Implementing Blended Learning Approach for Enhancement of Scientific Attitude of Undergraduate Students

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Abstract
The present research was conducted to determine the scientific attitude of undergraduate students in blended learning situations. COVID-19 has changed the teaching learning scenario all around the globe as Educational Institutions are opening in a hybrid mode where students are partially attending their classes in online mode and partially in offline mode. Blended Learning or Hybrid Learning has been proving to be a great boon in this time of pandemic. The blended learning approach is a mix of online teaching with traditional offline teaching methods to get the maximum advantage of both of them. Scientific attitude is requirement of today's multicultural society for peaceful and meaningful living of every person. Scientific attitude may be defined as open mindedness, a desire to gain accurate knowledge, confidence while proceeding towards attaining knowledge and belief that the problem will be solved by using scientific method. In the present study the authors prepared blended learning module of one week for the course “Assessment of Learning” and then this module was implemented on the students of Integrated B.A-B.Ed., using Blended Learning Approach. The findings of the paper indicated that there is significant enhancement in the scientific attitude of undergraduate students after implementation of blended learning approach. The present research recommended that blended learning approach should be effectively implemented in the classroom to maximize the learning outcomes. The present research provides an idea to implement flexible teaching methods that can be customized to adjust to the learning needs of diverse learners.

Keywords: Blended Learning Approach, Hybrid Learning, Blended Lessons, Scientific Attitude
Introduction

The outbreak of pandemic has forced the instructional planners and designers to actively involve 21st century students in the teaching learning process. Teacher of this century should not only have mastery of the content, but also have necessary pedagogical skills to integrate technology in teaching. Learning can become more effective, attractive and can retain for longer time by utilizing the benefits of technology. The National Policy on Education, 1986 and revised policy in 1992 have laid great emphasis on the application of Educational Technology in all aspects and stages of education. New Education Policy 2020 also aims to integrate technology in the field of education to improve practices in the classroom, support training of teachers, strengthen access of education for disadvantaged groups and combine educational planning, administration and management. One of the latest educational innovative ways is hybrid learning/blended learning whereby dynamic digital tools such as e-Learning or online learning components are blended with traditional classroom practices. The blended learning approach is a mixture of online teaching with traditional teaching methods to get the maximum advantage of both the methods. There is integrated amalgamation of conventional face-to-face learning with web-based e-learning in blended learning in which a vast variety of multimedia, pedagogical strategies, aids are utilized.

The integration of latest mobile technologies with online resources is proving highly effective in the time of pandemic. Educational Institutions all over the globe are redesigning because of COVID-19 and blended learning is becoming a new normal. Schools are opening in a hybrid mode, with students attending school part time and remaining time in online mode. Blended learning is economical in the sense that it reduces time and efforts of both students and teachers and hence facilitates implementation of the educational processes, the assessment of learners’ performance, and enrichment of the overall attainment of educational objectives while providing a flexible learning environment. Variety of modern communication technologies like computers, networks and internet portals are used in blended learning which increases interaction in the classroom. The social interaction in the blended learning provides scope for clarification of doubts. It also reduces time, efforts and cost involved and thus enables overall improvement of the educational process, environment.

Scientific attitude is a cognitive concept. It is composed of a series of mental tendencies that render an individual stable to face a problematic situation. It is a desire to attain accurate knowledge and attain confidence in finding a solution to the problems through use of verified knowledge. The scientific attitude recognizes three cardinal principles: firstly, truth is- what it is searching for; secondly, no ways should be missed that might help to find truth and thirdly, what seem to be the truth at one time, may later under the advance of new facts prove to be something less than the truth. The major components of scientific attitude include rationality, curiosity, open-mindedness, aversion to superstitions, objectivity, intellectual honesty and suspended judgements. Scientific attitude is need of today’s multicultural world. The present era is the world of technological advancements. The teachers and students need to have a positive scientific attitude so that they make themselves more objective and freer from superstitious beliefs and irrational thinking. They should have consistent scientific attitude so that technological advancements could be beneficial for the
progress of the nation and welfare of the whole mankind. Scientific attitude allows students to build their curiosity.

**Review of Related Literature**

In the present research the researcher while conducting the research, has consulted some reputed journals, research articles, thesis, dissertations etc., while conducting the research. She also drew some factual information from the internet. She also interacted with teachers, professionals and experts to update her knowledge.

