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EFFECT OF CONSTRUCTIVIST BLENDED INSTRUCTIONAL PARADIGM ON ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS

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Abstract:

There is a growing consensus that effective use of technology has vast potential in Indian classrooms and it can solve the problems of equitable access, low quality, high cost, and ineffective pedagogy. The purpose of the study was to ascertain the effectiveness of Constructivist Blended Instructional Paradigm (CBIP) on the academic achievement of secondary school students. The 37 B.Ed. student teachers delivered their lessons to secondary school students in 18 secondary schools in North India. Pretest-posttest design and Posttest only research designs were used to see the impact on academic achievement of secondary school student. It was found that there was a significant effect of the Constructivist Blended Instructional Paradigm on the academic achievement of all learners. The experimental groups have shown more improvement in academic achievement as compared to the control group (taught through traditional face-to face approach). But when it comes to individual subjects, a significant effect of CBIP was found in Science, Maths, and Social Science but insignificant effect was found in English and Hindi subjects. The school teachers appreciate the use of technology as, towards the end of experimentation, 100% of the school teachers were supporting constructivist blended learning strategies as these strategies resulted in higher attainments in the learners.

1.0 Introduction:

The emergence of new technologies has influenced the philosophical and psychological assumptions underlying the prevailing system of instruction. With the integration of Information and Communication Technology (ICT) in constructivism, many new Instructional Design Models (ID Models) have been developed which are effective for the specific subject, place, and contexts. In India, the educational transformations are still in the beginning stage and require empirical evidences for their effectiveness. On the other hand, in school education, although, there is considerable progress in aspects like access and reach, still a lot more is desired in terms of true accessibility, universalization, equality, and equity inside the actual classrooms. In the present digital world, the diversity of learners in terms of knowledge, skills, and their needs and

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aspirations are major challenges before student teachers. Such challenges emerge because of a mismatch between the perspective and philosophy of schools and Teacher Education institutions (TEI) about the role of the teachers as taught in TEIs and as required in schools (Chennat, 2014). A paradigm shift is required in teacher preparation to make it sensitive to the emerging demands from the school system. In teacher preparation and school education, the behaviorist, cognitivist and constructivist approaches are dominating the teaching-learning process. Educators around the world favor constructivism as most researchers concluded that constructivist methods are far better than another contemporary method of teaching and learning, and improve the academic attainment of students (Cummings, 2004; Gibson & Gibbs, 2006; Hmelo-Silver et al., 2007; Shachaf, 2008; Thomas & Brown, 2011). The technology has added online and digital dimensions into the collaborative, social environment of the constructivist classroom. This has extended the scope of collaborations to the outside world (Swan, 2005; Mishra and Koehler, 2006; Roblyer and Doering, 2013). This integration of technology in constructivism may be viewed as the rise of digital constructivism or some refer to it as techno-constructivism (Spodark, 2008; Noon, 2012; and Kumar, 2020).

