The Role of Programmed Learning in Enhancing Academic Performance for Secondary School Students in Assam

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Abstract: *This paper discusses the impact of programmed learning on academic performance of students in secondary schools in Assam, and history in particular. Programmed learning involves well-organised lessons which enable the student to learn at his/her pace. Although this approach is applied frequently in science and math, it is still a less common approach to teaching humanities such as history. This experiment was carried out in Silchar, where students being taught by programmed learning were compared with those taught traditionally. Findings indicated that students who studied through programmed learning scored better, showed more interest, and had a deeper insight into historical concepts. It was also easy to adapt to the multicultural and multilingual culture in Assam. This paper proposes that programmed learning will help to make history more interesting and effective for secondary school learners.*

Keywords: *Programme Learning, Academic Outcome, Secondary Education, History, Social Sciences*

1.1 Introduction

Programme learning is an educational method of teaching that is based on behaviourist psychology and helps students to learn at their pace through use of step by step instructions and instant feedback. It divides information into small, manageable areas, whereby one learns one concept before moving to the next one. The strategy facilitates engagement and helps to improve the learning outcomes. Programmed learning may also lead to good and engaging learning among students as

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they learn with different abilities in secondary schools as they are under high academic pressure. As the prism of various educational reforms in Assam, there are the problems of dropout rates, inequality in performance, and lack of resources. The proposed solution to these problems can be programmed learning, which would offer a personal approach to learning to address the learning rate and requirements of each student and improve the end academic achievement.

1.2 Review of Related Literature

The majority of the research has shown that programmed learning can improve student performance in different subjects. It concluded that programmed instruction students had high test scores compared to those who were taught through a traditional teaching approach [1]. The strategy provides the learner with the advantage of studying at his/her own pace, hence eradicating any form of stress and boosting their knowledge [2]. It is especially effective in those areas of the subject matter as mathematics or science, when the learning process is step-by-step. The researchers further found programmed learning to possess superior effects in helping students to memorise information, as well as learn more about intricate concepts [3] [4]. The academic success also depends on the socio-economic status [5], motivation and mindset [6 and 7 respectively]. Active learning strategies such as group discussion and peer instruction are effective in enhancing performance [8] [9]. Overall, the programmed learning of the Assam schools can help in the equal education reformation according to the technology [10] [11].

1.3 Rationale of the study

The current paper analyses the use of programmed learning as a way to enhance academic performance of students in secondary schools in Assam, particularly in regions where there are severe educational difficulties. The study aims to investigate the effectiveness of this approach for 9th-grade students and whether it can result in more effective and individualised learning. Such a study is needed based on the National Achievement Survey (2021), which indicated that in Assam, Cachar district, most students scored below basic, and only a very small number scored highly. Learning outcomes are poor in spite of access to digital tools [12]. The paper will seek effective solutions to the practical application of programmed learning to improve comprehension, participation and performance to help close the performance gap and achieve educational equality in the diverse classrooms of Assam.

1.4 Research Question

How do programmed learning materials of history influence the learning processes and perspectives on the 9th standard Social Sciences of the SEBA board?

1.5 Research Objectives

1. To compare the performance of students taught through conventional methods with those using programmed learning materials in history.

2. To explore the experiences of social science students in Assam regarding participation in programmed learning.

1.6 Research Hypotheses

H01: There is no significant difference between the performance of students taught through conventional methods with those using programmed learning materials of history in the pre-test.

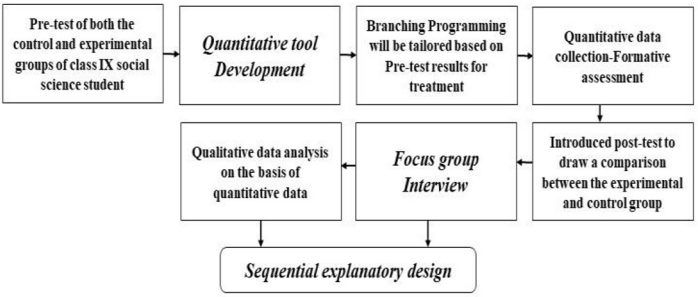
H02: There is no significant difference between the performance of students taught through conventional methods with those using programmed learning materials of history in the post-test.

