning and academic performance of the students. Rabia et al. (2017) defined study habits as consistent practices of the students to learn, revise, acquire, and retain information. The study further revealed that the students with good study habits usually have good time management, involve in constant revision and active learning. Hence, an effective study habits are characterized by the disciplined study routines with structured and organized approaches of studying. Such kind of study habits contributes to a significant positive impact on academic learning and performance that attributes to better comprehension, retention and application of knowledge (Cerna & Pavliushchenko, 2015). Additionally, Siahi and Maiyo (2015) asserted that while innate abilities and intelligence of the students play a role, the learning strategies and study habits that students employ are critical determinants of their academic success. Further, Nonis and Hudson (2021) while investigating on the study habits versus

study time, found that the study habits are more important than the amount of time spent for studying. The findings of the study further stated that students who have good study habits achieve better academic outcomes even though they have spent less time for studying compared to those students with poor study habits who spent more time studying. Therefore, the quality of study time is the core component of effective study habits rather than focusing on the quantity of study hours.

Developing and implementing a structured timetable during study hours is one of the effective methods in fostering productive study habits among students. It is found that the students often feel lost and confused during study hours without a structured timetable when they have multiple subjects to study, ultimately leading to wasted time and inefficiency (McVeety & Farren, 2020). Therefore, McVeety and Farren concluded that a structured timetable with appropriately distributed study hours for various subjects guides students to manage their time effectively, ensuring that equal attention is given to each subject. It further enables students to remain focused and active during study time. Moreover, a recent study carried out in Indonesia found that the structured timetable promote consistency in learning, encouraging students to study regularly rather than procrastinating and struggling to complete revision during examination time (Suranto & Pramitasari, 2024). Such kind of consistency helps students develop effective time management skills and make best use of their study time. Additionally, Yadav (2024) opined that the structured timetable assist students in managing their academic workload more efficiently while balancing academic and personal responsibilities. Hence, students can build positive study habits by creating a consistent routine that contribute to improved learning and performance, ultimately leading to academic success.

The implementation of structured timetable also empowers students to create their own study schedules based on their convenience and choice of the subjects. Such kind of empowerment enhances students' engagement and motivation (McVeety & Farren, 2020). It is found that when students are given opportunity to organize their learning, they develop a sense of ownership and responsibility which contributes to higher adherence to the study schedules or timetable that they have created. Hence, this approach fosters an engaging learning environment where students take initiative and responsibility for their own learning. Further, Reinke (2018) found that the students who follow a structured timetable during study hours have increased intrinsic motivation. The findings of the study further justified that the specific goals and timelines in a structured timetable boost student's engagement, motivation and commitment to their studies. This organized approach fosters self-regulated learning where students plan, monitor and evaluate their own learning processes effectively. Thus, through structured timetables, students will be better equipped to manage their academic responsibilities, thereby enhancing their academic performance and success.

Reflecting and summarizing after study hours is an essential practice that enhances learning and retention. Reflection helps students to consolidate what they have learned by mentally reviewing the concepts learned and making connections among the identified key concepts (Chang, 2019; Larsen et al., 2016). This process not only enhances memory retention but also make students aware of their strengths and weaknesses that help them to identify areas for improvement. Concept mapping is one of the strategies that facilitates reflection and enhances learning through visual representation of what they have learned. Sieben et al. (2021) asserted that by organizing information visually, students can comprehend and integrate knowledge more effectively that contributes to improved learning outcomes. A similar potential of concept mapping in enhancing the comprehension of the concepts is found in the study conducted in Netherlands (Eshuis et al., 2022). Additionally, Eshuis and De Jong (2022) concluded that the concept

mapping encourages active learning, enhances critical thinking and problem-solving skills by engaging students in organizing and structuring information. The findings of the study further stated that concept mapping help students make connections between new and existing knowledge which is crucial for meaningful learning. Hence, concept mapping is a valuable reflection tool that supports effective study habits in enhancing the learning of students during study hours.

