

A Study of the Effectiveness of Blended Learning Approach in Addressing Instructional Pluralism among B. Ed Students

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Abstract

Many B Ed students from arts and commerce background and vernacular medium students opt for a course on Environmental Studies. They face a lot of difficulty with the technical terminology and concepts involved in the subject. In addition, it is a challenge for the teacher to match her teaching style to the learning styles of students with diverse backgrounds. The present study is an attempt to address such instructional pluralism. Two group quasi-experimental study with a Convergent Parallel Pretest Posttest Design which included a well planned instructional module using the ADDIE Model of instructional design based on the principles of constructivist and cognitive theories and experiential learning. The researcher used technology as per the availability of the students and the researcher herself. Both synchronous and asynchronous strategies were used and all the instruction involved flipped classroom, where students reviewed the concept before hand with the help of videos and came to the class prepared with the topic. The various strategies used included a class blog, discussion group and a virtual classroom to complement and supplement the face to face sessions. The face to face sessions however included power point presentations, games, role play, concept mapping, debate, poster making, song creation, worksheets, assignment, field trip and a project. The research ended with a focus group interview followed by the posttest. The study found a significant difference in the gain scores of the experimental and control groups: students who learnt through the blended learning approach scored higher as compared to those with face-to-face approach. This paper discusses only the quantitative part of the research.

Introduction

Learning has got a new definition today with the onset of technology. The internet has made various social and friendly tools like the blogs, virtual class rooms, discussion groups, twitter, You-tube, face book, etc. available, which can be used in education. This has made teaching easier for the ICT driven teacher who tries to include technology in the teaching- learning process making use of the variety of tools and strategies both inside and outside the classroom. Moreover, it becomes a challenge to every teacher to meet the diverse needs of the students effectively within the stipulated time. This is when the teacher makes use of the varied blended learning strategies, which proves beneficial to both the teacher and the students. Also, the students love to enjoy their studies if they are given an opportunity to be responsible for their learning. The strategies should be based on the principles of constructivism, socio-cognitivism and experiential learning where the learner learns through self actualization and experience.

Review of Related Literature

A review of the related literature revealed that to prepare an environment useful to learn through CALM(Computer assisted learning materials) using the various functions like sender, receiver, message, mode, medium and the environment is indeed beneficial for the learners to learn and that Language can be learnt through CALM (Das A, 1998); Jain, N (2002) found that the effectiveness of the teleconferencing programs projected mixed reactions as some found it

very exciting and wonderful while others could not utilize these programs properly ; Chourishi D et al (2011) revealed that e-learning could be used effectively as an instructional medium for course development, online assessment and interaction; Patil, A (2011) concluded that female students had less understanding of the content through e-learning compared to the male students; while Roy S; Roy D (2011) learnt that a learner centric adaptive learning experience should be provided for e-learning to be truly effective; considering the presence of various challenges for the standardization of the whole e-learning system, increasing the quality of the existing standards and including cultural differences in the global distance learning programs which are the most neglected area (Kakoty S et al ,2011); to make more effective and efficient online learning environments, researchers need to explore the areas of the types of skills and strategies that teachers will need to have (Kawatra P.S; Singh N.K, 2011); cultural aspects of online classrooms can be adhered to through improvement in the intelligent on-line learning architecture system (Sakarkar G et al ,2011); Khan. S; Jumani,B (2012) in their descriptive research in Pakistan found that e-learning was more effective than the traditional one at the higher education level, where they used survey data using a self developed Questionnaire as a tool; Shinde, S.P, Deshmukh, V.P (2012) conducted a pilot study with online teaching methods in secondary schools and found that it improved practices in both virtual and face-to-face settings and instruction combining online and face-to-face elements had a larger advantage relative to purely face-to-face instruction than did purely online instruction; Kar, S(2015) in his study , “Development, Validation, and Effectiveness of Blended Learning on Teaching of Science at B.Ed Level.” attempted to develop blended learning modules by integrating the freely available e resources and the class room input of the teacher and investigated the effect of the modules on e quest, ICT readiness and achievement in science education. The researcher found that blended learning strategy was effective, interesting and offered better satisfaction to the learners; Radhika ,M (2015) in her study to examine the effectiveness of blended learning in the manufacturing industry assessed the employees’ learning outcomes of Knowledge, Skills, Attitudes and Behaviour and the impact of the training upon the organization by means of increased Job Performance using the Kirkpatrick model of evaluation and found that in spite of some barriers relating to the implementation of learning skills at workplace, the results demonstrated that the blended methodology allowed participants to acquire the knowledge and skills on how to integrate theory into their workplace more easily; Sasidharakurup, H et al (2015) developed web-based virtual labs for virtualizing the wet-lab techniques and experiments with the aid of graphics favored animations, mathematical simulators and remote triggered experimentations, analyzed its usefulness and came to a conclusion that it improved their academic performance and increased interactions amongst students; Krishnan, D (2016) concluded that blended learning strategies should be undertaken to improve the quality of Science education by integrating both online and face-to-face instruction; while finally the study conducted by Nair, T (2016) concluded that Blended learning is effective for enhancing achievement in Biology, is effective in improving Environmental Attitude and is effective for promoting Social Attitude of Secondary School Students.