**Kumar (2010)** analysed impact of strategies in blended learning on learning retention and attitude of secondary school students. It has been found that students taught through blended learning strategies have better learning retention and also have positive attitude towards blended learning strategies. **Krishnan (2011)** examined impact of blended learning on higher order thinking and skill of learning science. The experimental group has improved their higher order thinking skills like critical thinking problem solving skills etc. The science process skills have also been improved.

**Usta (2011)** studied the attitude of students towards computer and internet in web-based learning environment. The study revealed that there was no differentiation of scores of experimental group and control group. Thus, it can be interpreted that there was no impact of web-based learning on attitude towards internet and computer.

**Kingra and Kaur (2012)** in their study found that computer assisted instructional strategies and activity oriented instructional strategies have positive impact on scientific attitude and creativity of students. **Kiviniemi (2014)** explored outcomes of graduate level public health course students when blended learning approach was applied. The majority of students have improved their performance in blended learning situation.

**Nair (2014)** in his experimental study on blended learning strategy revealed that blended learning strategy was significantly superior to direct instruction method with respect to post-test achievement score in biology. The study also showed that blended learning strategy is superior to direct instruction method in improving and promoting environmental and social attitude of students. Meanwhile **Zhonggen and Zhejiang (2015)** analysed blended learning over two decades. Since the conception of online learning in 21st century, a large number of researches has been done on blended learning. In this study definitions, advantages and problems of blended learning has been briefed based on review of over thirty journals. It has been said that there are deficiencies in both conventional method and online learning when they are used alone. It has been recommended to implement innovative pedagogy in the form of blended learning in educational and non-educational institutions.

**Gani, Safitri, Habibati and Saminan (2016)** carried out the study on cooperative inquiry labs models with respect to scientific attitude of high school students on heat and temperature. It was found that there was improvement in the learning process after implementation of cooperative inquiry labs model. **Balentyne and Varga (2017)** designed a self-paced blended course in mathematics and then explored attitudes and achievement of students. It was revealed that the students who have positive attitude are more successful in self-paced blended course.
Firdaus and Darmadi (2017) examined the impact of research-based teaching in shaping scientific attitude of biology students. Research based teaching gave exposure to students in preparing posters in science and other activities which mould various skills like critical thinking, honesty, objectivity, tolerance etc. Thus, it was found in this study that research-based teaching helps to shape the scientific attitude of students.

Singh (2017) in her research on seeing the impact of blended learning on three variables viz. task value, goal-orientation and satisfaction of students. Blended learning improves the quality of communication and human interaction. Blended learning should be effectively implemented so that an equilibrium is maintained between traditional face to face teaching and e-learning.

Budiharti and Waras (2018) prepared blended learning course using I-Spring Suite 8 applications. This was then implemented to analyse the behaviour change in scientific attitude of students. It was revealed that skills like critical thinking, discovery, creativity, open mindedness, cooperation and perseverance are developed in blended learning environment supported by media applications like I-Spring Suite 8. Similarly, Kaleka and Nur (2018) conducted experimentation on the basis of scientific approach so as to improve science process skill and scientific attitude of grade X students of MAN Ende. There is improvement in scientific attitude of students.

Elizabeth Azukas (2019) promotes personalized learning of students by cultivating a blended community of practice. In the blended community of practice various skills of students like planning, risk taking, confidence, sharing with others, implementation etc., are improved. Teachers also showed improvement in various competencies like skill of using technology, facilitation and problem solving. Online learning improves personalized learning as integration of technology helps in facilitating cooperation and carrying out interdisciplinary work.

Saboowala and Mishra (2021) examined blended learning as a new normal pedagogy in post COVID time. In this study it was suggested that education system need to create technology dependent learning environment in post COVID time. So there is a need of paradigm shift in teaching learning process to enhance learning experiences of teachers as well as students.

Rationale of the present study

In the past the regulation of learning was primarily teacher controlled. But in the present times due to the technological advancements there is paradigm shift in the teaching and learning process. Today’s students are digital natives who are confronted with the internet and web-based technology and in the future these students do not conceive as passive learners without interaction. The aim of education is to make students capable of becoming a responsible, productive and skilled member of the society. The teacher should provide such opportunities and experiences to the learners which develop their innate capacities to create, to question, to investigate and to become independent thinkers. In the fast-moving global economy, the prime focus of educational institutions is to produce such learners who can deal with unlimited stream of profound information and who confront with the paradoxical problems very strategically. There is a need to pay emphasis on those modes of learning.
which can develop the higher order thinking skills of learners who are active learners. A paradigm shift in the present teaching learning process is needed to mould creative problem solvers who could strategically confront ambiguous paradoxical and bifurcated problems. Schools should empower learners to become more creative and responsible so that they can acquire productive skills and higher order thinking skills.