Good study habits that involve consistent practices such as effective time management, active learning and revision are significant in enhancing students' learning and performance. Implementing a structured timetable fosters effective study habits by providing a regular study routine for students. Reflection at the end of the study hours through concept mapping is essential for consolidating their learning. Hence, structured timetable along with reflection through concept mapping will contribute in developing productive study habits that lead to academic success.

3. Methodology

This study utilized a mixed-methods approach to collect both qualitative and quantitative data, providing a comprehensive understanding of the issue and evaluating the impact of the intervention. The approach enabled a thorough analysis by combining numerical data with in-depth insights from both teachers and students.

3.1.Participants

A total of 30 boarding students from Class XII Science participated in this study. These students were allocated a separate study room specifically for the duration of the research period to facilitate the implementation of the structured study hours and intervention activities. Participation was voluntary, and students who chose not to participate were excluded from the study without any impact on their academic standing or support.

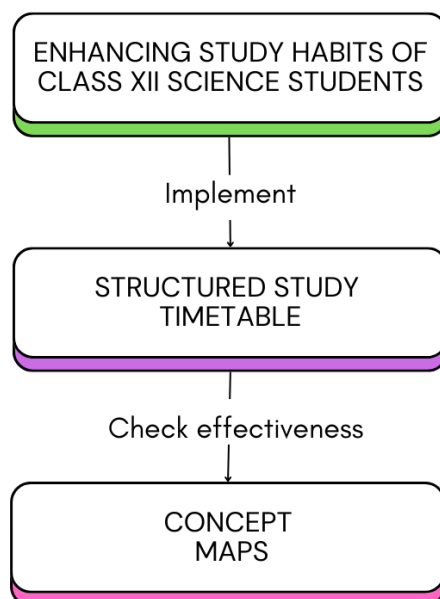
3.2.Data Collection Tools

Quantitative data were collected using a survey questionnaire (Appendix C), while qualitative data was gathered through teacher and student interview (Appendix A and B). The concept maps were also analyzed. The survey assessed both students' and teachers' perceptions of the current use of study hours and the impact of the intervention plan.

3.3.Intervention Strategy

The intervention strategy involved the implementation of a structured study program for Class XII Science students. This strategy included the introduction of a detailed study timetable, which outlined specific study periods dedicated to each subject. Students were trained in creating concept maps or summary maps to organize, consolidate, and validate their learning. These maps were submitted to subject teachers for review and feedback. By providing clear guidance on how to utilize study hours effectively, the intervention aimed to shift students' focus from merely completing homework to engaging in in-depth study and regular revision. Additionally, the study room allocated for the research period served as a controlled environment to reinforce the structured study sessions. This approach was designed to enhance students' study habits, promote comprehensive understanding of subject material, and ultimately improve academic performance.

Figure 1 Intervention Plan



3.4.Data Collection Procedure

Pre-intervention data was collected through surveys and interviews. Following this, students were taught how to create revision concept maps by the researchers. On the other hand, subject teachers were provided with guidelines on evaluating these concept maps effectively. The intervention was then carried out as planned. During the intervention, researchers periodically observed study sessions and documented their observations. Feedback was obtained from Teachers on Duty (ToDs) through interview and their reports were analyzed to assess the implementation and impact of the intervention. After the intervention, post-intervention data was collected through surveys and interviews as well. Finally, all boarding students were debriefed on the results and implications of the intervention.

3.5.Data Analysis Method

The survey data were analyzed through data visualization using Microsoft Office Excel Software. The teacher and student interview data were analyzed using simple thematic analysis method.