The above studies of Indian review show that lot of work is yet to be done regarding introduction of blended learning strategies in India. Considering that India, with a traditional background and suddenly exposed to the technology boom and in the backdrop of globalization, modernization, multiculturalism, and many other social, economic, financial and political issues, it is a very challenging task for blended learning to actually happen in the classrooms.

Research conducted abroad has revealed that the course on the (LMS) Learning Management Systems improved the computer skills and the students worked with collaboration, but they were critical about the improvement in English language skills (Nguyen L. V, 2011); self-paced learning and peer learning was facilitated through provision of softwares, spreadsheets, LMS ,moodling, etc., and also alternative classroom instructional strategies (Buraphadeja V et al ,2011); simple and effective wiki technology can increase the quality of engagement of the students (Pantzopoulos A.D, Gray K. 2011); university students in Thailand accept e-learning with ease and are above average in this aspect (Abulideh E.S., Hassan S, 2009); teacher education programs and general schools can integrate diversity issues into literacy teaching and learning through weblog – technology and Gollnick and Chinn’s cultural- identity model and there was positive attitude amongst the pre service teachers (introvert ones) towards discussions and interactions on the blog. Moreover students blogged to expand their diversity-themed discussions which they did not do in the classroom (Hui-Yin hsu, 2009); a tutor can assess using technology and enable collaborative learning through as part of a blended learning framework, which is visible in the study through a practical example of using Wikipedia and CLAT(Collaborative Learning through Assessment and Technology), a pedagogical model (Doolan M, 2011); Wong, L; Fong, M (2014) studied the student attitudes to traditional and online methods of delivery and investigated the student perceptions in a first year introductory accounting unit in a number of key areas like learning effectiveness, motivation and impact on assessment outcomes and found that both male and female students attached high importance to opportunities for social interaction in their learning, but however results showed no significant differences between face-to-face or online learning options and preference for online learning technology between male and female students; Ekmekci, A; Gulacar,O (2015) in their case study for comparing the effectiveness of a Computer simulation and a hands-on activity on learning electric circuits concluded that both computer-based and hands-on activities are effective when utilized in the right classroom environment centered on four components: learner, knowledge, assessment and community; Wu, T; Tai, Y (2016) studied the effects of multimedia information technology integrated multi-sensory instruction on students’ learning motivation and outcomes and to provide reference to the teachers applying information technology integrated instruction and the results showed significant correlations between multimedia information technologies integrated multi-sensory instruction and learning motivation, between learning motivation and learning outcome and between multimedia information technologies integrated multi-sensory instruction and learning outcome. Moreover, the students got more opportunities for manual operations stressing on real experiences which internalized their learning.

The review of the literature on blended learning shows that there is still a lot to be explored regarding the best and most effective learning tools. Many research studies show improvement in students’ achievements, but the researcher wants to find out the effectiveness of blended learning strategies on the achievement of pre-service teachers in the Indian set up.

Objectives of the study

1. To study the Gain Scores of the experimental and control groups on a test of Environmental Studies.
2. To study the Gain Scores of the experimental and control groups on the basis of their Levels of Achievement.
3. To study the Gain Scores of the experimental and control groups on the basis of their Subjects of Specialization.

