A COMPARATIVE STUDY OF EFFECTIVENESS OF CONCEPT MAPPING AND BLENDED LEARNING ON SCIENCE ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS

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ABSTRACT

School education is the one of the bottom foot for the learner that helps them to explore their ideas, thoughts and skills, shrug off the anxiety but nowadays, the academic standards are deteriorating day by day, and there is an urgent need to reform the methods of teaching. NEP (2020, p.3) also emphasised that, "The world is undergoing rapid changes in the knowledge landscape. With various dramatic scientific and technological advances, such as the rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand." The use of innovative and effective methods provides a spirit of inquiry, training in problem solving, and bridging the gap between the learning outcomes of the students in science. In the present paper, concept mapping and blended learning strategies are used in the teaching-learning process to bring equity, perseverance, critical thinking and creativity among the learners. Concept mapping is a valuable visual learning and thinking technique that helps students to understand the concept and communicate their ideas and thoughts whereas blended learning provides the platform to the learners to refine their skills, critical thinking and bridge the gap of the learning outcome in science.

Keywords: *concept mapping, blended learning, methods of teaching*

Children must be taught how to think, not what to think

— Margaret Mead

The aim of education should be to teach how to think rather than what to think- to improve the cognitive thinking of the learners so it enables them to think of the goals of their life. In education, the increasing awareness of the learner-centred approach, teaching-learning process has generated a lot of attention towards the learners, how long they keep the content, how they conceptualize the content and how they help themselves to organize their knowledge to enhance meaningful learning. As per Times of India, (2014, Jan 06) primary school students spend 800-1000 hours per year in India, this is the maximum of all countries of the world like China, Korea, Japan, Australia, France, England and even Finland which provides an exemplary approach in education to the world. Then why does our quality of education suffer? It is a question of deep concern.

It is also discussed by MHRD (2014) that there is an unsatisfactory level of student learning, one of the key challenges being faced by the Indian education system. There are quality-related deficiencies at each stage of education resulting in an unsatisfactory level of student learning-both scholastic and co-scholastic/non-cognitive. There is an increasing concern about the quality of education that the system is able to provide. The distribution of the students on the basis of the scores obtained by the students who participated in the NAS 2010

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(National student's academic survey) of class V, reported the significant proportion in the achievement of the students at the primary stage of education and it does not measure up to the expected levels. Though the overall mean scores in Language for class V was 56.06, about one-third (31.5 %) of students obtained scores of 40 % and below. While the overall mean scores in Mathematics for class V was 53.23, about 35.8% of students obtained scores of 40% and below. Similarly, while overall mean scores in Environmental studies (EVS) were 53.39%, about 35.1 % of students obtained scores of 40% and below. The phenomenon of under-achievement reflects the quality-related deficiencies facing the education system. Despite the important progress in the education system, the input mix and the educational processes in schools remain deficient resulting in unsatisfactory levels of student learning. The unsatisfactory levels of student learning underscore the fact that fostering quality education should be the key focus in the coming years.

To overcome the dissatisfaction in education, an effective and innovative teaching method must be used for instruction to achieve the aims and objectives of the education. The strategy should be based on the nature of the learner or on the subject matter that is to be taught in the class. The techniques of teaching should be like that reflected in the behaviour of the students, but how, it is still a question mark. This can be answered by setting the principles and instructional objectives before going to the class. The Principles are the chief guides to make the teaching and learning intelligently and productive through which we proceed from one situation to another. It shows the direction, how the things can be done and how the objectives can be achieved. When the principles will be well understood, it serves to determine and evaluate the aims and learning outcomes.

There is a great need to change the perspectives of teaching and learning in order to discover the pupil's original endowments, their interest as the quality of learning attained by the pupil is related to the quality of teaching done by the teacher.

To make the teaching and learning effective, the aims must be clear, material of the instruction must be based on pupil's need and the class environment must be conducive. Teaching and learning can only be run smoothly, if the ways of doing things are skilful and experiential. The spirit of modern teaching stresses not only the growth of the learner but also in the improvement of learning situations and participation of the learner.

The value of the cognitive aspect is basically determined by the teachers. Various methods of teaching have been developed to engage the students in the learning. There are a number of innovative techniques, one of them is concept mapping which helps the learner to create interest and develop the scientific attitude among pupils towards science. As every aspect of the lesson can be represented in the pictorial form through which pupils can relate their information with their pre-existing knowledge.

In 21st century, the learner centred approach is needed to be emphasized, i.e. we have to shift the focus from teacher to the learner. This can be done by using a concept mapping and blended learning technique. The learner–centred approach focuses on the skill development and enables the lifelong learning (LLL) also. It helps to foster the skills such as problem-solving, critical thinking and creativity among the learners.