4. Results

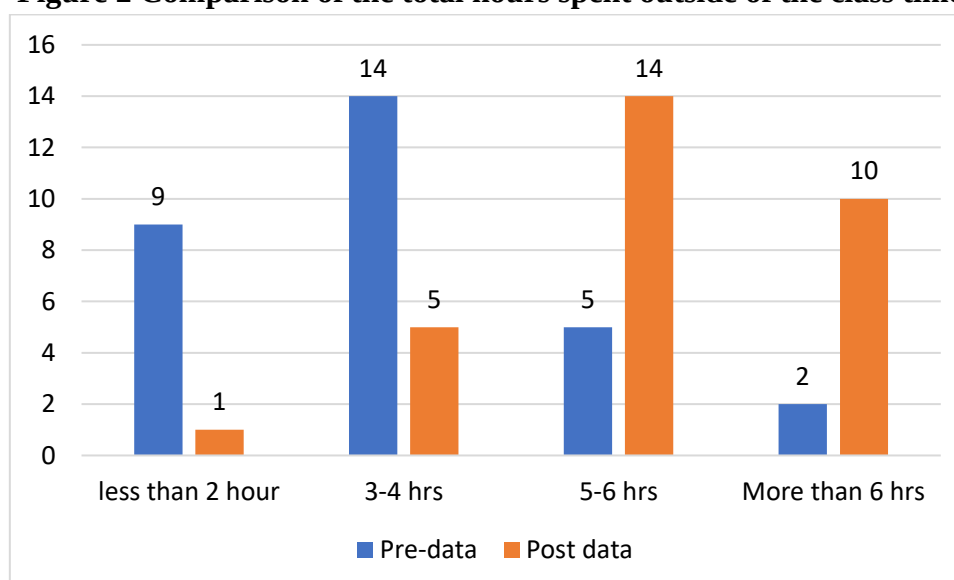
4.1.Impacts of a structured timetable on study habits

The comparison of pre-data and post data revealed a substantial improvement in how students utilized their study hours. The pre-data analysis showed that majority of the students usually used study hours to either complete homework, writing notes, or reading library books. However, post data analysis revealed that students made best use of their study hours for revision and active learning as per the structured timetable provided. For instance, S2 said, “Before introduction of structured timetable, I mostly used study hours for writing homework and I used to study only after completion of homework. But now, the timetable helps me focus on revising and studying rather than writing homework.” Similarly, S3 shared, “I have a clear plan on what to study during study hours with the structured timetable and I feel more responsible during study hours.” This clearly shows that the students are dedicating the study hours to revising, studying and learning the subjects as planned in the timetable, thereby, enhancing their study habits.

The changes in the study habits of the students were also observed by the TODs. It was observed that students maintained consistency in their approach to study with the structured timetable. Additionally, TODs noted improved punctuality and minimal behavioral issues during study hours. For instance, one of the TODs reported, “We need not have to monitor the Science students strictly during study hours because they are more serious in their study, they come on time and their study rooms happen to be silent for most of the time.”

The enhanced study culture of Science students during study hours is also depicted by the increase in the total hours spent by the students on the academic work outside of the class time as shown in Figure 2. This indicates that the students used after school hours for completing academic related tasks like homework, writing notes, or reading library books since study time was structured and they had to prepare a concept map of what they have learned during the study hours.

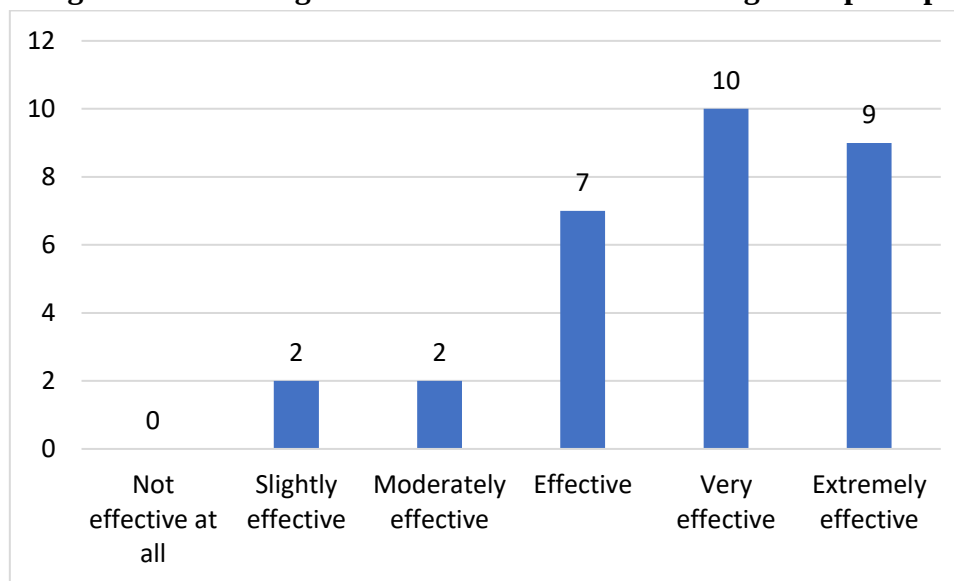
Figure 2 Comparison of the total hours spent outside of the class time