Hypotheses:

The following null hypotheses were formulated in pursuit of the objectives:

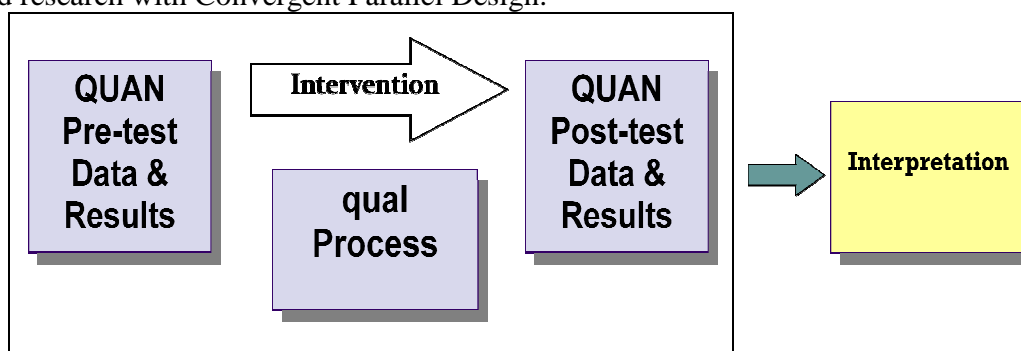
H₀₁. There is no significant difference in the Gain Scores of the experimental and control groups on a test of Environmental Studies.

H₀₂. There is no significant difference in the Gain Scores of the experimental and control groups on the basis of their Levels of Achievement.

H₀₃. There is no significant difference in the Gain Scores of the experimental and control groups on the basis of their Subjects of Specialization.

Methodology

Two topics (Sustainable Development and Sustainable Environmental Management) in Environmental Studies were selected and sequential activities were prepared for instructional intervention using Blended Learning Approach (BLA). The method adopted is a mixed method research with Convergent Parallel Design.



Source: John W. Creswell (2012)

The quasi-experimental design was The Pretest-Posttest Group Design, where 2 intact groups were selected. Both the groups were given pretest first then treatment followed by posttest. It is represented as follows:

$$\begin{array}{ccc} O_1 & X & O_3 \\ O_2 & C & O_4 \end{array}$$

(where X = Experimental Group, O₁ and O₂ = Pretests O₃ and O₄ = Posttests C = Control group)

The difference of the means of (O₁, O₃ Experimental group) and (O₂, O₄ Control group) were tested for statistical significance.

In the first stage, a Pretest was conducted with the Control Group (O₁) and the Experimental Group (O₂). In the second stage, the Control group (C) was taught by the Face to face Approach and the Experimental group (X) was taught by Blended Learning Strategies Approach. After the completion of the intervention of teaching of the topics, a Posttest (O₃ and O₄) was administered to Experimental and Control group respectively to assess the conceptual and academic achievement of the topics taught. After which, a focus group interview was also conducted with the Experimental group to ascertain students' attitude towards the Blended Learning Approach (BLA).

Participants

The population for the study was the prospective teachers undergoing one year's pre service training in B.Ed colleges. The sample was selected by purposive and convenient sampling technique. The sample selected for the study comprised of two groups of 35 B.Ed students (pre-

service teachers) each drawn from two different teacher education institutions: one was the experimental group and the other, the control group. Only those students who had opted for Environmental Education were considered for the study.

Instruments

The Researcher made use of the following tools to collect data:

- a) Personal Data Sheet;
- b) Criterion Referenced Pretest/Posttest
- c) Instructional module;
- d) B. Ed College records

Implementation of the Blended learning strategy

The following two topics of Environment Studies were selected for instructional intervention:

Sustainable developments and mitigation methods

Sustainable development

*Meaning

*Need

*Guiding principles

Sustainable Environmental Management

* Rainwater harvesting: M, P, S

*Solid waste management: M, P, S

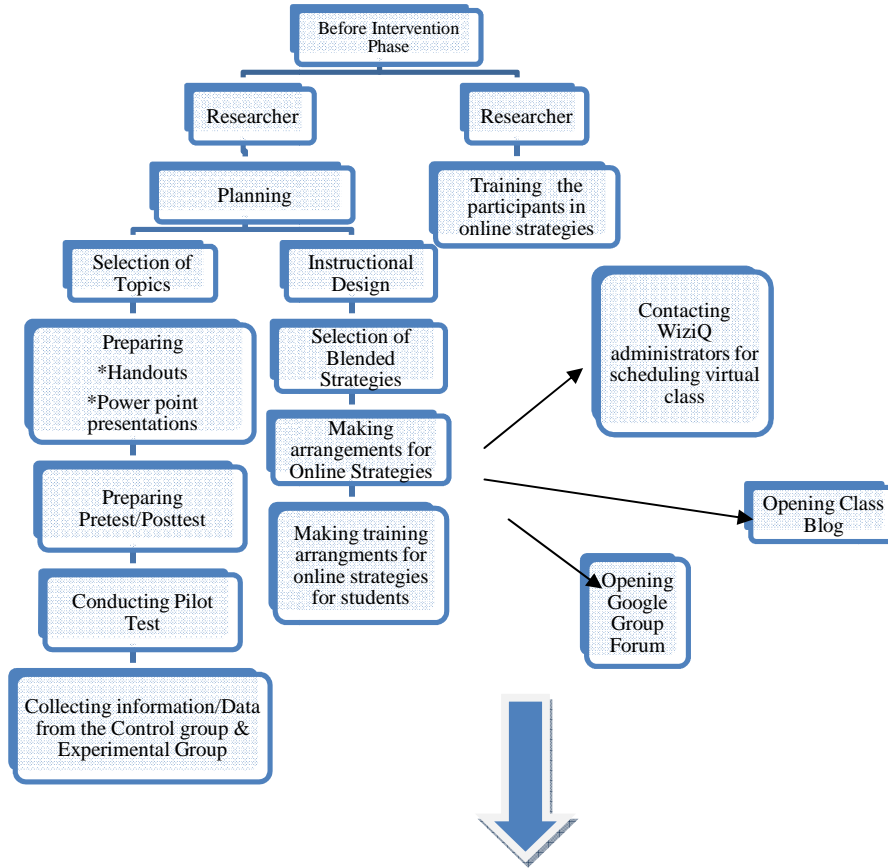
* Mangroves management: M, P, S

* Disaster management: M, P, S

(* M= Meaning, P= Process, S= Significance)

Fig 1: Content Analysis

The researcher evolved a broad framework for blended learning Module for conducting and facilitating the study smoothly.