1.7 Research Methodology

In a sequential explanatory design, researchers collect numerical (quantitative) data first and then collect detailed (qualitative) data to gain a deeper insight into the findings [13] [14]. The sequential explanatory design starts with qualitative data and then measures variables. The mixed methods research integrates the two by providing more insights and reliable findings that are well-rounded. In this research, the researcher employed the multistage random sampling technique to sample the participants. Such an approach includes the steps of random selection that can be repeated several times in order to feel fair and diverse. The sample was 60 ninth-grade children in the schools in Assam with SEBA affiliations, 30 of them belonged to the experimental group and 30 to the control group.

Figure 1

Flow chart of research design



Source: Adapted from [14]

Note: This figure demonstrates the flow chart related to the research design, which is based on the Sequential Explanatory Design, based on experimental research

Table 1

Design of the Present Study

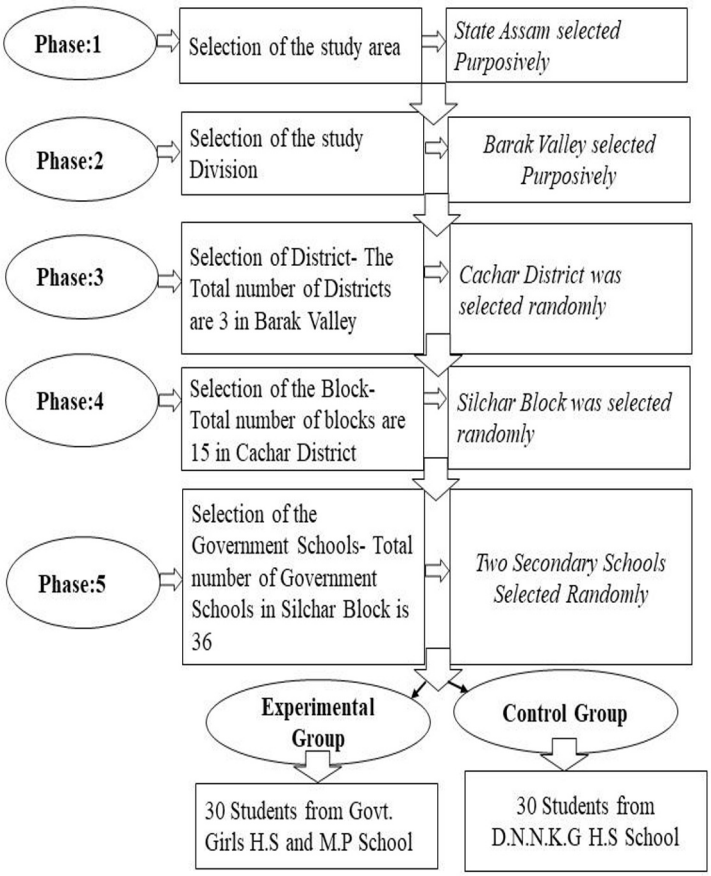
Groups and Treatment	**Experimental Group**	**Control Group**
Pre-Test	Measure based on revised Bloom's Taxonomy i. Remembering ii. Understanding iii. Applying iv. Analyzing v. Evaluating vi. Creating Achievement test of History	Measure based on revised Bloom's Taxonomy i. Remembering ii. Understanding iii. Applying iv. Analyzing v. Evaluating vi. Creating Achievement test of History
Experimental Treatment	Teaching History through branching programming with the help of designing a website named https://precisioninsocsci.000webhostapp.com/	Teaching History through the conventional Method for that

	for 7 weeks	particular time frame
Post Test	Measurement of History through Achievement Test	Measurement of History through Achievement Test