4.2 Effectiveness of concepts maps in enhancing learning and study habits

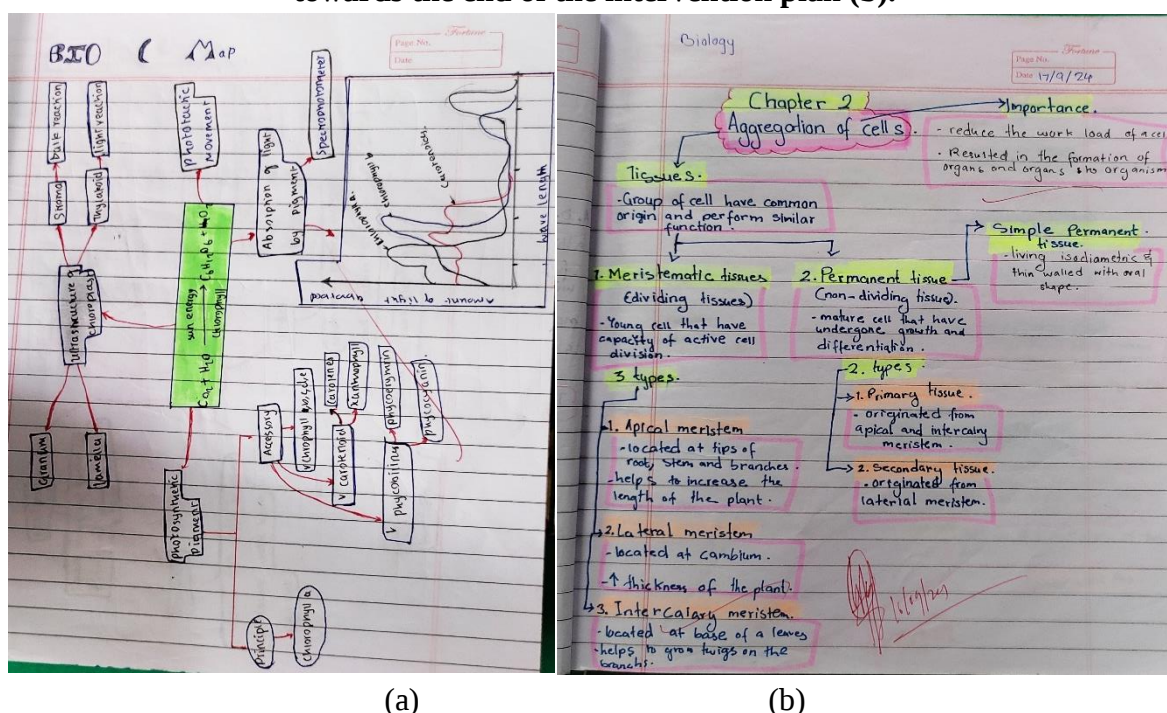
The post data analysis revealed that the concept mapping strategy was effective in improving comprehension and learning, thereby contributing to enhanced study habits during study hours. S3 said, “Developing a concept map at the end of every study hour really helped me to understand the concepts clearly.” Similarly, S4 shared, “Concept mapping is very helpful to me as I can revise my whole chapter by looking at that concept map.” Some of the students described concept mapping as an interesting way to summarize and revise the topics they learnt during study hours. For instance, S2 stated that he used colors and arrows in concept maps that helped him remember the connections between the concepts better than just reading the notes. The positive perception of students on the effectiveness of concept mapping in enhancing learning and study habits is also depicted in Figure 3, with majority of the students rating concept mapping as an effective strategy.

