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Abstract

The students are an important pillar of the education process. Education should be done only for 360-degree development of the students. It is very necessary to make the student centre education process for the holistic development of the students. 21st century is an explosion of knowledge. The whole world has accepted the importance of education. Primary education up-lift students for their future. There are some drawbacks in present education that are barriers to a student's development. In the present classroom teaching-learning, student's part were only listen, and it is forgotten by the students very soon. In fact, the real method should be that the students themselves read, think, learn, or solve the problems and proceed by self-efforts, and for all these self-learning methods, it is very important. The study aimed to check effect of the learning through the self-learning method over traditional learning method. The experiment was conducted with students from Prerna School, Ahmedabad. The research was a Quasi-experimental: two equivalent groups only with post-test group design aimed at evaluating the effects of teaching-learning through the self-learning method vs. the traditional method. Here, Two groups was taught through different methods. The achievement test was taken at end of experiment. The self-constructed achievement test of the subject was administered to both groups. A student paired student t-Test were calculated to test the hypotheses. On the basis of findings, the educational implication can be derived that both the methods are having a similar impact in the achievement of standard VIII students with Science and Technology subject.

Keywords: Self-learning material, Learning Science, Science Education, Primary Education.**Introduction**

The students are an important polar of education process. Students development possible through only Education, it is very necessary for complete shaping of student knowledge via student centre education process. 21st century is explosion of knowledge. The whole world has accepted the importance of education. Primary education is more important where the students are prepared for the future career. There are some drawbacks in present education which are barriers in child's development. In the present classroom situation, on the student's part, they only listen and it is forgotten by the students very soon. In fact, the real method should be that the students themselves reads, think, learn or solve the problems and proceed by self-efforts and for all this self-learning method is very important. Self-learning means, "The presentation of content is such that one can understand without the help of her is called self-instruction." In this method students can learn without the help of teachers or other and can proceed of their pace.

Concept of learning

Self-learning materials (SLMs) serve the role of a competent classroom teacher by offering educational experiences that mirror those in traditional instruction. In this way, the built-in "invisible teacher" helps guide learners through their studies, functioning just like a teacher would in typical face-to-face classroom environments during the learning process. Let us now explore what effective self-learning materials imply. In traditional education, students mostly receive instruction through direct interaction with teachers and classmates. However, learners in the ODL mode study using specifically developed self-learning materials. In this case, learning outcomes rely on the quality of resources created for primary-level learners. Students engage with content through printed texts, audio-visual aids, computer-assisted lessons, and other forms. Their understanding grows through exposure to concepts in science and technology using these developed tools. Hence, the instructional materials should align with strong design principles, learner needs, and the unique characteristics of the targeted student group.

Self-learning materials: the concept

Self-Learning Materials (SLMs) are specially designed educational resources that help students learn on their own, without needing constant supervision or instruction from a teacher. Although they are most commonly used in distance or open learning systems, SLMs are also highly beneficial for regular students who want to take charge of their learning and study more effectively outside the classroom.

Unlike regular textbooks or lecture notes, SLMs are created to act like a silent teacher. They explain concepts clearly, ask your questions to test your understanding, offer feedback, and even motivate you to keep going—just like a real teacher would in a classroom. According to Guskey (2000), the true strength of SLMs lies in their ability to guide and support students through their learning journey using a learner-centred approach. This means the materials are designed around your needs, your pace, and your style of learning. One major feature of SLMs is that they are self-contained. Everything you need to understand a topic is included in the material itself. You won't need to keep searching for extra explanations or help from other sources. Sharma (2012) points out that this structure allows students to learn independently and efficiently, as they can focus only on what's essential. SLMs are also self-explanatory, which means they are written in a clear and logical way so that most students can understand the content on their own. Materials problem is carefully adjusted satisfy different backgrounds, aiding you build confidence as you study (Bates, 2015). Even if you still ask your teacher for help, these materials make it easier to understand the basics before you do. Another important characteristic of SLMs is that they are self-directed. They guide you step by step through topics using well-structured lessons and activities. This makes it easier accept liability for your self-learning. As Knowles (1975) explained through his work on adult learning, students learn better when they have control over what, how, and when they learn. SLMs encourage this autonomy. SLMs are also self-motivating. They are designed to keep you interested and engaged. Instead of just giving facts, they often ask interesting questions, use examples from real life, and connect new ideas to things you already know. Moore (2013) highlighted that materials like these can boost motivation, especially when students are studying alone or outside regular class hours.

