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INFLUENCE OF BLENDED LEARNING PROGRAMME ON ACADEMIC ACHIEVEMENT OF STUDENT TEACHERS

MARIA JOSEPHINE AROKIA MARIE S[1]
[1]Assistant Professor, Faculty of Education, Indira Gandhi National Tribal University, Amarkantak (MP). INDIA

ABSTRACT

This study is aimed at studying the influence of using a Blended Learning Programme on academic achievement of student teachers of Puducherry. An achievement test was constructed with hundred items in the subject, teaching of Physical Science. The population of the study is the student teachers of teacher education colleges in Puducherry affiliated to Pondicherry University. 53 student teachers of physical science group from Pope John Paul II College of Education and Venkateswara College of Education (2014 – 2015) in Puducherry state form the sample size for this study. A teacher made achievement test of the course subject teaching of physical science is the tool used in the study. The tool was constructed by the investigator with the help and guidance of the research supervisor and it was validated using item analysis. The innovative teaching method namely Blended Learning Program was used in teaching the experimental groupwhich comprise 29 students from Pope John Paul II College of Education, while the conventional method was used with the Control group which consists of 24 student teachers in Venkateswara College of Education. The experiment started on 22 January 2015 and completed on 1April 2015. The findings of the study shows that there is a significant difference in the achievement scores of experimental and control group in teaching of physical science.This shows that the Blended Learning Programme is an innovative teaching method with the effective integration of technology for teaching of physical science.

KEY WORDS : ***Blended Learning Programme, Academic achievement, Student teachers, Active engagement, Teaching of Physical Science.***

INTRODUCTION

The success of the teacher education programme depends on the training provided to the student teachers according to the changing demands of the learners. Sothe teacher education programme should be competent enough to empower the learner by integrating new technologies in the classroom to meet the demands of the learners. The quality of teacher education programme depends on the quality of the teachers. So teachers are forced to adopt new method of teaching and learning process to improve quality. For quality improvement there is a need to apply powerful pedagogical strategies. The powerful pedagogical strategies include the integration of technology in teaching and learning process. Now a days students are called as "digital natives" because they think and process information differently, they learn differently (Prensky, 2001). According to them learning is exploring, expressing and exchanging their viewsand concepts through social networks. Therefore this new kind of students require alternative educational routes. So there is a need of paradigm shift from teacher centered approach to learner centered approach. This teaching and learning paradigm should be organized in such a manner that learner should construct knowledge of their own experiences. Learning through own experience increases their interest, curiosity and joy of learning through which they attain complete development.

The innovative teaching method namely Blended Learning Programme is used to fulfill the objectives of teaching physical science. In Blended Learning Programme the teacher integrates different teaching activities namely small group discussion, interaction, brainstorming method, debate with new emerging social networks. Therefore Blended Learning method afford opportunities for the student teachers to familiarize themselves with the technology rich learning environment in integration with other conventional methods. So Blending different methods of teaching would provide various benefits over a single method. The use of Blended Learning Programme in the teacher education may enhance student achievement and success rates.

1:Corresponding Author

REVIEW

Dhanya Krishnan (2011) studied the effect of Blended learning strategy on higher order thinking and learning science among secondary school students. The study findings revealed that the Blended learning strategy had a positive effect on critical thinking, problem solving, science process skills and science achievement of students. Blended learning strategy was considered as one of the innovative pedagogical approach for integrating ICT in science education at school level.

Yen and Lee (2011) tried to explore problem solving patterns and their impact on learning achievements in a Blended Learning environment. Through quasi experimental design, data'swas collected from 34 students in a Blended Learning environment using classroom instruction which includes mobile teaching and web scenarios. By combining cluster analysis and content analysis, three groups were identified with distinct characteristics: the hybrid- oriented group, the technology-oriented group, and the efficiency-oriented group. Learners in the hybrid-oriented group used the classroom, mobile teaching and web scenario almost equally. They displayed a regular manner in following the instructor's teaching procedure, and tended to passively accept whatever the teacher said. Students in the technology- oriented group spent most of their time using mobile and web technologies but they revealed only superficial problem solving abilities. The efficiency-oriented group was characterized by the efficient monitoring of learning processes. It was more task-oriented and problem solving performance was better in technology group than the other two groups.