Figure 3 Level of agreement on effectiveness of using concept map



The respective subject teachers also observed improved learning, engagement and retention of information in students who developed concept maps sincerely. One of the teachers said, “The concept maps showed me what they understood and where they are confused. Some students even asked for feedback and revised their maps.” The result also indicates that majority of the students have taken the intervention seriously as it is evident from the concept maps prepared by the students at the beginning of the intervention and towards the end of the intervention period as shown in Figure 4. The concepts map slowly evolved to be more detailed as students started understanding the effectiveness in summarizing the study material in the form of concept map and incorporating teachers’ feedback.

Figure 4 Comparison of the concept maps at the beginning of the intervention plan (a) and towards the end of the intervention plan (b).



Teachers also shared that providing timely feedback, sharing study tips, teaching effective time management, monitoring study hours effectively, and providing encouragement seems to help students to effectively use the study hours.

4.3 Influence of the structured timetable with concept mapping on overall study culture

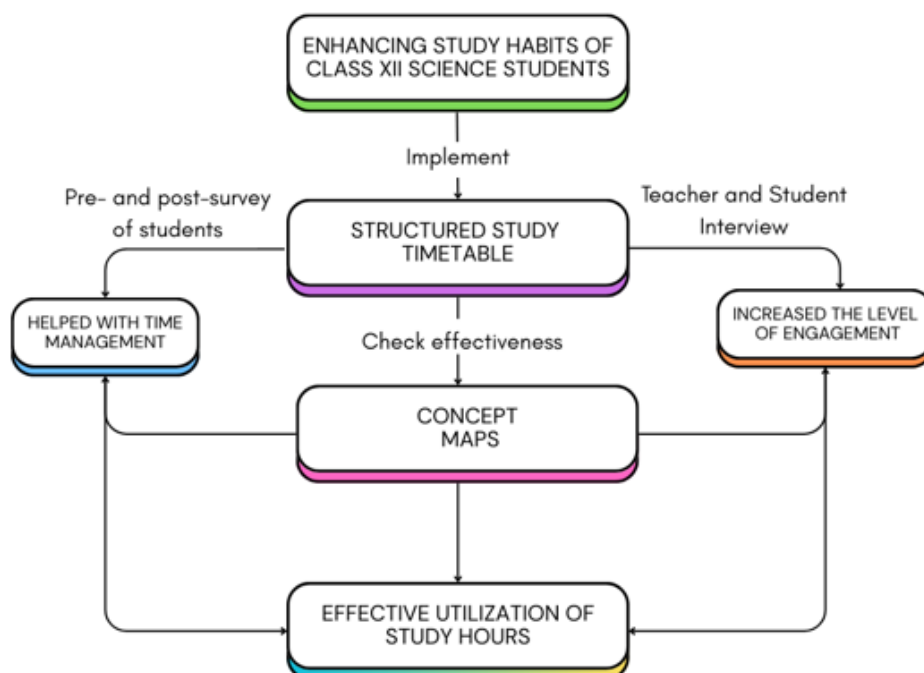
The new study structure fostered a more positive and academically focused culture among class XII Science students. The atmosphere during study hours transformed to a more engaged and motivated learning environment. “Earlier we used to wait for the TOD to study during study hours and as soon as TOD leave, we talk and waste our study time. Now we study seriously during study hours” said S2. Similar view was shared by S5, “We study seriously now during study hours as we have to develop the concept map at the end of the study hour, and submit it to our subject teachers. I think this method truly help us to have good study habits during study hours.” This clearly indicates that majority of students realized the importance of study hours, which contributes to the enhanced study culture.