The nations around the world are using emerging technologies, modern methods of learning and teaching to keep pace with the technological advancements and bring satisfactory educational outcomes. This emphasis allowed researchers to develop various integrated and blended models as per their contexts. The education in India is not in isolation as Ministry of Education in its National Education Policy (NEP), 2020 suggests that technology plays an important role in preparing prospective teachers into competent professionals; in teaching, learning & evaluation, and improving access to education. It enables the teachers to break the traditional barriers in meeting the needs of every learner. The Indian contexts are unique and different. The ID Models practiced here are originally not developed in Indian contexts but borrowed from western education systems. So, the need is to see the effectiveness of ID models suiting to the Indian conditions keeping in view the various challenges originating at teacher education and school education. The Constructivist Blended Instructional Paradigm (CBIP) is a harmonious blend of all pedagogical approaches (behaviorist, cognitivist and constructivist), media, methods, and technology in a balanced, pragmatic, and justified manner. Media involves traditional (books, blackboard, charts, models) and online media (live expert lecture/talk, videos, images, web 2. 0 tools), methods imply the use of different learner-centered (brainstorming, role play, demonstration, case study) and group-centered (discussions, projects, debates, Socratic talk, collaborative strategy, group presentation, video analysis) teaching methods and technology involves both synchronized (online videos, online quiz, expert talks through mobile) and non-synchronized (blogs, wikis, e-mails, mobile chats, discussion forum) resources. Media, methods, and technology bring variety, flexibility, and conceptuality dimensions to CBIP (Nagpal & Kumar, 2020). Such models need more experimentation to prove their effectiveness on teaching and achievement among learners. Achievement is a specified level of proficiency in scholastic or academic work. Good (1970) defined achievement as accomplishment or proficiency of performance in a given skill or body of knowledge. It deals with overall performance of students in a year. Basically academic achievement is related with scores obtained in formative and summative examinations. It is connected with marks, knowledge, attainment of skills acquire in school subjects which are assessed by the teacher and higher authorities with the help of examination and tests. Thus, academic achievement means excellence in all academic disciplines, in class as well as extracurricular activities.

2.0 Objective:

The main purpose of the study was to explore the effectiveness of Constructivist Blended Instructional Paradigm (CBIP) on academic achievement of secondary school students. Further the difference between academic performance of students taught with CBIP and traditional face-to-face approach alone was also explored.

3.0 Research methodology:

The mixed method research with explanatory sequential design was used to conduct the research. Quantitative data collection and analysis was done using quasi experimental approach and later focused group interviews were used to collect qualitative data. The sample of 37 B.Ed. student teachers in five subjects (Science, Mathematics, Social Science, Hindi & English) was selected through convenience sampling technique from one of the teacher education institutions. At the school level, 796 secondary school students from 18 schools were selected through convenience sampling techniques as per classes given to B.Ed. student teachers during their teaching internship. 371 learners were in the experimental group and 425 learners formed the control group. The pre-posttest design was used to study the effect of CBIP treatment on the academic achievement of learners of the experimental group (Fig. 1) and the post-test-only research design was used to see the impact of CBIP on the academic performances of the learners. Focus group interviews were also held with learners and school teachers. A significant difference between the means of post-tests of experimental and control groups was calculated in all five subjects (Fig. 2).
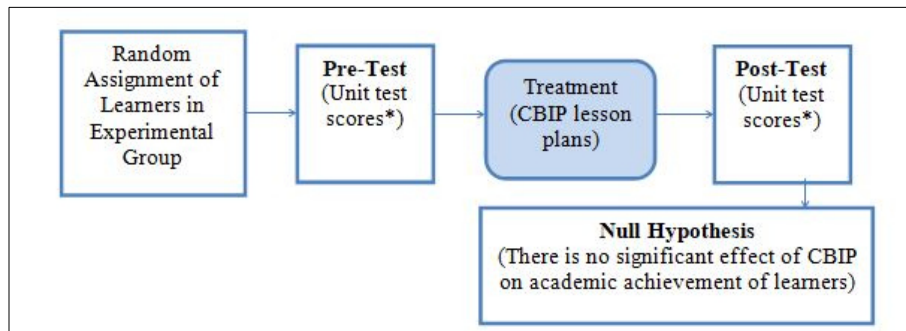