Hong and Miao (2009) aimed at investigating how Blended Learning programme has influenced sixth grade students with different ability levels in an elementary school in Taiwan in terms of their achievements in environmental education. The outcomes of the experiment are: 1) no conspicuous interaction between teaching approaches and learning capacity is found in the posttest on environmental education.; 2) Students who accept Blended Learning programhave better achievements than the other group; 3) Students with higher learning capacity have higher achievements than the lower ones; 4) with different teaching approaches, students with lower learning capabilities show a remarkable difference in the posttest on environmental education.

Hana Berger. Bat-ShevaEylon. Esther Bagno (2008) studied on Professional development of Physics teachers in an evidence based Blended learning program. This study examined continuity of learning between face-to-face and online environments in a Blended professional development program was designed for 16 Physics teachers. The program had nine face-to-face meetings as well as continuous online exchange between them through a website. The program focused on 'knowledge integration' innovative activities in Physics classes using an evidence-based approach. The teachers implemented the activities, collected and analyzed data about their practice and their students learning, and reflected on the evidence with their peers. Five reflective tools were used to promote continuity; your comments, Hot polls, Smashing Sentences, Hot reports and mini research. Continuity was assessed with regard to the ideas discussed by the teacher and the reasoning patterns that they employed. Analysis of the online exchanges in relation to teachers' face-to-face discourse revealed that the teachers discussed the same ideas employed the same reasoning patterns and extended ideas in re-visitation. The online and face-to-face environment played different and complementary roles in the teachers learning. This study shows that appropriate use of an online environment in a Blended program and it lead to a continuous course of learning and transform meeting once in a 9 month as 9-month workshop.

Eddie Gulc (2006) published paper on using Blended learning to accommodate different learning styles, this paper reveals that the concept of Blended learning has been with us for some time and really builds on the good practice of blending teaching and learning styles for the benefit of the learner. Tutors who adopt a variety of teaching styles are more likely to offer their learners a more rewarding and successful educational experience. This was true when e-learning and online learning are added to the mix, as it would be for integration of practical work and industrial visits. The potential of new technologies can be maximized when you see how best to blend e-learning with existing programme to the benefit of learners.

BLENDED LEARNING PPROGRAMME

Blended Learning Programme is defined and implemented in multiple ways. It is defined as a hybrid of classroom and online learning without the complete loss of face-to-face contact. Blended Learning Programme is a flexible learning strategy that integrates innovative and technological advances of online learning with interaction and participation of traditional classroom learning. It combines online delivery of educational content with the best features of classroom interaction and live instruction to personalize learning, allow thoughtful reflection, and differentiate instruction from student-to-student across a

diverse group of learners (NACOL, North American Council for Online Learning).

Blended Learning Programme is termed as not just about using technology because it is available; it is about finding better ways of supporting students in achieving the learning objectives and providing them with the best possible learning and teaching experiences, as well as supporting teachers in their role (Bonk and Graham, 2006). Through this programme a rich mixture of learning opportunities provided through active engagement of students.

As both the face-to-face instruction and online learning suffer from limitations, it is natural to combine the strengths of the two modes into Blended Learning. Combining face-to-face and fully online components optimizes both environments in ways impossible in other formats (Dziuban& Hartman, 2004). Blended Learning Programme gives learners and teachers an environment to learn and teach more effectively. Learners can select the best activities to suit their own pace, learning style and level, as well as time and place. Learners can be more independent and self-reliant in their own learning.

NEED OF BLENDED LEARNING PROGRAMME

At present educational classrooms are no longer limited by four wall. The use of technology and social network tools continues to grow. Blended Learning Programme increases the options for greater quality and quantity of human interaction in a learning environment. It integrates both conventional method of teaching and technologies which supports social interactions. A community of learners can interact at anytime and anywhere because of the benefits that computer-mediated educational tools provide. So it is shifted from teacher centered method to student centered method which provides an integration of technologies and interactions, resulting in a socially supported, constructive, learning experience; this is especially significant in Blended Learning. This goal of teacher education could be attained when students think critically, reflect and analyze their own learning process. This in turn ensure maximum learning process.

To enhance teaching and learning process the teacher should provide environments and tools that encourage everyone to become fruitful and accountable learners. Various Researches revealed that computer technology can support learning and is especially useful in developing their achievements.Therefore it is important to implement new method of teaching in teacher education programme and train the budding teachers to use educational tools which are effective. And research reviews reveal that there is a lack of studies in Blended Learning Programme at teacher education level. So it intended to design and implement a Blended Learning Programme and find its effectiveness among student teachers

ELEMENTS AND DESIGN OF BLENDED LEARNING

Blended learning designs differ according to the elements that are blended such as orientation of programme, lesson plan, analyzing educational resources, determining educational objectives, assigning platform for teaching learning process, designing teaching learning process and tools.