In addition, SLMs include tools for self-evaluation. You'll find review questions, quizzes, and practice exercises that help you check how well you've understood the material. This built-in feedback helps you figure out where you're doing well and where you might need to put in more effort (Anderson, 2008).

Finally, SLMs support the idea of lifelong learning. Garrison (2000) stressed that by using these materials, students don't just learn subject content—they also develop the skills to study and learn independently in the future. SLMs often include study tips, reminders to think critically, and ideas for where to explore topics further. This means you're not just learning for a test; you're building habits that will help you learn for life.

For regular students, self-learning materials offer a powerful way to supplement classroom learning and develop independence. They are more than just handouts—they are structured, supportive, and student-friendly resources that teach you how to learn. When used well, SLMs make learning more personal, flexible, and effective. Whether you're reviewing for exams, exploring new topics, or just trying to study smarter, these materials can help you become a more confident and capable learner.

Importance of Self-Learning Materials for Regular School Students

In traditional classroom settings, all students are typically taught the same content at the same time, regardless of their individual learning styles or pace. However, due to inherent individual differences, students often do not absorb or comprehend lessons equally. Some students may grasp concepts quickly, while others may need more time or alternative explanations. In such cases, self-learning materials (SLMs) become essential educational tools that support personalized learning beyond classroom instruction. Self-learning materials gives flexibility to learn according to their own pace and comfort level. This is particularly important in subjects like science and technology, where concepts are often complex and abstract. Research indicates that students gain a deeper understanding of these subjects when they are given the opportunity to explore concepts independently and actively construct knowledge (Zimmerman, 2002). SLMs support this process by presenting information in a structured, clear, and learner-friendly manner that promotes active engagement.

Advantages of self-learning material accommodate diverse learners. According to Mishra and Panda (2007), SLMs are especially useful in bridging the gap between high-achieving and low-achieving students by offering differentiated content and learning support. For instance, slower learners can revisit difficult concepts multiple times without the pressure of keeping up with the rest of the class. On the other hand, advanced learners can progress at a faster pace, diving deeper into the subject matter. Moreover, self-learning materials encourage **student autonomy**, which is a vital skill for lifelong learning. When students are given control over how and when they learn, they tend to develop critical thinking, self-assessment, and time management skills (Garrison, 2000). In the classroom, the teacher may not always be able to address every student's doubts or explain concepts repeatedly. SLMs empower students forging ahead and accept liability for students' his/her learning, fostering self-confidence and educationally independence.

In the context of the classroom, it has been observed that traditional teaching often involves passive learning—teachers writing on the board while students listen and take notes. This method rarely leads to deep understanding or meaningful engagement. Self-learning materials, however, shift the focus from passive reception to active construction of knowledge. As stressed in the NEP-2020, innovative and flexible teaching-learning approaches that promote experiential

learning should be adopted in schools to improve learner outcomes (Ministry of Education, 2020). SLMs are aligned with these principles as they incorporate activities, illustrations, examples, and questions that stimulate student curiosity and enhance understanding.

In summary, the importance of self-learning materials for regular school students lies in their ability to personalize learning, promote academic independence, and deepen conceptual understanding. SLMs allow access personalized learning and revised same for study, SLMs make education more inclusive and effective. As education systems continue to evolve toward learner-centred models, the integration of self-learning materials into everyday teaching practices is not just beneficial—it is essential.