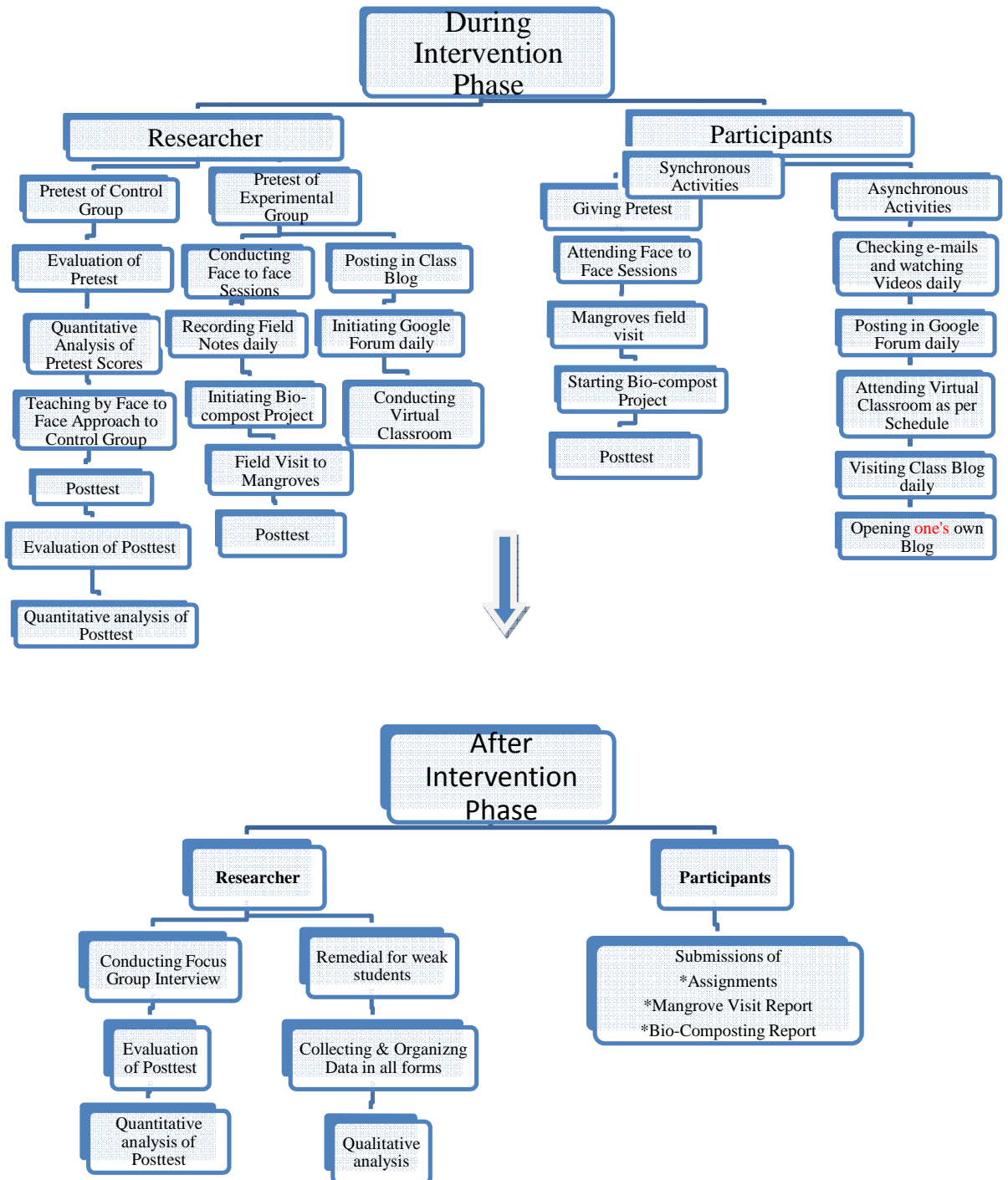
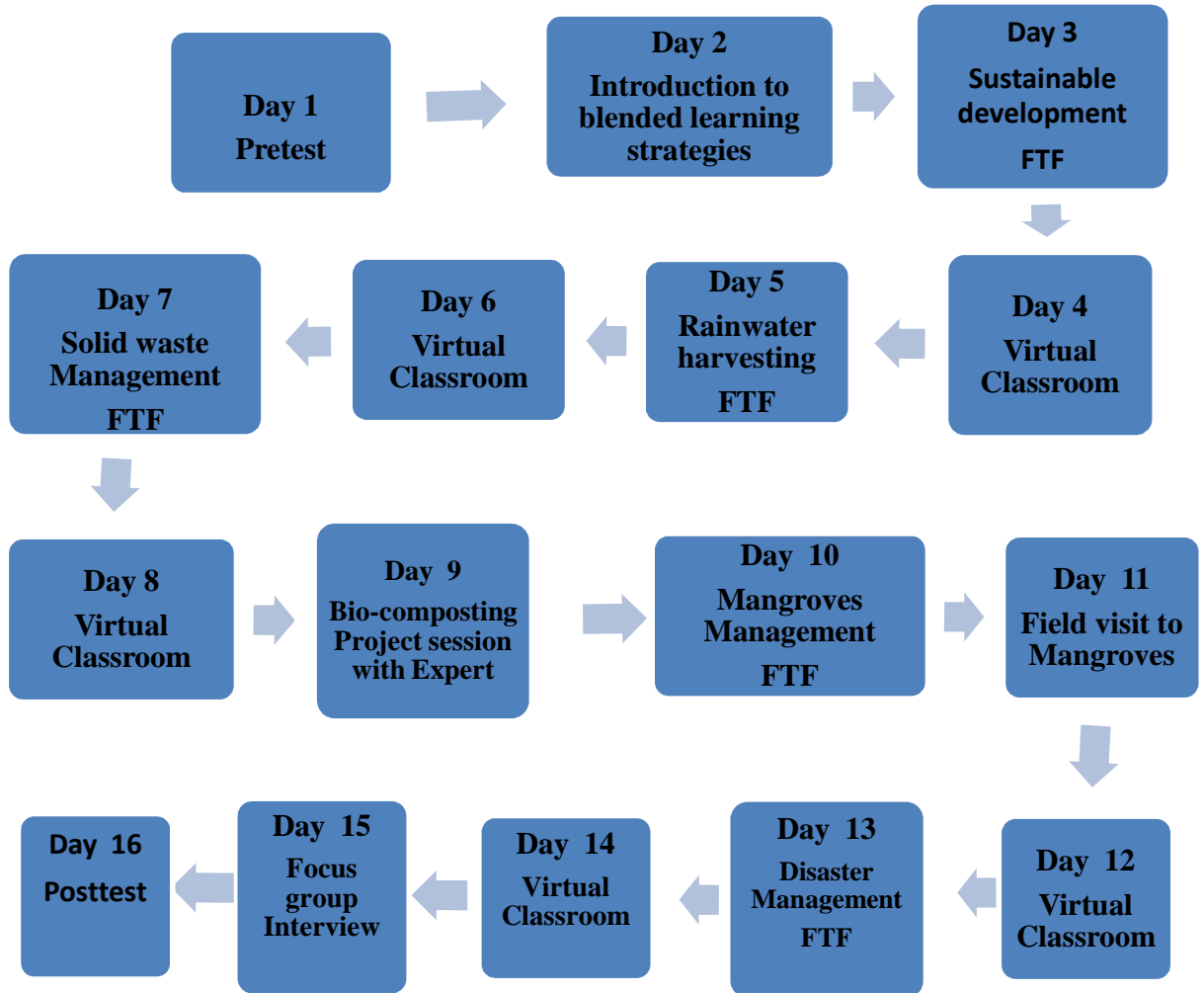


