

Development of an Intervention Programme using Brain Based Learning (BBL) Principles and Fundamentals

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Abstract: *Brain Based Learning (BBL) has emerged as one of powerful approaches towards holistic development of students. The practical use of this approach followed by its effective implementation is achieved via an intervention programme developed using the BBL principles and seven stages of lesson plan. In this paper, an attempt is made to develop an intervention programme for a selected unit of Science text book of Standard VII. Furthermore, effect of the BBL approach on achievement in science subject is revealed via teaching the selected unit as per the intervention programme to an experimental group of students. While designing the intervention programme, due consideration was given to aims and objectives of science education, class room objectives of the selected content, and seven stages of BBL lesson plan. The intervention programme was finalized after pilot study followed by evaluation by experts. The statistical analysis revealed that the intervention programme has affirmative effect on achievement of students in science subject, thus advocating adaptation of BBL approach for all subjects.*

Keywords: Brain Based Learning (BBL), Lesson plan, Intervention programme

1. Introduction

One of the prime motives of school education is holistic development of students. In this regard, since the commencement of formal education, the educationalist, psychologist, policymakers, etc. are jointly taking efforts in exploring, developing, and validating various teaching-learning methods. Furthermore, with the changing social, economic, and technological scenario, timely reforms in the exiting teaching-learning models and/or development of new strategies are essential to meet the contemporary needs of school education. Brain based learning (BBL) is very advance and powerful teaching-learning method, as it is based on structure and function of human brain. The BBL is a relatively new idea, and requires the educators and neuroscientists to work together and create meaningful programs. Moreover, specialists in the fields of neuroscience, psychology, cognitive science, and education should join together to improve teaching methods and academic programs. It is desirable that the educators should understand the structure and function of human brain along with, how it learns, processes, registers, stores, and remembers information. This is essential, so that the teachers can acclimate their style of teaching in order to optimize the learning process.

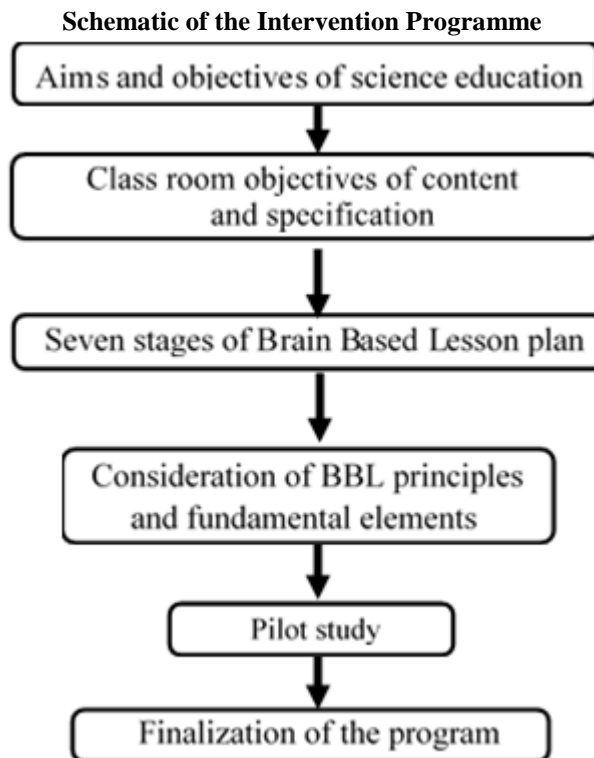
BBL deals with 12 principles and 03 fundamental elements. The practice of BBL approach is via intervention programme. The brain based intervention is a specific

program or set of steps to help a child to improve in an area of need. An intervention is a combination of program elements, or strategies, a specific set of activities, accompanying materials designed and to produce behavior changes. The interventions that include multiple strategies are typically observed to be the most effective in producing desired and lasting change. The evidence has shown that such interventions create change by influencing (i) individuals' knowledge, attitudes, beliefs and skills, (ii) increasing social support, and (iii) creating supportive environments, policies and resources.