STATEMENT OF THE PROBLEM

The present study is aimed at preparing Blended Learning Programme for teaching of physical science paper to enhance the academic achievement of student teachers in physical science group towards Blended Learning Programme. The study is thus entitled as "**INFLUENCE OF BLENDED LEARNING PROGRAMME ON ACADEMIC ACHIEVEMENT OF STUDENT TEACHERS"**

VARIABLES OF THE STUDY

The variables of the study are

1. The independent variable represented is the Blended Learning Program.

2. The dependent variable represented is Academic Achievement in Teaching of Physical Science for Student Teachers.

Objectives of the present study are as follows:

1. To construct and administer an achievement test on teaching of physical science for student teachers of experimental and control group.

2. To design and develop a Blended Learning Programme for teaching of physical science among student teachers of experimental group.

3. To study the effectiveness of Blended Learning Programme of teaching on achievement in teaching of physical science.

HYPOTHESES

1. There will be a significant mean difference between the pretest and posttest scores of the experimental group in their achievement in teaching of physical science.

2. There will be a significant mean difference between the pretest and posttest scores of the control group in their achievement in teaching of physical science.

3. There will be a significant mean difference between the pretest and posttest scores of experimental and control group in their achievement in teaching of physical science.

DELIMITATIONS

1. The study is confined to the student teachers i.e. B.Ed. level in Pondicherry.

2. The study is conducted in only two colleges of Pondicherry Pope John Paul college of Education (Experimental group) Venkateswara College of Education (Control Group)

3. The Units from Teaching of Physical Science course alone is taken for the present study. The Unit was divided into three Sub-units and the teacher taught these three Sub-units during the Experimentation.

4. The Pre-test and the Post-test Achievement Question paper remains the same in order to control the extraneous variable in the experimentation.

5. Online learning activities included sharing information through message board, email, uploading materials, mobile teaching, video conferencing and online submission of assignment. And activities like synchronous online tutoring was excluded.

METHODOLOGY

This study aimed at investigating the effectiveness of using a Blended Learning program on Academic achievement of student teacher of Puducherry.

RESEARCH DESIGN

The researcher adopted the quasi experimental approach. Two groups were assigned as the participants of the study, the experimental group and the control group are taken as intact group. A quasi experimental design is an approximation of a true experiment that uses groups that have not been formed randomly (Wierma&Jurs, 2009). In this research, the investigator selected intact groups rather than randomly assigning participants to the experimental or control groups, since assigning participants randomly to the groups disturbs the routine of the class schedule. The research includes two variable, the first variable is Blended Learning programme, the second variable is Achievement test in teaching of physical science. The Experimental group was taught teaching of physical science paper using Blended learning program, while the control group was taught through conventional method. The experiment lasted for eight weeks. Both groups were taught by the same teacher. The design is symbolically outlined in the following table.

Experimental Group	Control group
Pretests	Pretests
Blended Learning strategy	Conventional teaching
Posttest	Posttests

Table 1 : Design of the study

POPULATION AND SAMPLE

Population of the study is the student teachers of teacher education colleges in Puducherry affiliated to Pondicherry University. 53 student teachers of physical science group from Pope John Paul II College of education and Venkateswara College of education in Puducherry state form the sample size for this study.

SELECTION OF THE SAMPLE AND SAMPLING DESIGN

The total population is distributed in teacher education colleges in Puducherry, from these colleges, only two teacher education colleges were selected for the study due to the availability of technology resources and maximum number of students in physical science group. Therefore purposive sampling technique was employed in selecting the colleges of teacher education. Two colleges of teacher education affiliated to Pondicherry University were selected from Puducherry for the study. The two colleges are Pope John Paul II College of education with the provision of technology rich environment to use 'www.edmodo.com' as learning management system as experimental group and Venkateswara College of education as control group where 'www.edmodo.com' as learning management system was not used.

The intact group of 29 student teachers from Pope John Paul II College of education was regarded as the experimental group. The intact group of 24 student teachers from Venkateswara College of education was selected as the control group. The experimental and control group were equated on the following aspects.

- Both the colleges are located in Puducherry.
- Both the colleges are affiliated to Pondicherry University.
- Both the colleges are co-educational institutions.
- In both the colleges medium of instruction is English.
- Both the groups are drawn from teaching of physical science methodology groups.