Importance of the Study .All the students are equally taught in the class room but because of individual differences all the students cannot attain the taught lesson same way. So, if the lesson taught in such a way by considering their learning pace or high, average or low then the student might be understanding or attain the lesson easily. This is expected from the new innovative teaching- learning methods. The present study was conducted with aim to compare self-learning method and traditional method. Generally, it is observed that in class room teachers write on black board and students listen and note down in their note books, but in very rare the students understand the taught lesson. The students cannot understand the science and technology subject till when they try to understand all the concepts themselves. Self learning material is such a material that the students can learn at their ease and pace. This study holds significant relevance in today’s evolving educational context, particularly in addressing the challenges faced by students within traditional classroom environments. In most regular classroom settings, students receive uniform instruction regardless of individual learning differences, which often results in varying levels of comprehension. Some students grasp the lesson quickly, while others struggle, especially in subjects such as science and technology that demand deeper conceptual understanding. This research emphasizes the urgent need to explore alternative teaching strategies that promote active, student-centred learning. The introduction of self-learning materials (SLMs) represents one such innovative strategy that aligns with the demands of 21st-century education. SLMs empower students to learn independently, at convenient pace, and in a way that suits their personal learning styles. By doing so, they promote critical educational goals such as autonomy, self-regulation, and lifelong learning skills needs for success in both academic as well as practical in existence (Zimmerman, 2002; Garrison, 2000). This study is crucial as it assesses how integrating SLMs in regular schooling can transform passive learning environments into more dynamic, inclusive, and participatory ones. Moreover, this research is importance for to contribute to the design and implementation of more effective, learner-friendly teaching approaches at the school level. Current pedagogical practices often rely on rote memorization and one-way instruction, which do not cater to individual student needs. Self-learning materials offer an alternative that is flexible, engaging, and better suited to the developmental needs of primary and secondary students. As supported by Mishra and Panda (2007), SLMs bridge the achievement gap by offering customized learning pathways for both high and low achievers.

This study is also timely in light of global and national educational reforms that advocate for learner-centred teaching models. In the NEP-2020, highlight the importance of experiential learning, critical thinking, and problem-solving as core aspects for effectiveness of education (Ministry of Education, 2020). Self-learning materials, with their structured yet adaptive design, are in line with these objectives. Through this research, educators and policymakers can better understand how SLMs can be integrated into mainstream classrooms to complement existing teaching methods and enhance 360-degree student outcomes.

In essence, this study is important because it addresses a core limitation in current educational practices—namely, the lack of personalized learning. By evaluating the role and impact of self-learning materials, it offers valuable insights into how regular students can become more active participants in their own learning journey. The findings of this research could help shift the focus from teacher-led instruction to a more balanced, student-driven educational approach that promotes understanding, independence, and long-term academic success.

Variables of the present study

➤ **Independent Variable**

- Method of Teaching:
 - Self-learning
 - Conventional Method.

➤ **Moderate Variable**

- 1) Gender: Boys and Girls
- 2) Educational Achievement: High Educational Achievement and Low Educational Achievement

➤ **Dependent Variable**

- Scores obtained in the Post test of Science Subject

Objectives of Research

1. To study the effectiveness self-learning material on the achievement of students in Science and Technology subject in context of educational achievement.
2. To study the effectiveness of self-learning material on achievement of students in Science and Technology subject in context of their gender.

Hypothesis

- Ho₁: There is no statistically significant difference between the post-test mean scores of students in the experimental group and those in the control group.
 Ho₂: There is no statistically significant difference between the post-test mean scores of male students in the experimental group and those in the control group.
 Ho₃: There is no statistically significant difference between the post-test mean scores of female students in the experimental group and those in the control group.
 Ho₄: There is no statistically significant difference between the post-test mean scores of high-achieving students within the experimental group.
 Ho₅: There is no statistically significant difference between the post-test mean scores of low-achieving students within the experimental group.

Population and Sample: The present research selected gujarati medium school students enrolled in standard VIII of year 21-22 in Ahmedabad city as population. The schools were chosen on the premise of achievability, foundation and eagerness to coordinate with the researcher for her research experiment. Researcher has contacted authorities of 5 schools of Ahmedabad city having smart class in their school and Prerna School has shown desire to cooperate for this experiment. As a result, the school was chosen using purposive sampling, and the pupils were chosen as a cluster. Two groups of students made using random technique and both groups were decided as controlled and experimental group by lottery technique of randomization. Thus total 108 students studying in standard VIII at Prerna School, Ahmedabad were selected as a sample.

Research method:In the present study, Two Randomized Groups, Quasi-experimental: two equivalent groups only post-test design was used. Experimental group and controlled group were decided by lottery technique for randomization. Experimental group was taught pre-decided units of Science & Technology subject through self-learning material and the same units were taught to controlled group in conventional chalk and talk method. A post-test was administered to both groups, and the effectiveness of each group was assessed by comparing the students' mean scores.