In the present research study, an attempt was made to develop an intervention programme for selected units from Science textbook of Standard VII. In designing the intervention programme, due consideration was given to aims and objectives of science education, and class room objectives of the selected units. A pilot study was carried out and based on the feedback of experts, changes in the intervention programme were done, followed by its finalization.

Development of an Intervention Programme:

As underlined in the BBL seven stage lesson plan, movement plays very important role in teaching-learning. The physical movements activate brain cells for learning, hence at the beginning of every session, cross lateral movements were introduced. The flow-chart of an intervention programme is outlined below.



Following the aforesaid flow chart, the researcher has prepared lesson notes for each session. The selected topics were taught in 19 sessions, divided into 57 class hours. In every session, the researcher had used most of the principles and fundamental elements of BBL, as well as the seven stages of lesson plan, described in later section.

2. Aims and Objectives of Science Education:

In the National Curriculum Framework (NCF-2010), the objectives, content, and pedagogy pertaining to general science education at the upper primary stage are summarized as below.

- 1) The child should be engaged in learning the principles of science through familiar experiences, working with hands to design simple technological units and modules, and continuing to learn more about the environment and health.
- 2) The scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science, but the scientific concepts to be taught should be chosen so as to make sense of everyday experiences.
- 3) Group activities, discussions with peers and teachers, surveys, organization of data and their display through exhibitions, etc. in schools and the neighborhood should be important components of pedagogy.
- 4) The emphasis on the process skills of science should continue through the upper primary stage to enable children how to learn for themselves so that they could carry on learning to even beyond school.
- 5) At the upper primary stage the children are getting their first exposure to 'science'; this is the time to bring home the right perspective of what it means to 'do science'. Science education at this stage should provide a gradual

transition from environmental studies of the primary stage to elements of science and technology.

Classroom Objectives of Content and Specification:

In order to identify the classroom objectives of the content (topic of interest), its analysis was carried out, and classroom objectives, based on Bloom taxonomy, were framed. The Bloom's taxonomy deals with three domains namely, cognitive domain, psychomotor domain, and Affective Domain. The classroom objectives are based on stages of cognitive domain, knowledge comprehension, application, analysis, synthesis, and evolution.

Seven Stages of Brain Based Lesson Plan:

The seven stages of brain based lesson plan are as described below.

Stage 1: Pre-exposure

This stage provides the brain with an overview of the new learning before really digging into the concept. Pre-exposure helps the brain to develop better conceptual maps. The pre-exposure stage involves various activities such as. (i) posting an overview of the concerned topic on the bulletin board, (ii) encouragement to drink plenty of water and good nutrition, (iii) identification of student's interest related to the concept (what the students know about the concept?), allowing them to set their own goals (what the students want to know about the concept?), (iv) performing brain 'wake-up' exercises, and (v) creation of healthy learning environment

Stage 2: Preparation

At this stage, the teacher creates curiosity or excitement. It is similar to the "anticipatory set" but goes further in preparing the learner. (i) create curiosity/excitement - Anticipatory set. (ii) "You are there" experience - give learners a real-world grounding. (iii) Elicit from learners what possible value and relevance to the topic, (iv) provide something real, physical,

or concrete, (v) conduct an experiment, go on a field trip, or invite a guest speaker who is professionally involved with the topic, (vi) provide a “hook”, a “surprise”, or a “bit of novelty” to engage learners’ emotions.