Tests	Average Marks	SD	Mean of Difference (d= $\bar{x}$post-$\bar{x}$pre)	SD of (d)	C.I. difference (d)	t-value	p- value
Pretest Posttest	37.3793 62.0689	9.7153 10.6969	24.6897	7.7878	(8.7370 , 40.6423)	-17.0725	2.46E-16*

- Both the colleges have similar infrastructure facilities except the experimental group has the online learning platform.
- The admission procedures followed in both the colleges are same.

TOOLS USED FOR DATA COLLECTION

➢ Teacher made achievement test in teaching of physical science constructed and validated by the investigator with the help and guidance of research supervisor.

EDMODO AS A TEACHING AND LEARNING PLATFORM (an open access learning management system) was used as the teaching Learning platform for the implementation of Blended Learning programme. It is a free and safe platform for teachers and students to connect and work together. This platform enables teacher to conveniently blend different learning activities using constructivist practices. EDMODO is a secure social networking platform used for learning due to secret group code. Teacher and students can continue their discussions, respond to the posts frequently, aware of assignments and events, create online quizzes and receive award badges for their performance and progress. The EDMODO home page is interactive, teacher and students can leave comments, ask questions, and find out information upload and download photos and videos related to the content.

ANALYSIS AND INTERPRETATION OF DATA

The study was mainly aimed at finding out the Influence of Blended Learning Programme on academic achievement. Both descriptive and inferential techniques were used in the data analysis. Descriptive statistics such as mean and standard deviation were used. Inferential statistics technique includes parametric test namely t- test. Statistical Package for Social Sciences (SPSS 19.0) is used for the quantitative analysis of data.

To accomplish the purpose of the study, the hypotheses were tested.

H01: There is no significant mean difference between the pretest and posttest scores of the experimental group in their achievement in teaching of physical science.

H11: There will be a significant mean difference between the pretest and posttest scores of the experimental group in their achievement in teaching of physical science

*Significant at 5% level

Table 2. Paired sample t-test for experimental group of students'

Source: Calculated by authors

Paired sample t-test for experimental group shows that there is a significant difference between the mean scores of pretest and posttest scores of experimental group at 0.01 level. Therefore the null hypothesis is rejected. Therefore it is concluded that there is a significant difference in the average marks of the student in the experimental group. The average mark of students in the posttest is (62.0689), whereas in pre-test was (37.3793) (t = 17.0725, p=0.01 < 0.05). This result indicates that using Blended-learning program is more effective in teaching of physical science. This is shown through radar diagram in figure 2.

H02: There is no significant mean difference between the pretest and posttest scores of the control group in their achievement in teaching of physical science.

Tests	Average marks	SD	Mean of Difference (d= $\bar{x}$post-$\bar{x}$pre)	SD of (d)	C.I. difference (d)	t-value	p- value
Pretest Posttest	38.2083 52.375	7.9618 7.7505	14.1667	9.8628	(-6.2362, 34.5695)	-7.0368	3.6E-07*

H22: There will be a significant mean difference between the pretest and posttest scores of the control group in their achievement in teaching of physical science.

*Significant at 5% level

Table 3. Paired sample t-test for control group of students'. Source: Calculated by authors

Paired sample t-test for control group shows that there is significant difference between the mean scores of pretest and posttest scores of control group at 0.01 level. Therefore the null hypothesis is rejected. The average marks of the posttest in the control group students is (52.375), whereas in pretest is (38.2083) (t = 7.0368 p=0.01< 0.05). This result indicates that in control group students show moderate difference using Conventional method in teaching of physical science.

H03: There is no significant mean difference between the pretest and posttest scores of experimental and control group in their achievement in teaching of physical science.

H33: There will be a significant mean difference between the pretest and posttest scores of experimental and control group in their achievement in teaching of physical science.

Tests	Groups	Average marks	SD	t-values	p- values
PreTest	Control	38.2083	7.9617	0.3350	0.738976**
	Experimental	37.3793	9.7153		
Post Test	Control	52.375	7.7505	-3.7047	0.000521*
	Experimental	62.0689	10.6969		

*Significant at 5% level; **Not Significant at 5% level

Table 4Independent sample t-test for scores of students in control and experimental group in the tests. Source: Calculated by authors

There is no significant difference in the mean scores of Experimental and Control group at 0.05 level in the pretest (t=0.3350, p=0.7389 > 0.05). Therefore the null hypothesis is accepted. Hence, it is concluded that the average marks of students in the control and experimental group in pretest does not have any significant difference.