Fig. 1: Pre-Post Research Design (Academic Achievement)
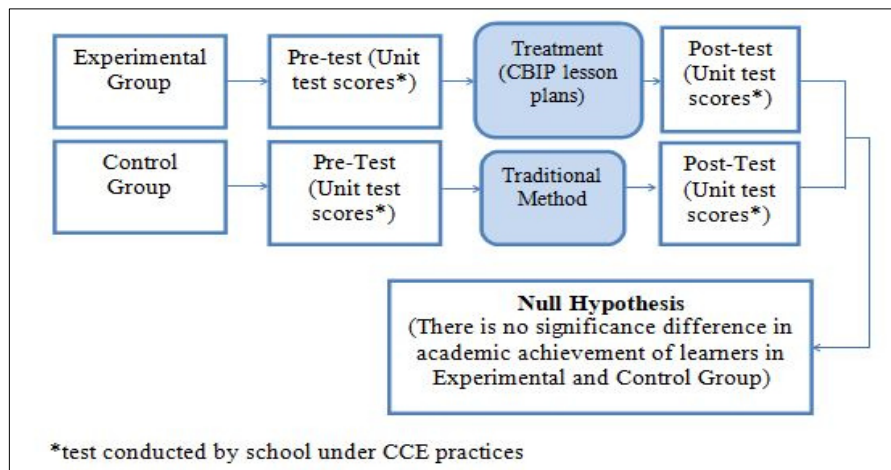(Source: Computed by the author)

Fig. 2: Post-test Only Research Design (Academic Achievement)
(Source: Computed by the author)

4.0 Results and discussions:

As discussed earlier, to make uniformity throughout all the 18 schools & as per usual practices, one section of class was taken by the student teacher to teach through CBIP & the other section by their regular teacher through traditional face-to-face approach. Total 371 learners were in 5 experimental groups pertaining to each subject under study. As part of CCE practices and departmental guidelines regarding syllabus completion in schools, student teachers and school teachers have completed the same units and so same tests prepared by schools were administered on the learners. The test scores; thus, obtained by learners were used to ascertain the effectiveness of CBIP on their academic performance. This data were analyzed and results are presented in table 1 and 2.

Table 1: Difference in Mean of Pre and Post Test Academic Achievement Scores of Learners in Experimental Group

Subject	Treatment	N	Mean	SD	SE$_D$	t' value	p-value
English	Pre-test	22	16.64	3.03	0.60	3.95*	0.00
	Post-test	22	19	3.24			
Hindi	Pre-test	61	20.24	5.01	0.48	3.40*	0.00
	Post-test	61	21.88	4.97			
Maths	Pre-test	79	17.42	3.36	0.37	6.14*	0.00
	Post-test	79	19.67	4.64			
Social Science	Pre-test	109	19.80	5	0.26	7.49*	0.00
	Post-test	109	21.74	4.83			
Science	Pre-test	100	19.50	4.86	0.31	5.73*	0.00
	Post-test	100	21.26	4.58			
Overall	Pre-test	371	19.10	4.69	0.16	11.97*	0.00
	Post-test	371	21.03	4.74			

*significant at 0.01 level of significance

Table 1 shows that there are significant differences in academic achievement of learners between pre and post-tests in all the five school subjects under study. The difference between pre-test (M=19.10; SD=4.69) and post-test (M=21.03; SD=4.74) is significant at t (DF=370) = 11.97, p-value=0.00. So, the overall result was found to be significant. The mean analysis clearly shows that the treatment with CBIP has increased the academic achievement of learners. So, there was a significant effect of constructivist blended instructional paradigm on academic achievement of learners and hence, CBIP is effective.

Table 2: Difference in Mean Academic Achievement Scores of Experimental and Control Group Learners

Subject	Group	N	Mean	SD	SE$_D$	t' value	p-value
English	Control	33	17.24	4.85	1.18	1.49	0.14
	Experimental	22	19	3.24			
Hindi	Control	61	20.56	4.99	0.90	1.46	0.15
	Experimental	61	21.88	4.97			
Maths	Control	88	16.64	4.87	0.74	4.11*	0.00
	Experimental	79	19.67	4.64			
Social Science	Control	135	19.67	4.96	0.63	3.28*	0.01
	Experimental	109	21.74	4.83			
Science	Control	108	19.75	4.85	0.65	2.31**	0.02
	Experimental	100	21.26	4.58			
Overall	Control	425	18.98	5.09	0.62	4.19*	0.00
	Experimental	371	21.57	11.51			

*significant at 0.01 level of significance and **significant at 0.05 level of significance

The post-test only research design was used to compare the mean academic achievement scores of post-tests of both experimental and control group. All five experimental groups were taught through CBIP based instructions by student teachers. The corresponding non-equivalent control groups were taught by the regular school teachers through their regular teaching methods. In both

the groups, experimental & control, same content from the school text books was taught for 50 working days. The independent sample t' test was used to find out the significant differences between means of academic achievement experimental & control groups in all five subjects under study (table 2).