Concept map is a way of representing the ideas, concepts, facts, images, in the pictorial form. Each word or phrase is interconnected to each other and develops logical thinking and study skills by revealing the connections. The term was developed by Joseph Novak in 1970. He based his work on the theory of learning proposed by David Ausubel. This theory started from the stance that, "If I had to reduce all educational psychology to just one principle, I would say this. The most important single factor influencing learning is what the learner already knows, ascertain this and teach him accordingly." Joseph Novak got the idea of assimilating the new concepts and propositions into existing cognitive structures to enhance meaningful learning in science and other subjects.

Concept mapping strategy helps learners to organize their cognitive frameworks into more powerful, integrated patterns (Kinchin, 2005). In this

regard, it serves as a meta-knowledge and a meta-learning strategy (Jegede, Alaiymola, and Okebukola, 1990). Meta-knowledge refers to knowledge that deals with the nature of knowledge and knowing and meta-learning refers to learning that deals with the nature of learning, or learning about meaningful learning (Novak and Gowin, 1984). Meaningful learning means that learners can integrate new knowledge into their existing networks of concepts and proposition into their cognitive structures (Malone and Dekkers, 1984)

A concept mapping is defined as the graphical representation of the meta-knowledge and meta-learning. Meta-knowledge helps the child to lead from rote-memory of understanding of the concept and meta-learning helps the child to lead from low order thinking skills (LOTS) to high order thinking skills (HOTS).

Ausubel (1963) concept maps are helpful in teaching and learning process as these maps facilitate learning because they have a long lasting impression on the mind of students thereby improving the learning outcomes of the students.

Novak (1991) concept maps are tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts or propositions, (indicated by a connecting line and linking word) between two concepts. Linking words on the line specify the relationship between the two concepts. Joe Novak defines "concept" as a perceived regularity in events or objects, or records of events or objects, designated by a label.

The term **blended learning** was I[st] developed in 1960. However, the terminology of blended learning was unknown until late 1990. In 1999, the term was appeared in the press release in which the interactive learning centres, an Atlanta-based education business, announced its name as EPIC learning. The term 'blended learning' initially encompasses of variety of technology and pedagogy in varying combinations. In 2006, it becomes more concrete with its First published handbook of Blended Learning by Bonk and Graham.

This approach helps to increase the level of achievement of the students. Teachers can pay attention to those students easily who need more individual care as many of the students in the class can learn at their own pace with new approaches. Overall, it also helps to facilitate independent learning and teachers can get feedback simultaneously. It allows the learner to create interest in the subject as well as develop self-regulation among pupils. Above all it becomes more authentic if it is in-cooperated in the curriculum. If so, it facilitates the teacher to maintain the anecdotal records also.

Mixing different approaches in the teaching and learning process provides new opportunities that support the teacher and the learners' cognitive experiences as well as social environment. Blended learning is realized in teaching and learning environments where there is an effective integration of different modes of delivery, model of teaching and styles of learning as a result of adopting a strategic and systematic approach to the use of technology combined with the best features of face to face interaction (Krause, 2007).

Blended learning is not only about the use of technology in the class, it is about finding better ways and means for supporting and achieving the learning objectives. It gives immense support to the student's learning as well as to the teacher also in managing and administering the class.

The blended learning technique is designed to enhance the teaching and learning experiences by integrating ICT (Information and communication technology) into the traditional method of teaching. It enables the students and the teachers to engage in ways that would not be available normally, whether it is face to face interaction or distance mode. It involves a mixing of different teaching and learning styles.

Discroll (2002) blended learning is defined as a combination or mixing of at-least four different methodologies including:

1. Mixing of technology-based learning (e-learning collaboration, virtual classroom, etc.).
2. Combination of pedagogical approaches (behaviourism, cognitivism and constructivism).
3. Mixing of forms of instructional technology (face-to-face, internet, CD –Rom, etc.).

4.   Integrating instructional technology with actual job activities.

Graham (2006) blended learning is the combination of instructional modalities, combining instructional methods, combining online and face to face learning.

Conclusion

In the teaching-learning process, the mind is not the vessel to be filled, but a fire to be ignited (Plutarch) means of expressing qualitatively different kinds of thinking. Concept mapping and blending learning are techniques which can be used to ratify the meta-cognitive behaviour and enhance conceptual learning instead of rote-memory. In recent years, the increasing awareness of the importance of learner-centeredness in the teaching–learning situation has generated a lot of attention in relation to understanding how learners learn and how to help them learn about concepts (Jegede, Alaiymola, and Okebukola, 1990). These efforts in assisting learners to learn more effectively have led to the development of meta-cognitive strategies to enhance meaningful learning (Biggs, 1988; Cliburn, 1990).

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