There is significant difference between the mean scores of Experimental and Control group at 0.05 level in the posttest (t=3.7047, p=0.0005 < 0.05). Therefore the null hypothesis is rejected. Hence, it is concluded that the average marks of students in the control and experimental group in posttest are differing significantly. The average marks in the posttest and pretest of experimental group students are (62.0689, 37.3793) respectively, whereas in the control group students is (52.375, 38.2083). This result indicates that using Blended learning program has more influence than the Conventional method in teaching of physical science.

Effect size analysis was carried out to find the effectiveness of Blended Learning Programme over the conventional teaching method. Cohen's d for effect size for the control group and experimental group to the mean scores for pretest is Cohen's d=0.0942, r=0.045 and for posttest is Cohen's d=1.0422, r= 0.46. Hence it is concluded that the large effect size is due the implementation of Blended Learning Programme to the experimental group.

MAJOR FINDINGS

The following are the findings of the study:

1. There is a significant difference in the achievement scores of experimental and control group in teaching of physical science (t=3.704, p=0.005<0.05). The mean value shows that students in experimental group performed better than control group. This result shows that Blended Learning programme is effective in improving the achievement scores of students in teaching of physical science.

2. There is a significant difference in the pretest and posttest achievement scores of experimental group in teaching of physical science (t=17.0725, p=2.46E-16* <0.05). The mean value shows that students in experiment group performed better in posttest than pre-test. This result shows that Blended Learning Programme improved their achievement scores in posttest.

DISCUSSION

The study was aimed at finding the effectiveness of Blended Learning Program on academic achievement in teaching of physical science. It is shown that the innovative techniques used in the classroom have enhanced their teaching and learning ability. The results indicate that the experimental group which was exposed to Blended Learning Program showed significant improvement in their academic achievement compared to the control group which was taught through conventional method (t = -3.7047 and p= 0.01<0.05). The result shows that there is a significant difference in the achievement scores of

experimental and control group in teaching of physical science. The result of the study is in line with the result obtained by Moodley, (2004) who studied the effects of computer based dynamic visualization simulation on student learning in high school science and found that students understanding and performance were better in classes where teacher uses technology to complement their traditional teaching.The statistical analyses carried out for experimental group revealed that Blended Learning Programme is effective than conventional method of teaching for improving achievement in teaching of physical science. In this method the role of the teacher was shifted from teacher centered method to learner centered method. Integration of suitable technology in the conventional classroom empowered every student teacher as active participants in learning. Therefore the educational institutions should look beyond the traditional boundaries of classroom teaching by integrating all possible pedagogical practices with new technologies to maximize the educational achievement. The technologies used in classrooms by teachers by not effectively integrating them with pedagogical practices may not bring out intended results of teaching.

EDUCATIONAL IMPLICATIONS AND RECOMENDATION

Based on the findings of the study the following educational implications and policy recommendations are suggested for inclusion of Blended learning programme at teacher education level. The study reveals that Blended Learning Programme provide an atmosphere that is better than both face-to-face and online classes in producing higher levels of student participation and fostering intellectual interactions. Training student teachers on strategies, types and implementation of Blended learning program is a pre-requisite for establishing blended learning programme in higher education. Teachers should create motivating classroom environment so that students should utilize the resources inside and outside the classroom. Teachers, student and education system should intend to continue to explore the use of technology-facilitated learning to optimize the teaching and learning potential. Pedagogical, technological and cost issues should be taken care.

SUGGESTION FOR FURTHER STUDIES

The study can be undertaken with increased sample size and with more sophisticated experimental designs. This study can be replicated with other populations including students at school level and college level. This study can be extended to other disciplines since the present study is limited to teaching of physical science in B.Ed., level. The study can be investigated for longer period on other variables to produce better results.

CONCLUSION

The result of this study shows that the Blended Learning Programme can provide support to the acquisition of effectiveness in teacher education programme. The EDMODO platform used in Blended Learning programme provides more information to the student teachers. Teacher can plan the teaching and learning activities based on pedagogical approaches in the EDMODO planner. This includes a constructivist approach to education which emphasize on how learners are facilitated to contribute to their own educational experiences. Information acquired through EDMODO resource cannot fully replace teacher and their relationships in teaching and training process. Teaching is only replaced by learning through active engagement and interaction. First, the teacher provides appropriate help through face-to-face discussion and supervision. Second, the students receive a greater amount of guidance in teacher education. This implies that blended learning programme at any level should promote collaborative work, giving the trainees a sense of how teaching can be performed in interaction with fellow trainees and teachers and the other is acquisition of fundamental teaching skills requires cognitive effort rather than the support of well-designed online resources.

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