Source: Compiled by Author

Figure 2

Flow chart of the Selection of the Sample



Source: Compiled by Author

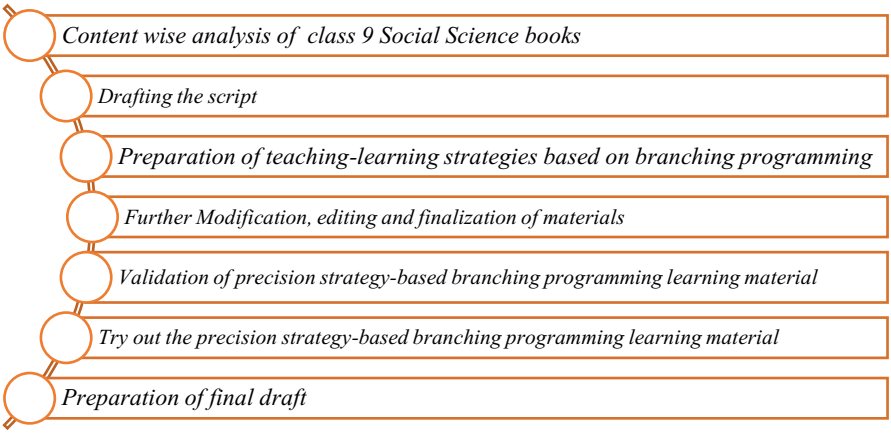
1.8 Procedure of the Intervention Programme

The study will use a programmed learning intervention to improve students' academic outcomes by employing a behaviourally-based instructional method to teach specific skills. The development of programmed strategy-based branching learning material involves a systematic approach to ensure its effectiveness in enhancing student learning. This material is a self-contained unit with clear objectives, covering knowledge, comprehension, applicability, and process skills. It integrates various teaching-learning styles and evaluation methods to provide comprehensive overview of the intended content [15].

The research focuses on creating programmed strategy-based branching learning material for selected topics in social science, specifically history and political science, targeting 9th-grade students under the Secondary Education Board of Assam (SEBA). The development process, guided by a blueprint and refined through consultations with supervisors and experts, emphasized both theoretical principles and practical instructional strategies. The goal was to create a structured and engaging educational resource that enhances the learning experience for 9th-grade students in Assam.

Figure 3

Flowchart of Intervention Program development



Source: Compiled by Author

i) Content-wise analysis of class 9 Social Science books

The development of precision strategy-based branching programming learning material for class 9 Social Science follows a systematic process

aimed at creating effective instructional resources. The first stage involves a thorough content analysis of class 9 Social Science textbooks to identify major topics, concepts, and learning objectives, particularly in history and political science. The researcher reviewed multiple sources, including NCERT, SCERT, NEUPA, CBSE, ICSE books, articles, journals, and online resources, to ensure alignment with educational standards.

After careful evaluation, the researcher selected the textbook "Itihas" for history. Specifically, the fourth chapter, "Maaner Assam Akromon" (Burmese Invasion of Assam), was chosen for the intervention. This chapter was selected due to its relevance to the second unit test, which took place between October and December, 2023 as per the SEBA academic calendar. The content was developed in both Bengali and English, with MCQs based on revised Bloom's taxonomy. The social science teachers entrusted researcher with full responsibility for preparing students for this test.

Table 2

Name of the Chapter of history

Sl. No.	Name of the Chapter	Chapter wise divides Frames related to Branching Programming
1	Burmese Invasion of Assam	Content-wise Main Frames-32 Sub Frames-64 MCQ Frames-96 Total No. of Frames-192

Source: Compiled by Author

So, the total no. of content as well as MCQ frames are 192. The total No. of frames in Bengali and English contents is 384. Students mainly followed Bengali content. Some of the students and experts checked the English contents.