According to TODs, students are found to be more engaged in learning the lessons rather than completing notes or homework during the intervention period which further validates that above finding. One of the TODs noted, “There is a noticeable change in the study culture. Study hour is quieter in XII Science students’ study room, students are more focused and there is minimal requirement of disciplinary reminders during study hours.” The TODs observed that students took more ownership of their learning and developed a greater sense of responsibility for their academic learnings with the implementation of structured timetable with concept mapping. Hence, the intervention contributed to significant improvement in the overall study culture among Class XII Science students.

4.4 Data Triangulation

The comparison of the findings from different data sources indicates that the structured study timetable for the boarding students in fact helps students to effectively utilize the study timetable as the effectiveness can be validated by how comprehensive their concept maps are. The data triangulation is reflected in Figure 4.

Figure 5 Data Triangulation



5. Discussion

The main objective of this action research was to determine the impact of structured timetable and effectiveness of concept mapping in enhancing study habits among class XII Science boarding students. In doing so, the perceptions from both teachers and students were gathered with regard to the observed changes in the study culture due to the implementation of the structured timetable and introduction of the concept maps.

The study demonstrated that the implementation of a structured timetable significantly enhanced students' ability to utilize their study hours effectively. Not only did it allocate dedicated time for focused studying, but it also enabled students to manage their time efficiently for writing notes and completing homework after class. These findings align with the research by Suranto and Pramitasari (2024), who asserted that a structured timetable fosters consistency in learning and encourages students to complete revisions before examinations. Similarly, McVeety and Farren (2020) concluded that one of the most effective strategies for improving study habits is adhering to a well-organized study schedule.

The mandatory preparation of concept maps helped students not only to summarize what they have learned but also motivated students to learn in depth as evidenced by the detailed maps over the intervention period. The study found that summarizing lessons through concept maps helped students visualize connections between concepts that enhanced their learning. This aligns with the findings of Eshuis et al. (2022), who found that concept mapping enhances critical thinking and knowledge integration. Similarly, Sieben et al. (2021) noted that concept mapping encourages active learning and reflection, which was evident in the students' evolving ability to create detailed and interconnected maps in this study. The evolution of students' concept maps over the intervention period, from simplistic to detailed and well-organized concept maps, further validated their growing proficiency in using this tool for reflection and revisions. Hence, the study concludes that the concept mapping indeed help students in learning, encourage reflection, identify key concepts, enhances memory retention, and make students aware of their strength and weakness.

The intervention fostered a more disciplined and motivated study environment. Students expressed greater ownership of their learning, as evidenced by their adherence to the timetable and active participation in concept mapping. The TODs observed a noticeable reduction in distractions and an increase in focused study sessions. This findings indicates the positive impacts of structured timetable along with concept mapping in enhancing study culture of students of XII Science. The findings aligned with the findings of Reinke (2018), who found great correlation between structured study routines and learning outcomes. The shift in study culture after implementation of intervention in this study corresponds with Rabia et al.'s (2017) definition of effective study habits that include disciplined routines and structured approaches. Hence, the intervention implemented contributed to the holistic improvement in the study culture of the students.

6. Conclusion and Recommendation

As this study highlights the transformative potential of structured timetables and concept mapping in enhancing study habits and academic outcomes, the study conclusively demonstrates that the implementation of a structured timetable and the incorporation of concept mapping significantly enhance the study habits, engagement, and motivation of Class XII Science boarding students. The data reveals a clear shift in how students utilized their after-school hours, transitioning from completing routine academic tasks to engaging in using study period for studying only.

The structured timetable fostered consistency in learning and allowed students to allocate time effectively for studying, writing notes, and completing assignments. Furthermore, the mandatory preparation of concept maps encouraged deeper understanding, reflection, and retention of material, as evidenced by the evolution of students' concept maps over the intervention period.

The triangulation of data from surveys, student and teacher interview, and concept maps, further validates the effectiveness of the intervention. Therefore, based on the findings, the study highly recommends adoption of structured timetable across grades for boarding schools to promote consistent study habits and time management skills and incorporate concept mapping to assess what students have studied during the study period and provide feedback accordingly.

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