Fig 2: A broad framework for Blended learning Module

Data Collection: The experimental group received the instructional intervention using blended learning strategies whereas the control group received instruction by traditional method as follows:



[*** The participants watched 2 videos (links emailed by the researcher and also communicated in the class) at home and came prepared for their Face to Face (FTF) interactive sessions]]

Fig 3: Overview of the Instructional Intervention for the Experimental group

The control group was taught the two topics by traditional face to face method as follows:

Table 1: Traditional Method for the Control group

Day1	Pretest
Day 2	PPT presentation on theTopic: Sustainable development
Day 3	PPT presentation on theTopic: Sustainable development

Day 4	PPT presentation on theTopic: Rainwater harvesting
Day 5	PPT presentation on theTopic: Rainwater harvesting
Day 6	PPT presentation on theTopic: Solid waste Management
Day 7	PPT presentation on theTopic: Solid waste Management
Day 8	PPT presentation on theTopic: Mangroves Management
Day 9	PPT presentation on theTopic: Mangroves Management
Day 10	PPT presentation on theTopic: Disaster Management
Day 11	PPT presentation on theTopic: Disaster Management
Day 12	Revision Lecture
Day 13	Posttest

Results: The following graph shows the gain scores of both the experimental and control groups.

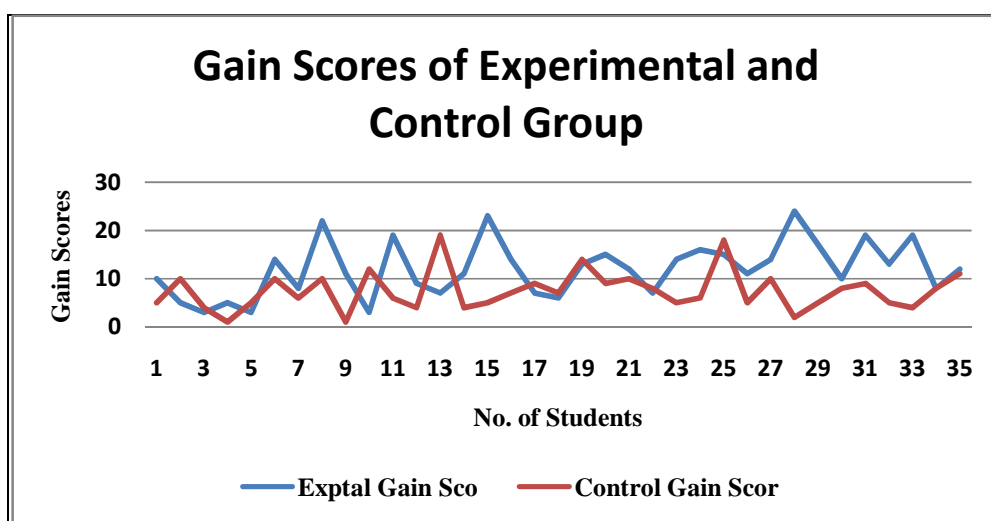


Fig1: Gain Scores of Experimental and Control group on a test of the two topics of Environmental Studies

In the graph, we can observe a marked difference in the Gain Scores of both the groups.

Inferential analysis resulting in the verification of hypotheses is presented below:

Verification of the Hypothesis H₀1

The hypothesis **H₀₁** reads: **There is no significant difference in the Gain Scores of the experimental and control groups on a test of the two topics of Environmental Studies.**

The following table shows the results of the t test.

Table 2
Significance of the Difference in the Gain Score Means of FTFA and BLA of the Participants

Groups	N	df	Mean	SD	Table Value		t value	LOS*	100 ω^2
					.05 level	.01 level			
FTFA	35	68	7.49	4.09	2.00	2.65	3.79	S** (0.01 level)	0.15%
BLA	35		11.97	5.67					

df: degrees of freedom; *LOS=Level of Significance;** S=Significant;

Interpretation of ‘t’: The obtained value of ‘t’ of the Gain Scores of the B. Ed students is **3.79**, which is more than the table value 2.00 at 0.05 level of significance and the table value 2.65 at 0.01 level of significance. Thus ‘t’ is significant at 0.01 level. Further, ω^2 estimate indicates that 0.15% variance of the Gain Scores of the participants of both the groups (FTFA and BLA). The null hypothesis is therefore **rejected at 0.01 level.**

Conclusion:

There is a significant difference in the Gain Scores of the experimental and control groups on a test of the two topics of Environmental studies of the participants at 0.01 level.