Equivalent Two Groups Only Post Test Design

Group	Treatment	Post Test
Experimental Group	X	Tz _E
Controlled Group	-	Tz _C

Where X = self-learning material

Tz_E = Experimental Group Scores of Post Test

Tz_C = Controlled Group Scores of Post Test

Self-learning material: Self-learning material develops using concepts from selected chapters of standard 8th science and technology textbook - i. e. 1. Microorganisms: Friend and Foe, 2. Synthetic Fibers and Plastics and 3. Coal and Petroleum. Self-learning Material designed in such a way that allowed individuals to learn independently, without direct instruction or guidance. These materials typically provide information, explanations, and exercises that help learners understand a subject, develop skills, and self-assessment their own progress.

Tools for collecting data: A self-constructed a blue print-based test of 40 marks with 40 multiple choice questions in test was prepared by the researcher. It was used to collect achievement scores of students. The face validity and content validity of the assessment papers was given to experts, and the unwavering quality of the test was done with items analysis, consider df/dv values between 0.2 to 0.8 values for finalized 40 marks accomplishment test. The allotted time for answering the test was forty minutes.

Data Collection and Data Analysis: By considering into account the students' prior academic exam scores, the investigator in the present research makes sure that both groups were equal prior the experiment. A coin toss was employed to select the groups at random, and one group was taught implementing self-study materials whereas the other group was taught using conventional methods. To assess the effectiveness of the methods used to teach, a post-test was executed in both groups following the instruction was given. After then, statistics were employ to examine the post-test data. In particular, mean, the t-test, standard deviation(SD), and standard error of mean (SE) calculations were used to analyze the scores. Based on the results of the post-test, the Mean, SD, SE, and student t-values were calculated for every hypothesis. To evaluate the significance of the findings, a significance level of 0.05 and 0.01 was used to determine the acceptance or rejection of the null hypotheses.

Table 1: Post-test scores of experimental group and control group

Group	N	Mean	SD	SE	Mean Difference	t-Value	Level of Significance
Experimental	97	17.37	7.26	1.02	0.03	0.03	Not Significant
Controlled	97	17.34	6.90				

Table 1 shows values that the t-value for the difference in student performance between the experimental and control groups was less than 1.96, at 0.03. As a result, the t-value is insignificant at a 95% confidence level. So, the acceptance of null hypothesis is correct. Because there is no appreciable scores between the experimental and control groups, this shows that the learning through self-learning materials has not influence on achievement scores in the science and technology subject.

Table 2: Post-test scores of boys of the experimental group and control group

Group	N	Mean	SD	SE	Mean Difference	t-Value	Level of Significance
Experimental	61	17.92	7.32	1.29	0.20	0.15	Not Significant

Controlled	61	17.72	6.86				
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Table 2 shows that the t-value for the difference between the experimental and control groups values of the boys was 0.15, which is less than 1.96. As a result, the t-value is insignificant at a 95% confidence level. The null assumptions are therefore not disproved. This suggests that the self-learning approach has no effect on boys' academic performance in the science and technology concepts, as there is no noticeable difference in the average scores of boys both groups.

Table 3: Post-test scores of girls of experimental group and control group

Group	N	Mean	SD	SE	Mean Difference	t-Value	Level of Significance
Experimental	36	16.44	7.05	1.64	0.15	0.15	Not Significant
Controlled	36	16.69	6.91				

Table 3 shows that the t-value for the score difference between girls in the experimental and control groups was 0.15, which is below 1.96. Consequently, the t-value is insignificant at a 95% confidence level. Consequently, the null hypotheses remain accepted. This means that there is no notable difference in the average scores of girls from both the experimental and control groups, suggesting that the self-learning approach does not influence the educational performance of girls in science and technology subject.

Table 4: post-test Scores of high-achievers of experimental group and control group

Group	N	Mean	SD	SE	Mean Difference	t-Value	Level of Significance
Experimental	46	22.22	7.33	1.51	0.50	0.33	Not Significant
Controlled	46	21.72	7.17				

Table 4 denote that the t-value for the disparity in scores between the experimental and control groups of higher-achieving students was 0.33, which is below 1.96. Consequently, the t-value is insignificant at a 95% confidence level. The null hypotheses are therefore not disproved. This suggests that the self-learning approach has no effect on the academic performance of higher achievers in the science and technology subject since there is no discernible variation between the average scores of these students in both groups.