Scientific attitude is the need of present world of scientific advancements and technological revolution where the learners are confronted with newer technologies every new day. Scientific attitude develops curiosity, creativity, decision making abilities and make them objective thinkers. There is need to adopt those methods of teaching which develops scientific attitude of learners. Almost all educational committees and commissions of India stated the importance of developing scientific attitude of learners. If the learners are given proper guidance, they will excel in all streams of life and contribute towards national development. Effective curriculum transaction by using effective approach of teaching and learning will instill scientific attitude of learners. Blended learning approach proves to be one such successful approach whereby learners are provided with flexible learning activities that can lead to the cultivation of scientific attitude of learners.

The present research stems from the need to implement new methods of teaching which are effective and improve the active engagement of students in teaching and learning environment. Blended learning is considered as an innovative teaching strategy which combines both conventional and online classroom where technology is integrated to enhance learning outcomes (Zhonggen and Zhejiang, 2015; Saboowala and Mishra, 2021). The integration of technology with teaching plays a major role in transforming the educational system from a teacher centered into rich student-centered interactive environment. The present research also emerges from the need to diversify the teaching methods in the time of COVID-19. COVID-19 pandemic consequently redesigned the scenario of teaching and made us realize the importance of technology in teaching learning process. Students and teachers faced diverse challenges giving rise to methods of teaching that avoid social interaction and at the same time provides quality education. The pandemic of COVID-19 has transformed the whole system of education in India. Acknowledging the current scenario, the University Grants Commission (UGC) has prepared a concept note on blended mode in universities and colleges. UGC in this draft has agreed upon 40% teaching in online mode and 60% in offline mode.

The research evidences indicate that the blended learning strategies have a positive impact on different domains of students’ learning (Kumar, 2010; Usta, 2011). Blended learning has also found to develop attitude of students as indicated by review studies (Nair, 2014; Budiharti and Waras, 2018). It has been found that only a few researches have been done to see the impact of blended learning strategies in Indian context. Besides there are very few researches done on scientific attitude in blended learning environment. Based on the above facts it is significant venture to implement blended learning approach to enhance scientific attitude of learners.
Statement of the problem

Based on the above facts the investigators selected following problems for the present study:

Operational Definitions of the Terms Used

Blended Learning Approach

Blended learning is an innovative approach to teaching which combines the best elements of online and face-to-face education. In the present study the blended learning applications means to use MS Word documents, Google Classroom, Google Meet, PowerPoint Presentations, You Tube videos, Gmail, audio clippings, video clippings and online test components, online discussions on WhatsApp group rightly blended with face-to-face components

Scientific Attitude

Scientific Attitude can be defined as a generalized disposition towards science, which can be measured in terms of its favorableness estimated from the scores obtained on a scientific attitude scale by testing the components like rationality, curiosity, open mindedness, faith in scientific method and aversion to superstition.

Variables of the study

Independent Variable

Blended Learning Strategies

Dependent Variable

Scientific Attitude

Objectives of the Study

The investigators completed her study with the objectives given below:

1. To implement the blended learning approach on under graduate students.
2. To see the effect of blended learning approach on scientific attitude of under graduate students.

Hypotheses of the Study

On the basis of review of literature, the investigators formulated following hypothesis:

There will be no significant difference in scores of scientific attitude of experimental group on pre-test and post-test.

Delimitations of the Study

The study was done with following delimitations:

1. The study was confined to the students of integrated B.A-B.Ed. Sem-V students only.
2. The study was confined to the students of Integrated B.A-B.Ed. Sem-V students of Central University of Jammu only.
3. The study was limited to only one variable i.e., scientific attitude.
Population
Population includes individuals that have one or more similar characteristics and that are of interest to the researcher. For the present research the students of Integrated B.A-B.Ed students form the population of study.

Sample
Sample is the true representative of the entire population. It represents the characteristics of the whole population. Sampling is the process or action in which the researcher selects a representative part of individuals from the population as a sample. This sample is selected for the purpose of conducting research for determining the parameters of the whole population from this sample. For the present study the students of Integrated B.A-B.Ed. Sem-V of Central University of Jammu only comprises sample of study.

Research Design
A research design is like a road-map. It is the mapping strategy or blue print of research procedure. It is the path which a researcher follows while conducting the research. For the present study the investigators used the single group pre-test post-test design. The sample of the study consisted of 16 students of Integrated B.A-B.Ed. Sem-V.