ii) Drafting the script

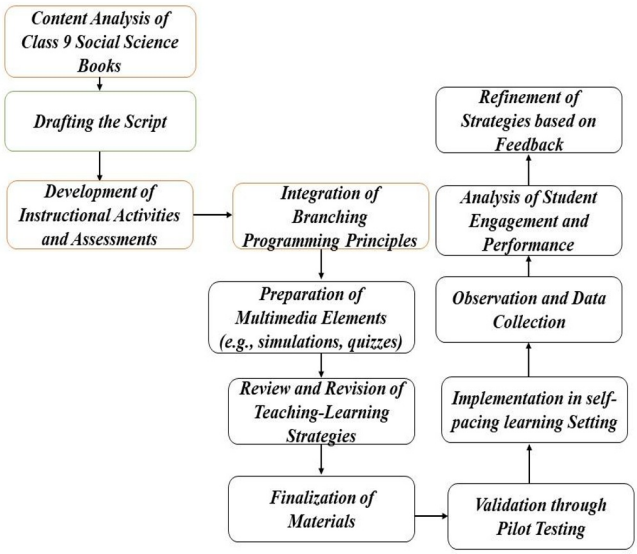
After completing the content analysis, the next step is to draft the script based on branching programming learning material. This script outlines the structure, sequence, textual content, instructional activities, and assessments, ensuring logical organization, clarity, and alignment with learning objectives to effectively engage students [16].

iii) Preparation of teaching-learning strategies based on branching programming

With the script finalized, the focus shifts to developing teaching-learning strategies based on branching programming principles. These strategies, informed by extensive research and resources, include interactive exercises, MCQs, and multimedia elements, such as YouTube links, to engage students. They are tailored to diverse learning styles, promoting inclusivity and personalized learning.

Figure 4

Flow chart of Preparation of teaching-learning strategies based on branching programming



Source: Compiled by Author

iv) Further Modification, editing, and finalization of materials

After drafting, the learning material is edited for accuracy, coherence, and effectiveness. Feedback from experts, educators, and potential users is incorporated to refine the content. Subject matter accuracy is reviewed by an expert, and language issues are corrected. The material, including MCQs, is then finalized based on this feedback.

v) Validation of branching programming learning material

Validation is crucial for assessing the quality of learning material. Pilot tests and usability studies with students gather feedback on their experiences, revealing areas for improvement. The content and MCQs were reviewed by 19 experts, and after incorporating their suggestions,

the material was finalized. It was then converted into an online program, "Precision Strategy for Teaching Social Science," available at https://precisioninsocsci.000webhostapp.com/.

vi) Try out the precision strategy-based branching programming learning material

In this stage, the learning material is implemented in classrooms to evaluate its effectiveness. The researcher instructs using the material and observes student interactions and progress. Data from student performance and feedback help assess impact and guide refinements. The material was trialed with 25 students from Bhorakhai High School and Netaji Vidyabhawan Girls High School, with feedback collected through WhatsApp, leading to necessary corrections based on their input.

vii) Preparation of final draft

After validation and trial, the final draft of the precision strategy-based branching programming learning material is prepared for widespread use. It incorporates revisions from feedback, aligning with curriculum standards and instructional best practices. The final draft serves as a comprehensive resource for teaching History and Political Science to Class 9 students. The website was finalized and students received a completion message, marking the material's readiness for implementation.

1.9 Preparation of the Achievement Test

Once the test plan is established, the next step is to prepare the achievement test. This involves identifying and selecting test items that align with defined objectives and content areas. Test items may include multiple-choice questions. Each item should be clear, concise, and focused on assessing specific learning outcomes based on revised Bloom's taxonomy. Additionally, attention should be paid to the balance of difficulty levels and the distribution of items across different content areas to ensure comprehensive coverage of the curriculum [17]. For the current research, one chapter was selected for the achievement test, which is the fourth chapter of the History of Class IX SEBA board. The blueprint is arranged below for understanding the no. of achievement test MCQs with the percentage of the parameters of revised Bloom's Taxonomy.

Table 3

Number of items of achievement test based on Bloom's taxonomy

Sl. No.	Number of Items based on the parameters	Fourth Chapter of History
I	Remembering	12
II	Understanding	10
III	Applying	3
IV	Analyzing	2
V	Evaluating	1
VI	Creating	2
	Total	30

Source: Compiled by Author

1.10 Data Analysis and Interpretation

Objective 1: To compare the performance of students taught through conventional methods with those using programmed learning materials in history.