Stage 3: Initiation and Acquisition

This stage provides the fascination and engagement. It is flooded with content. In contrast to the singular, lockstep, sequential, one-bite-at-a-time presentation modes, it provides initial virtual overload of ideas, details, complexity, and meanings. At this stage the learner would feel temporarily overwhelmed. It will be followed by anticipation, curiosity, and determination to discover meaning for oneself. Over the time, it all gets sorted out brilliantly by the learner. It involves various activities like (i) provide concrete learning experiences (e.g., case study, experiment, field trip, interview, hands-on learning), (ii) provide activities that employ a majority (if not all) of the multiple intelligences, (iii) offer a group a project that encompasses designing, building, and/or exploring, (iv) attend the theater, put on a skit, produce a commercial, or create a class/school newspaper, (v) provide enough choice that learners have the opportunity to explore the subject using their preferred modality.

Stage 4: Elaboration

This is the processing stage, it requires genuine thinking on the part of the learner. This is the time to make intellectual sense of the learning. In this stage (i) provide an open-ended debriefing of the previous activity, (ii) tie things together so that learning across disciplines occurs, (iii) have learners design an evaluation procedure or rubric for their own learning, (iv) have learners explore the topic online, (v) hold a debate, essay contest or panel discussion on the topic, (vi) have students to the teaching in small groups, as class presenters, in pairs.

Stage 5: Incubation and Memory Encoding

This stage emphasizes the importance of down time and review time. The brain learns most effectively over time, not all at once. (i) provide time for unguided reflection, (ii) ask learners to keep a journal of their learning, (iii) ask learners to take a walk in pairs to discuss the learning, (iv) provide stretching and relaxation exercises (like a music-listening area), (v) ask the learners to discuss new learning with their family and friends.

Stage 6: Verification and Confidence Check

This stage is not just for the benefit of the teacher; learners need to confirm their learning as well. Learning is best remembered when the students possess a mode/metaphor regarding the new concepts or materials. (i) ask learners present their learning to other, (ii) have students interview and evaluate each other, (iii) ask students to write about what they’ve learned (e.g. essay, news article, report, etc.), (iv) students demonstrate learning with a project, present a role-play, a skit, or a theatrical performance, quiz (verbal or written).

Stage 7: Celebration and Integration

In the celebration phase, it is critical to engage emotions, make it light, and joyful. This stage instills the all important love of learning. It must never be missed. (i) have a class

toast with juice. (ii) provide sharing time, peer sharing, demonstration, and acknowledgments, (iii) play music, hang streamers, and blow horns to celebrate the end of successful unit, (iv) invite another class, parents, the principal, or community guests through video conferencing to view projects, and (v) incorporate the new learning in future lessons.

Consideration of BBL Principles and Fundamental Elements:

There are 12 principles of BLL, as outlined below.

- 1) Brain is a parallel processor.
- 2) Learning engages the entire physiology.
- 3) Learning is developmental.
- 4) Each brain is unique.
- 5) Every brain perceives and creates parts and wholes.
- 6) The search for meaning is innate.
- 7) Emotions are critical to learning.
- 8) Learning is enhanced by challenge and inhibited by threat.
- 9) The search for meaning occurs through patterning.
- 10) Learning always involves conscious and un-conscious process.
- 11) The brain is a social brain.
- 12) Learning involves both focused attention and peripheral perception.

Caine and others (2005) argued that great teaching involves three fundamental elements, and were appended as BBL fundamental elements. These three elements play very important role in implementation of BBL approach, and are namely

- 1) Relaxed alertness: Creating the optimal emotional climate for learning.
- 2) Orchestrated immersion in complex experience: Creating optimal opportunities for learning.
- 3) Active processing of experience - Creating optimal ways to consolidate learning.

Development of Supporting Material

For execution of the intervention programme, supporting material was prepared. It consists of following things.

Overview of Topic:

As per the outlined sessions, overviews are prepared by the researcher and displayed on the class bulletin board prior to actual classroom teaching. In an overview of a given session, the researcher has presented concept importance in chart form/schematic diagram. It gives the central idea of chapter before taught in the classroom and attracts the students to learn particular content/chapter.