Table 5: post-test scores of lower-achievers of both groups

Group	N	Mean	SD	SE	Mean Difference	t-Value	Level of Significance
Experimental	51	13.00	3.39	0.67	0.39	0.59	Not Significant
Controlled	51	13.39	3.36				

Table 5 suggest that the t-value for the variation between the scores of lower-achieving students in the experimental and control groups was 0.39, which is less than 1.96. the t-value is insignificant at a 95% confidence level. As a result, the null hypotheses are accepted. This suggests that the self-learning content has no effect on the academic performance of lower achievers in the science and technology subject since there is no discernible difference between the average scores of these students in the experimental and control groups.

Findings of current research

According to the current research, students' academic performance, irrespective of gender (boys and girls) or achievement level (high achievers and lower achievers), difference between students who were taught using self-learning resources and those taught using conventional methods. The information for both the groups are displayed in the tables, indicated that the null hypotheses were accepted because the t-values for the variations in post-test scores were all below the critical value of 1.96. This means that both methods -i.e. self-learning materials and conventional teaching, resulted in similar student outcomes in the context of Science subject.

- The educational achievement of the students studying with the help of the Self Learning material and conventional method is similar therefore it can be said that the difference observed is merely accidental.
- The educational achievement of the Boys, Girls, Students having higher achievement and lower achievement studying with the help of self-learning method and conventional method is similar therefore it can be said that the difference observed is merely accidental.

Despite the apparent advantages of self-learning materials - such as promoting student autonomy, increasing engagement, and supporting self-paced learning - the results of This study suggests that, given the particular circumstances of the current investigation, the impact of SLMs on student achievement was not significantly greater than that of the conventional method.

Discussion.In today's educational landscape, fostering independent learning skills is a critical objective for educators. The importance of personalized and student-centred learning has grown significantly, especially in the context of the 21st-century knowledge explosion. Traditional classroom settings, while effective in some aspects, are limited by the passive learning methods often employed. This study purpose to evaluate the impact of SLMs compared to conventional teaching methods on students' educational achievement in Science and Technology subject. The research goal to assess how these two instructional strategies—self-learning materials and conventional methods—affect students based on their gender and educational achievement levels.

Educational implications.Although the findings of this study indicate that students who used SLMs and those who used the conventional approach did not significantly differ in their academic performance, the broader implications of self-directed learning cannot be ignored. SLMs offer several advantages beyond academic achievement alone. By assisting students in the development of abilities like self-control, critical thinking, and problem-solving, they promote lifelong learning. As education systems worldwide evolve to fulfill the 21st century's challenges, incorporating elements of self-learning can help to prepare students for future educational and career success. For educators, this study underscores the importance of blending teaching strategies to accommodate students' various needs. While SLMs is alternative a valuable tool in the educational toolbox, depending on the type of content, their efficacy may change, the students' learning preferences, and other contextual factors. Therefore, teachers should consider integrating self-learning materials alongside traditional teaching methods, tailoring the approach to the specific needs of the students and the subject matter.

Limitations and Further Research.Recognizing the limitations of this research is crucial. Although adequate, the sample size was restricted to students in a single area and school, which might not accurately reflect the student body as a whole. Furthermore, the study focused solely on the impact of self-learning materials in Science and Technology, therefore, the results might not apply to other topics. The usefulness of self-learning resources in a larger range of subjects and with more varied student populations could be investigated in future studies. A more thorough grasp of SLMs' potential would also come from examining their long-term effects on student learning outcomes, motivation, and engagement.

Conclusion.In conclusion, the study demonstrated that both self-learning materials and conventional teaching methods had similar effects on students' educational achievements in Science and Technology. While self-learning materials offer flexibility, independence, and personalization of learning, their effectiveness in improving academic performance, in this study, was not found to be significantly different from the traditional teaching method. Nonetheless, the potential benefits of self-learning materials in fostering autonomous learning and lifelong skills are valuable considerations for educational reforms.

The findings of this study shows the significance of combining various teaching approaches provide chances for opportunities to different needs of students, guaranteeing that all student has the chance to succeed, as educational systems continue to investigate and incorporate cutting-edge teaching strategies.

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