Discussion:

This implies that the BLA to curriculum transaction interspersed with activities was more favourable for student learning than FTFA. The blended learning strategies addressed instructional pluralism, which was the main aim of the researcher. All the participants performed tasks according to their preferred learning styles (in agreement with the findings of Krishnan, D (2016), according to their tastes and senses in different activities, like games, role play, poster making, debate, etc. (in agreement with the findings of Wu, T; Tai, Y, 2016), according to their interests in technology (in agreement with the findings of Nair, T(2016), according to their various levels of achievement, etc. Moreover, group work helped them to interact with each other. This promoted an inclusive learning environment. The findings agree with that of Khan. S; Jumani,B (2012) where learning through technology proved effective in their achievement. FTFA was more of a traditional approach, with not much of interaction with the peers. Moreover, the variance (0.15%) between the two approaches itself justifies the Hypothesis, that the achievement level of the participants in the experimental group has definitely increased.

The experiential learning and constant interaction with the teacher and the peers has definitely helped to enhance the achievement scores of the participants in the experimental group.

Verification of the Hypothesis H₀₂

In pursuit of Objective 2, the researcher formulated the following null hypothesis:

The hypothesis H_02 reads: **There is no significant difference in the Gain Scores of the experimental and control groups on the basis of their levels of achievement.**

The statistical technique to test this hypothesis used is ANOVA. The Table 3 shows the relevant statistics.

TABLE 3
Inferential Statistics (ANOVA) of Gain Scores of the Participants of Both Groups on the Basis of their Levels of Achievement

Groups	Sources of Variance	df	Sum of squares	Mean Square	F- ratio	LOS*
BLA	Among Means	2	225.93	112.97	4.38	S** at 0.05 level
	Within Groups	32	825.95	25.81		
	Total	34	1051.88			
FTFA	Among Means	2	116.04	58.02	4.21	S** at 0.05 level
	Within Groups	32	440.65	13.77		
	Total	34	556.69			

df: degrees of freedom; *LOS=Level of Significance;** S=Significant; Table value at 0.05 level:3.32; 0.01 level: 5.39;BLA= Blended Learning Approach; FTFA= Face To Face Approach

Interpretation:

BLA: F Ratio of Gain Scores of the participants is 4.38, which is greater than the table value 3.32 at 0.05 level of significance. Thus F is significant at 0.05 level. Hence the null hypothesis is rejected at 0.05 level.

FTFA: F Ratio of Gain Scores of the participants is 4.21, which is more than the table value 3.32 at 0.05 level of significance. Thus F is significant at 0.05 level. Hence the null hypothesis is rejected at 0.05 level.

To ascertain the significance of difference between the means of the Gain Scores of the participants at different levels of academic achievement, t test was done. Table 4 shows the t test results.

Table 4:
Significance of the difference between the Gain Score means of the Participants of the FTFA and BLA Groups on the basis of their Levels of Achievement

Groups	Group (LAA)	N	Mean	SD	df	Table value		t value	LOS
						0.05 level	0.01 level		
BLA	Av	13	15.07	1.61	15	2.13	2.95	0.73	NS**

	AA	4	12.25	2.75					
FTFA	Av	10	6.90	0.73	13	2.16	3.01	1.07	NS**
	AA	5	12.20	1.90					
BLA	Av	13	15.07	1.61	29	2.04	2.76	2.98	S** (0.01)
	BA	18	9.61	1.04					
FTFA	Av	10	6.90	0.73	28	2.05	2.76	0.11	NS**
	BA	20	7.05	0.922					
BLA	AA	4	12.25	2.75	20	2.09	2.84	1.27	NS**
	BA	18	9.61	1.04					
FTFA	AA	5	12.20	1.90	23	2.07	2.81	2.50	S** (0.05)
	BA	20	7.05	0.922					

df: degrees of freedom; *LOS=level of significance; NS**=not significant; S*=Significant;
BLA= Blended Learning Approach; FTFA= Face To Face Approach

Conclusion: There is a significant difference in the Gain Scores of the experimental and control groups on the basis of their Levels of Achievement at 0.05 level of significance.