Worksheets:

The worksheets were prepared as per the following considerations; simple language (easy to fill), time management, neither too lengthy nor too short, wider validity from ‘weak’ to ‘intelligent’, and so on. The worksheets helped the researcher to know/check the concept understanding, fulfillment of the goals set by the student(s), building of confidence level, inculcation of curiosity, and inspiration for further learning.

Reflection Sheets:

Similar to the worksheets, reflection sheets are integral part of the learning process. The reflection sheets are oriented towards learner's self-assessment. Keeping this in mind, the reflection sheets were prepared giving due weightage to understanding of the concept and its application, creativity, self-evaluation, new surprises and/or experience(s). The reflection sheets were provided at the end of the sessions (wherever applicable).

Evaluation by the Experts:

The intervention programme developed by the researcher was evaluated from a panel of experts. The researcher has selected experts who are Associate Professors/Professors at College of Education/University Department of Education, possessing good teaching and research experience, and active researchers in the field of BBL research,

Suggestions by the Experts

For critical assessment of the intervention programme (the lesson plans, worksheets and reflection sheets), the researcher had thorough discussions with the panel of experts. The researcher explained the selection/use of particular BBL principle(s) and fundamental(s) for a given 'unit' of the topic. The experts suggested some important changes in the programme. The researcher had incorporated these changes and once again sent the modified version to the experts. Upon their approval, the research had used the approved (corrected) version of the intervention programme for the proposed research study.

Pilot Study

The pilot study was carried out by engaging 09 sessions (19 class hours) as per the designed lesson plan. The aim of the pilot study was to find out the rationality of the intervention programme (designed lesson plan) and reveal the correctness of following points.

- 1) The total time required for the entire presentation,
- 2) Class management.
- 3) Attention span of the students.
- 4) Concepts not understood by the students.
- 5) Any difficulty to execute activities included in the session.
- 6) Attractiveness of the worksheet and reflection sheet.
- 7) Response of students.

Important outcomes of the pilot studies:

- 1) In the first couple of sessions, the researcher observed that the students are unable to decide and write their own goals from the 'overview' of the topic displayed on the bulletin board. Therefore, the researcher decided that in the main study, at the outset of first session (About Your Self), guidance should be given on how to decide and write the goals from an overview of the topic.
- 2) In the fourth stage of lesson plan (Elaboration), one of the suggested activities was to explore the said topic 'online'. The researcher had observed that 'online' exploration using the key words (coined by the student) and randomly visiting the websites is very much time consuming. Although this activity was asked to carry out at home, it was noticed that every student do not have internet facility at home. Therefore, for the main study, the researcher had decided to provide the websites addresses to the students (to save time), to

request the IT class teacher to allow the students for online exploration of the said topic.

- 3) Regarding the supporting materials (worksheets and reflection sheets), the researcher observed that the students are enthusiastic to fill up the worksheet(s), and somewhat reluctant to write the reflection sheet(s). This might be due to their unwillingness towards expressing the reflections in 'written' form. However, the students were found to be very much responsive to express the reflection in 'oral' or 'action' form. Therefore, during the main study, the researcher had decided to give worksheets for every session and reflection sheets for some of the sessions only.
- 4) During the pilot study, the researcher has realized re-distribution of the number of periods allotted for the sessions. Accordingly, for the main study, the time allotment was modified.

Based on the feedback received from the experts (observers), and students' responses, personal gut feeling, changes were incorporated during the execution of complete intervention programme in the final study.

3. Conclusion

In order to practice BBL approach, an intervention programme, based on BBL principles, its fundamental elements and seven stage lesson plans, was successfully designed and developed for selected units of Standard VII text book. For its testing and validation, a pilot study was carried out wherein 19 sessions (each comprised of 03 class hours) were engaged. From the student's responses, feedback from the experts, and personal gut feeling, needful changes were made in the final intervention programme to be used for the main study. It is worth to state here that the outcome of main study clearly revealed that intervention programme has led to significant enhancement in student's achievement in science subject.

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