Table 4

Group Statistics of Experimental Group and Control Group for Pre-test

Group		N	Mean	Std. Deviation	Std. Error Mean	t-Value	p-Value (2-tailed)
Pre-test	Control	30	11.87	2.46	.45	-1.38	0.17
	Experimental	30	12.70	2.19	.41		

Source: Compiled by Author using SPSS25

The pre-test results show that Experimental group scored slightly higher (mean 12.70) than Control group (mean 11.87). However, the difference is not statistically significant (p = 0.17). This means both groups started with nearly the same level of performance before the experiment began.

Table 5

Group Statistics of Experimental Group and Control Group for Post-test

Group		N	Mean	Std. Deviation	Std. Error Mean	t-Value	p-Value (2-tailed)
Post-test	Control	30	16.10	2.46	.45	-8.53	0.00
	Experimental	30	21.77	2.72	.49		

Source: Compiled by Author using SPSS25

The experiment indicates that the experimental group was far ahead of the control group. The mean score of the control group was 16.10, and the experiment group was 21.77. This was statistically significant ($p = 0.00$), which indicates that the improvement was not based on chance but a real one, which proves the effectiveness of the programme.

Objective 2: To explore the experiences of social science students in Assam regarding participation in programmed learning.

The study explored Class IX social science, mainly focused on History, students' experiences in Assam with the "Precision Strategy for Teaching Social Science" program and found largely positive responses. About 45.71% of students appreciated the program's ability to exceed expectations, while 34.29% felt disappointed. Over half (56.67%) found the content engaging, especially interactive elements. Sixty-five percent of respondents are a solid majority (65.71%) who stated an improvement in knowledge and confidence in History, and 65 percent of the respondents referred to the value of the self-paced mode of learning. 65.63 percent of the students rated positively the performance of the instructor, and 46.67 percent rated positively the structure of the programme and feedback. The level of motivation and interest was high, as 42.86% found the activities inspiring. The general perceptions of the programme were mostly positive (83.33 percent), with 80 percent expressing interest in participating in the future. These results were confirmed with the help of focus group interviews, where more knowledge and appreciation of social science were noted. These findings support the utility of the experiential, personalised learning and provide some suggestions for programme improvement in the future.

1.11 Conclusion

As demonstrated in this research, precision education proves very beneficial in the enhancement of learning outcomes of Class 9 students in social science learning, and in particular, history. An interactive online platform facilitated the learning process, where learning became more interesting, personal and enjoyable than traditional teaching. The learners were able to study at their own pace, get immediate feedback, and undertake collaborative work that increased the level of understanding and confidence [18]. The research suggests Assam Secondary Education Board should further revise the content of the programmes to make them interesting and relevant, provide personal guidance and mentorship, and provide more interactive and practical learning experiences [19]. Frequent student feedback and career and internship support will also assist students in bridging the gap between

learning and real life. These measures will improve the involvement, satisfaction, and academic achievement among learners. Students were better understanding and interested compared to the traditional classes. In general, precision education was a rather efficient and student-centred method of enhancing learning outcomes.

1.12 Recommendations

Based on the study, there are various recommendations that are made to improve the effectiveness of integrated programmes in secondary education. To begin with, the same programme material has to be constantly updated to make sure that the materials used are interesting, current and related to the ever-changing interests of the students because responsiveness of the curriculum has been found to keep them motivated. Secondly, individualised academic assistance, i.e. mentorship and one-to-one guidance, ought to be reinforced to meet the various learning requirements and keep students motivated. Thirdly, incorporation of more experiential-based and interdisciplinary learning, including project-based learning and simulations, can bring an additional comprehension and practical uses of knowledge. Fourthly, consistent and regular feedback gathering among students on programmes and services is necessary to make changes and adjustments in the programmes to align with what students expect and ensure constant improvement. Finally, the introduction of career development programmes such as internships, field studies and collaboration with professional bodies may be used to increase the practical and employability skills of students, which is a good practise in experiential and work-integrated learning [20]. Through these suggestions, Assam University can continue to enhance the quality, relevance and effectiveness of its integrated programmes and eventually the satisfaction of the students and academic performance.

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