Table 2 depicts significant difference in mean academic achievement scores of control and experiment group learners. There was significant difference between the experimental group (M=21.57; SD=11.51) and control group (M=18.98; SD=5.09) as t (794) = 4.19, p-value= 0.00. The mean analysis shows that the experimental group has shown more improvement in academic achievement as compared to control group. But when it comes to subjects, in English and Hindi subject there exist no significant differences in experimental and control group. Although the means are higher for experimental group in both the subjects, yet the difference is not significant.

So, there is no significant effect of CBIP on academic achievement of learners in English and Hindi subjects. The significant effect of CBIP was found on academic achievement of learners in Maths, Social Science and Science. The overall effect of CBIP is found to be significant.

5.0 Discussions:

A significant effect was observed on academic performance of learners in experimental group. The academic achievement of learners in experimental group was found higher than control groups in all subjects taken together. Similar to these results, Tuckman (2002) has also found significant positive effect of hybrid model (ADAPT) on academic achievement of students; Li and Ma (2010) found that constructivist approach integrating technology has higher impact on the academic achievement of students. Whereas Korkmaz & Karakus (2009) found that the experimental group (blended learning model) showed high attitude towards geography and critical thinking dispositions as compared to control group (traditional learning method); Wang, Ke, Wu, & Hsu (2011) found significant effect of blogs, MS PowerPoint, and Internet as learning tools in 6th grade science classes; and Yapici & Akbayin (2012) found positive effect of blended learning model on high school students' biology achievement. Doering et al., (2014) found significant effect of technology integration through TPACK on the achievement of secondary school students in geography. Fazal, Panzano & Luk (2019) has also found significant impact of blended learning strategies on academic achievement of 3-8 class students in mathematics. The subject wise analysis (table 2) showed that in English and Hindi subjects although the means of academic achievement scores of learner were high as compared to control groups, the observed differences were not significant. Contrary to these results, Rani and Kumar (2014) in their experimental study found significant effect of technology integrated constructivist approach on the academic achievement of students in Hindi subject. The reflective discussions with school students and school teachers revealed that language teaching requires more contextual skills like soft skills, verbal skills etc. in addition to technological skills. Moreover, experience of teaching language also matters a lot. The school students further perceived student teachers as excellent teachers and have improved in many areas with due course of time and practice like informing learning outcomes, encouraging classroom collaborations, technology integration, connecting with experts, peer tutoring, online evaluations, feedback and reinforcement, classroom management and in organizing variety of activities in the classroom. More than 80% of students perceived that they learned new things with technology and their learning got extended from classroom to outside world. The school teachers appreciate the use of technology as 100% of the school teachers were supporting constructivist blended learning strategies as these strategies resulted in the higher attainments in the learners. The school teachers recommended proper training for technology integration for everyone involved in the process of instruction.

6.0 Conclusion:

There is a significant effect of the Constructivist Blended Instructional Paradigm on the academic achievement of all learners. The CBIP based approach is more effective as compared to traditional face-to-face approach. The experimental groups (CBIP) have shown more improvement in academic achievement as compared to the control group (traditional face-to-face approach). But when it comes to individual subjects, a significant effect of CBIP was found in Science, Maths, and Social Science but insignificant effect was found in English and Hindi subjects. The study further recommends experimentations in CBIP to make it suitable for language teaching through due emphasis on contextual skills and proper training for technology integration for everyone involved in the process of instruction.

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