Discussion:

BLA: There is no significant difference between the means of Gain Scores of AV and AA and AA and BA students. The Mean of the Gain Scores of BLA indicate that the achievement of the participants is (9.61) among BA students, (15.07) among AV students and (12.25) among AA students. This indicates that the AV students have benefitted more than the BA and AA students.

FTFA: There is no significant difference between the means of Gain Scores of the AV and BA students and AV and AA students. The mean of the Gain scores of BLA indicate that the achievement of the participants is (7.05) among BA students, (6.90) among AV students and (12.20) among above average students. This indicates that BA students do well in FTFA compared to AV students. While the AA students are fine with both the BLA and FTFA and have scored consistent. i.e. 12.25 and 12.20 respectively.

This shows that the study has been beneficial as the instructional pluralism has been addressed in the positive direction. In the BLA, the Average students have gained better scores than the BA and even the AA students for that matter. This has been one of the main aims of the study

as the Title rightly suggests. This is in affirmation with the study conducted by Nair, Tara(2016) which promoted social attitudes and enhanced achievement in Biology; Radhika,M(2015) found BLA effective as it allowed students to acquire knowledge and skills more easily; Sasidharakurup, H et al(2015) found that BLA environment augmented academic achievement; Shinde, S.P, Deshmukh, V.P (2012)found that students performed better on an average; Krishnan, D (2016) found that BLA addressed the higher order thinking and learning amongst the students and it benefitted the different learning styles also.

Verification of the Hypothesis H₀₃

The hypothesis H₀₃ reads: **There is no significant difference in the Gain Scores of the experimental and control groups on the basis of their Subjects of Specialization.**

The statistical technique to test this hypothesis used was ANOVA. The Table 5 shows the relevant statistics.

Table 5
Inferential Statistics (ANOVA) of Gain Scores of the Participants of Both Groups on the Basis of their Subjects of Specialization

Groups	Sources of Variance	df	Sum of squares	Mean Square	F- ratio	LOS*
BLA	Among Means	2	16.4	8.19	0.25	NS**
	Within Groups	32	1058	33.06		
	Total	34	1074.4			
FTFA	Among Means	2	24.46	12.23	0.67	NS**
	Within Groups	32	580.69	18.15		
	Total	34	605.14			

*LOS=Level of Significance;** NS=Not Significant; Table value of F at 0.05 level: 3.32, at 0.01 level: 5.39,
BLA=Blended Learning Approach; FTFA=Face To Face Approach

Interpretation

BLA: F Ratio of Gain Scores of the participants is 0.25, which is less than both the table values 3.32 at 0.05 level and 5.39 at 0.01 level of significance. Thus F is not significant. Hence the null hypothesis is accepted.

FTFA: F Ratio of posttest scores of the participants is 0.67, which is less than both the table values 3.32 at 0.05 level and 5.39 at 0.01 level of significance. Thus F is not significant.

Therefore, the null hypothesis **H₀₃ is accepted.**

Conclusion: There is no significant difference in the Gain Scores of the experimental and control groups on the basis of their Subjects of Specialization.

Discussion: This study revealed that irrespective of the subjects of specialization, whether it is Commerce, Arts or Science, the mean of the Gain Scores of the students was more in BLA compared to FTFA. This indicates that BLA indeed brings gains in the achievement of the student no matter whatever be their subject of specialization. The results match with the study

by Kar, S(2015) who found that the use of a Blended Learning module in teaching of Science at the B.Ed level to the Science students improved their achievement scores; Wong,L; Fong,M (2014) who found that there was no significant difference between Face to Face Approach and Online learning in an introductory Accounting unit provided to students and also in the study conducted by Ekmekci, A; Gulacar,O (2015) involving college students majoring in Science, Technology, Engineering and Mathematics (STEM) areas and pursuing secondary teaching certification in their major areas in a public university in central Texas where both the synchronous and asynchronous teaching strategy did not differ in terms of learning gains and the results showed that both the approaches significantly improved pre-service mathematics and science teachers' learning of electric circuits.

Conclusion

Blended learning definitely is effective than the Face to face traditional method of teaching. Students, especially at the College level usually need to be brought into the classroom and need to be motivated. This is possible only by teaching through innovative strategies, using technology which the new generation embraces with open arms. Technology has made teaching and learning very easy for both the teachers and the students respectively. Also, in the face to face sessions, a lot of activities and making them responsible for their learning through various tasks can bring about an improvement in their achievement scores. It is high time that we start using blended learning strategies for teaching other subjects also.

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