Methodology
For the present research the researcher first of all prepared a blended learning module on the course ‘Assessment of Learning’. This module comprises of three topics viz: Difference between measurement, assessment and evaluation; Assessment of learning, assessment for learning, assessment as learning; Formative and Summative evaluation. These topics were prepared by using various sources like MS Word documents, PowerPoint Presentations, Video Clippings, rightly blended with face-to-face discussion. Pre-test on scientific attitude was administered to the sample of study. Then blended learning approach was implemented on them where the prepared blended learning module was transacted by the researcher. This module was implemented for the duration of one week on the group. After that the post-test on scientific attitude was administered to the group.

Tool Used
For the present study the scientific attitude scale by Dr. N.N. Srivastava was used. There are a total of 36 items in the scale. The scale is 3-point scale where the items ranged from agree to disagree. The scoring pattern is 2 to 0 from agree to disagree.

Statistical Techniques Applied
Mean, Standard Deviation and t test was used for the analysis and interpretation of results.
Results of the Study
Analysis of Data

<table>
<thead>
<tr>
<th>Group</th>
<th>Scientific Attitude Scores</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>R</th>
<th>t-value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>Pre -Test</td>
<td>16</td>
<td>46.25</td>
<td>5.44</td>
<td>-0.16</td>
<td>3.26</td>
<td>Significant at 0.01 level</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>Post -Test</td>
<td>16</td>
<td>52.25</td>
<td>3.78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table shows result of t-test for correlated data of experimental group on pre-test and post-test of scientific attitude.

Interpretation
It can be interpreted from the above table that the calculated value of $t$ for experimental group under pre-test and post-test situation is 3.26 which is more than 2.60 (Table value of $t$ at df 15) at 0.01 level of significance. Hence the hypothesis stating, “There will be no significant difference in scores of scientific attitude of experimental group on pre-test and post-test” is rejected at said level. Thus, it can be inferred that there is a significant difference in scores of scientific attitude of experimental group on pre-test and post-test.

Findings
On the basis of Statistical Analysis of data, the study entitled “Implementing Blended Learning Approach for Enhancement of Scientific Attitude of Undergraduate Students” revealed the following findings:
There is a significant difference in scores of scientific attitude of experimental group on pre-test and post-test.
Hence, we can say that there is significant enhancement in the scientific attitude of undergraduate students after implementation of blended learning approach.

Educational Implications
On the basis of analysis and findings of the study, following implications of the study are mentioned:
1. The present research dispensed an innovative model of teaching where technology can be effectively utilized in teaching and learning so as to complement conventional teaching.
2. Positive impact of blended learning strategies in enhancing scientific attitude of undergraduate students have been highlighted through this study.
3. An outcome of the study is that the students after implementation of blended learning strategies shows a significant enhancement in the scientific attitude of students. The reason of such an outcome may be that blended learning strategies provides flexible learning activities which keep them engaged and interested in learning.
4. Universities and other educational institutions should effectively implement blended learning as it offers high potential in improving teaching learning process and catering to the needs of contemporary learners of digital world.

5. Undergraduate students have their own experiences and they can contribute in teaching learning process by sharing their experiences and ideas. Blended learning approach provides a common platform for learners where they can share their knowledge and ideas and become active contributors in learning.

6. Blended learning provides an efficient method for addressing the needs of diverse learners by providing a variety of learning resources and maximizing the learning outcomes of every learner.

7. The study may deliberate conversations in educational sector to evolve innovative pedagogical approaches in the time of pandemic where hybrid mode of learning has become essential aspect of education.

8. The present research also provides inputs for policy makers and educationists to effectively utilize the benefits of technology so as to improve the quality of education.

9. The present research also implicates those educational institutions should provide good infrastructure and all the facilities for successfully implementing blended learning approach.

10. Proper training for effective implementation of blended learning approach should be provided to teachers at pre-service and in-service level.

11. There is need to conduct more research for examining success of blended learning approach on different populations

Conclusions

Blended learning strategies have the potential to completely transform the whole scenario of teaching and learning. The aim of the study was to implement blended learning approach on under graduate students for the enhancement of scientific attitude. The results of the study showed significant enhancement in the scientific attitude of students after implementation of blended learning strategies. It has been manifested that blended learning approach has high potential to transform the teaching learning process by acting as an innovative pedagogical approach. It is also need of the present time of pandemic as educational institutions are opening in a hybrid mode where face-to-face teaching can be perfectly blended with online learning. It has also been suggested that colleges and universities should continuously emphasize the importance of blended learning and should continuously strive towards its inclusion in the teaching learning scenario.

References


